Legal Information Management Using QR Codes

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Abstract: In the information society, e-services designed for citizens with respect to legal information are provided by online platforms available online, that allow quick access based on authentication, to an impressive collection of legislation, case law and legal doctrine. These can be accessed from the office or courtroom, smartphone, tablet or laptop and quickly identify the information needed, at any time or place.
The purpose of this paper is to present a model for the organization of legal information using QR Codes.
It presents the main software for reading and generating QR Codes and a qualitative research regarding obstacles and barriers to rapidly accessing legal information in legal academia.
It presents the results of the research and a database model for preservation, classification and accessing legal information.

1. Introduction

Information and communicating their core is a phenomenon of every human society, so information technology (rapidly and accelerated development) and its overall impact characterizes the society we live in as an information society. Whereupon, it is natural to consider information as one of the basic conditions for economic development (with capital, labor and raw materials). But what makes information have currently a priority role is its likely digital nature. Impact of information technology on social and natural sciences made of this usual notion a complex and controversial concept.

It can be said that information management is the management of processes and systems that create, acquire, organize, store, distribute and use information. The purpose of knowledge management is to help people and organizations to access, process and use information effectively.

Information deemed predominant processes are managed by Information Management: information creation, acquisition, organization, storage, distribution and use.

- Creation of information is the process by which individuals and organizations generate and produce information elements (us).
- The acquisition of information involves indexing and classification information in ways that require subsequent retrieval of information easily.
- The storage of information requires physical location of information in structures such as databases or systems.
- Disseminating information involves dissemination, transmission or dissemination of information.
- The use of information is the process in which individuals and organizations use and apply information that became available to them.
- Effective management of these processes of information helps to achieve the correct information to the right people, in the right form, at the right time and at reasonable cost.

The importance of legislative information systems has greatly increased in recent years, especially since the advent of the Internet, which has dramatically changed the way in which all information is produced and communicated. Currently, the Internet has become the main source of legal knowledge for citizens and is fast becoming the main source of information also for lawyers, and legal sources previously existing are "moving" on the Internet and new sources of legal information are being developed.

Law came into massive mass of information available on the Internet: the law is an important set of information provided on web, distinguished not only by its particular content (the legal one), but also the fact of being connected (it refers to legal documents so often one to another, while there are relatively few links to material non - legal). Therefore, it is possible to say that a legal web is also developing a distinct subset of the broader global web.

The ways in which the legal information is provided have changed enormously legal in recent years in connection with the evolution of information technologies.

2. QR Codes – support for the transmission of information

QR Code is a range of standard-dimensional coding bars. QR is abbreviated from "quick response code". QR Code is registered trademark of Denso Wave Inc. company "(QR Code, 2014).

They are regularly used by mobile smartphones, as QR codes can represent (the Codification) addresses of Internet sites (type URL); for quick access to a desired site, user only needs to scan the QR code using the camera of a cell phone. A software reader interprets the image and decodes the code, and routes the user phone's browser to the URL in question. The simplicity of these connections from the physical world to the electronic world, known as "physical hyperlinks" (in English hardlink), explains their popularity. "

(QR Code, 2014).

A QR code can store a maximum of 7089 numeric characters and 4296 alphanumeric characters. There are two main types of QR code: "Micro QR" and "Design QR".

Micro QR Code is a lesser form of code used to encode shorter information" (QR Code, 2014).

QR standard structure allows organizations to insert in the code not only necessary textual information, but also images, logos or special characters, to make it more attractive and easier to recognize, without loss of information. The result is called Design QR. It was provided in order to be easily recognized by customers. It usually resembles with the design of company's logo. (QR code 2014).

QR code consists of small modules (usually black) arranged in a square on a white background. (Figure 1)

Fig. 1: QR Code
(QR Code , http://www.qrcode.com/en/codes/model12.html)

Nowadays, this type of QR code became more popular outside the industry for its fast readability and large storage capacity compared to traditional information of UPC (Universal Product Code), known as barcode on products that we buy daily. The amount of data that can be stored in the QR code depends on the type, version and the error correcting code.

QR CODE CLASSIFICATION BY TYPOLOGY

QR Code Model 1and Model 2	Micro QR Code	iQR Code	SQRC	LogoQ

Fig. 2: Various types of QR Code
(Types of QR Code, http://www.qrcode.com/en/codes/)

a) QR Code Model 1

Model 1 (Figure 3) represents the original model of the QR code, a code capable of encoding 1167 numerals, with a maximum 14 version (73 x 73 modules).

QR Code Model 1

Fig. 3: Model 1
(Model 1 , http://www.qrcode.com/en/codes/model12.html)

b) QR Code Model 2

Model 2 (Figure 4) QR Code was created by improving model 1, so that the code can be easily read, even if it is distorted in some way. QR codes that are printed on a curved surface or whose images are distorted due to the angle reading, can be read efficiently by reference to an alignment pattern embedded in them. This code can encode up to 7089 numbers and the full version is 40 (177 x 177 modules).

QR Code Model 2

Fig. 4: Model 2
(Model 2 , http://www.qrcode.com/en/codes/model12.html)

c) Micro QR Code

An important feature of Micro QR Code is that it has a position detection pattern, compared with the QR code regularity requiring a given area, because the detection patterns are in the three corners of the symbol. Moreover, QR Code requires at least four modules wide margin around a symbol, while the two ends of the module are sufficient for Micro QR Code. This configuration Micro QR Code allows printing in areas even smaller than QR Code (Figure 5).
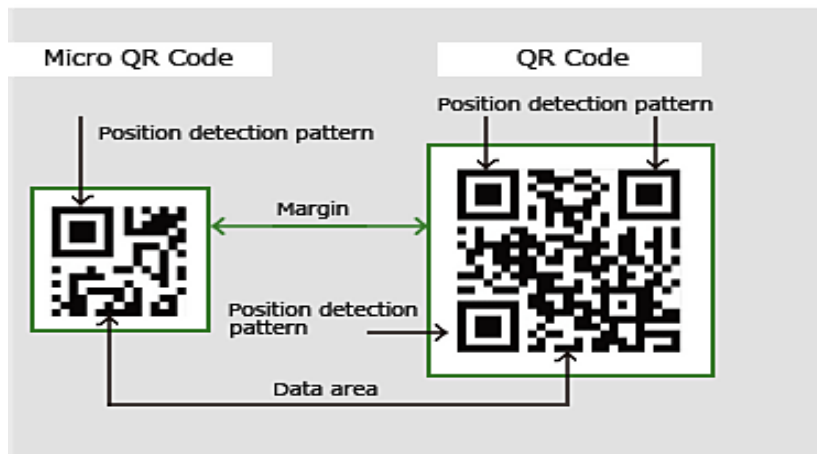
Fig. 5: Differeces between Micro QR Code and QR Code
(Differeces between Micro QR Code and QR Code,
http://www.qrcode.com/en/codes/microqr.html

d) iQR Code
IQR code is a 2D matrix type code to allow easy reading of the position and its size. This code allows a wide range of sizes from the smallest codes than traditional Micro QR and QR codes and the large ones that can store more data than these. This code can be printed as a rectangular code, code printed over another, code black-and-white inverted or the model code points and allows a wide range of applications in various fields. IQR Code can hold a larger amount of information than the traditional QR code. A IQR Code same size as a QR code can hold 80% of the more information than the latter, may contain the same amount of information being 30% smaller (compared with QR Code) (Figure 6).
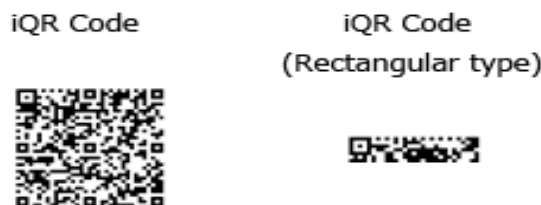

Fig. 6: IQR Code
(IQR Code, http://www.qrcode.com/en/codes/iqr.html).

e) SQRC Code
SQRC is a type of QR Code reader equipped with restricted function. This can be used to store private information and manage internal company information.

SQRC codes can only be read by certain types of scanners. SQRC aspect is no different from ordinary QR code. Features that are found in QR Code, including error correction function, are all kept.

f) Logo QR Code

 LogoQ is a new type of QR Code is designed to increase visual recognition by combining it with letters and pictures in full color (Figure 7).

Fig. 7: Logo QR Code
(Logo QR Code, http://www.qrcode.com/en/codes/logoq.html)

QR code can be combined with letters. LogoPass is a QR code that displays a QR code alternative and more images. LogoQMotion is an animated code, designed to express the encoded content with animation, combining moving images with a QR code.

Decoding the information contained in QR codes can be done with any mobile phone equipped with a camera, through a decoding applications installed on your phone. These applications can be pre-installed by the manufacturer on certain models of mobile phones or can be downloaded from the Internet, many options are available. Due to the rapid development of technology and facilities offered by mobile phones, they have become an instrument almost indispensable in everyday life. In addition to traditional telephone services, they allow users access and use of varied digital content: text, photo, video, social networking, games, mms, online payment services etc. QR Code is a tool through which consumers can enrich the experience of interacting with a brand, making the transition from offline environment to online environment.

QR code can be added to any printed material of a brand: business cards, presentation folders, banners, posters, packaging, print, even vehicles. By reading the code, the user, who can be a potential customer or employee, has access to information, benefiting from the advantages of digital media: multimedia content, ease of editing and data storage. .

QR Code can be read by mobile phone camera, using a program called "QR code reader". QR Code can be photographed or scanned with your phone and the software interprets (decodes) the code. After scanning, the user can receive / send SMS, e-mail, see text, automatically add a vCard in "Contacts" (phonebook) without typing all the information on the screen, open a URL (web address) , watch a video (advertising or not) can receive a discount coupon for

various products-services. It seems that about a quarter of Internet users access and use a mobile device, phone or tablet.

QR codes have wide range of use in applications: the pursuit of commercial products, marketing products / loyalty (discount coupons, store, information about company: address, email, telephone, postal code, web address, etc), transport tickets, product transportation, recreation, restaurants, real estate, business cards, advertising (flyers, advertisements, banners, magazines / newspapers, books), recruitment companies labor / staff, retention of personal information by government institutions, etc.

3. Study regarding the need for the provision of information in the field of law

Lately, it has been showed a great interest in marketing research in many different fields. Marketing researches are intended for determining attitude and behavioral barriers in order to acces and promote scientific research and to increase visibility of research by developing free access to information. In the concept of modern marketing, any activity must be carried out on the basis of knowledge of user behaviour.

For our domain of interest, we addressed a research to persons engaged in legal environment, namely legal advisors from The College of Legal Advisors Brasov (total number – 200), lawyers from The Bar Association in Brasov (total number – 548) and teaching staff from the Faculty of Law of Transilvania University from Brasov (total number – 35).

Through the research named ” Study regarding the need for the provision of information in the field of law”, we wanted to know the level of interest in traditional sources of information, especially electronic sources, the use of online platforms and systems for organizing and retrieving legal information and their knowledge about QR Codes and their interest in using this codes for legal infomation.

The questionnaire contains 20 questions. Research has been carried out usig electronic questionnaire variant, which has been disseminated through email, in which was pointed out the link where the questionnaire can be accessed: https://www.surveymonkey.com/r/7JZCM89.

We obtained 299 responses (Figure 8):
- 76 responses from legal advisers
- 202 responses from lawyers
- 1 response from a judge
- 18 responses from university tearchers
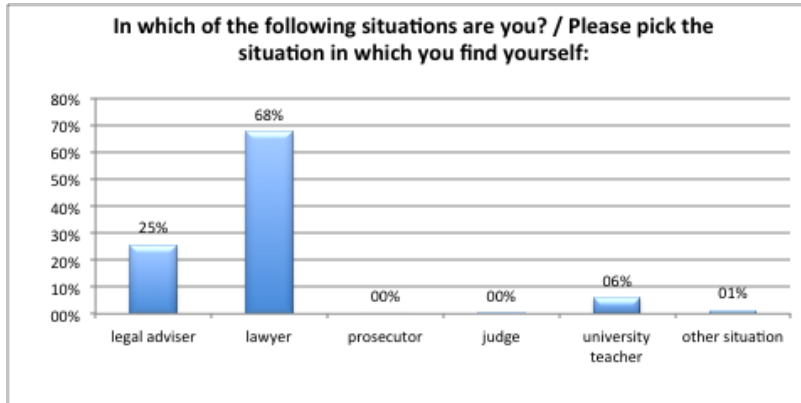- 4 responses from persons in another situation.

Fig. 8: Categories of subjects

The questionnaire has the following structure:
1. How old are you?
20-30 Years
30-40 years
40-50 years
50-60 years
over 60 years
2. What is your level of education? / Which is the last school education and training:
college
degree
doctorate
post doctorate
3. For how long have you been working in the field of law?
0-2 years
2-5 years
5-10 years
10-20 years
over 20 years
4. In which of the following situations are you? / Please pick the situation in which you find yourself:
legal adviser
lawyer
prosecutor
judge
university teachers
other situation
5. Where are you working?
University
court
prosecutor's office

private company
a state-owned company
lawyer society
individual law firm
other situation
6. What sources of information do you use for documentation for the settlement of accusations/preparing teaching material for lectures?
Software
Legislative codes
specialty books
other:
7. Do you use online platforms for consulting legal information?
Yes
No
8. Which of online platforms containing legislation/juridical materials do you use?
Legis
Legis plus
Sintact
E-drept
others
9. You have subscribed to these platforms/software or do you go to the University Library to gain free access to the databases for legislative elections?
Subscription
Library
10. Do you use software to manage the legal information?
Yes
No
11. Where did you hear about online platforms with legal information?
12. Do you have information about QR Code ("quick response" code)?
Yes
No
13. Have you used a QR Code?
Yes
No
14. In what field have you used a QR Code?
15. Have you need training to use QR Code?
Yes
 No
16. Have you used the mobile phone application to access QR Code?
Yes
No
17. Have you used a QR Code for accessing the legal information?
Yes
No
18. Can online platforms with legal information be considered accessible?

Yes
No
I don't know
19. Do you think that it would be helpful for you to use QR Code for accessing legal information?
Yes
 No
I don't know
20. Would you use legal applications with QR Code in order to access an online platform with legal information?
Yes
No
Maybe

Most of the persons who answered to the questionnaire have been working in the field of law for 5-10 years – 36%, followed by the ones who have experience for 2-5 years – 23% and 10-20 years – 22%, over 20 years – 11% and 0-2 years – 0,7% (Figure 9).
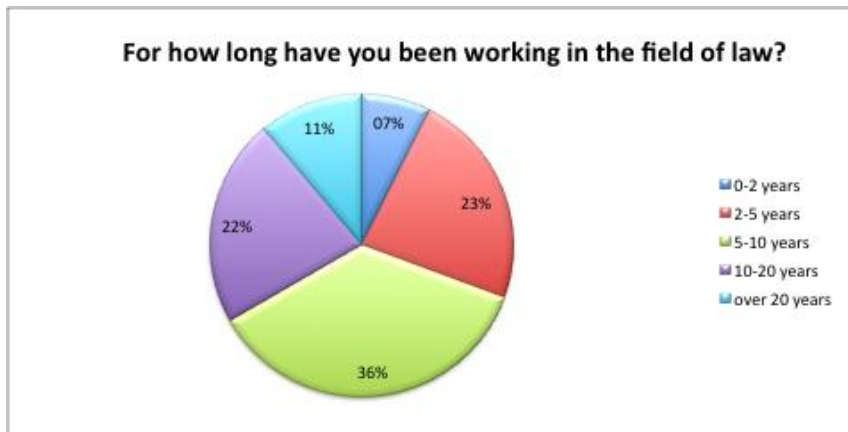
Fig. 9: The experience of subjects in the field of law

The survey shown that all three sources of information are used for documentation: legislative codes the most, then legislative software and speciality books (Figure 10).
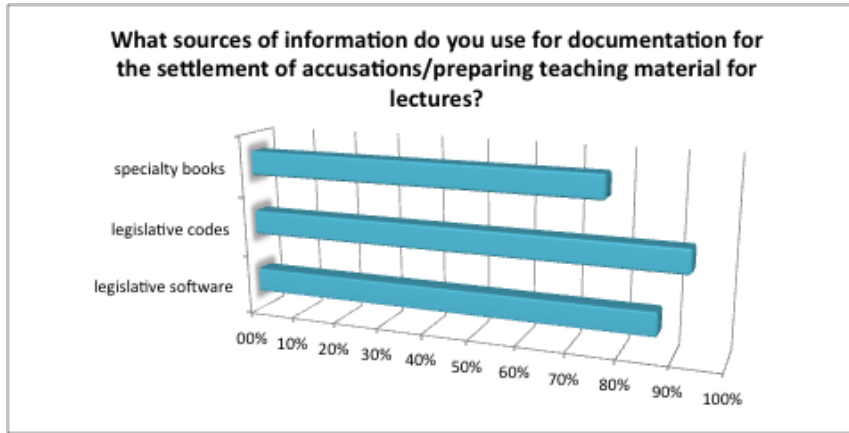
Fig. 10: Sources for documentation used by subjects

The study revealed the fact that most for the people who responded are using online platforms for legal information and that most of them know about QR Code, used a QR Code with their mobile phone, but not for accessing legal information (Figure 11).
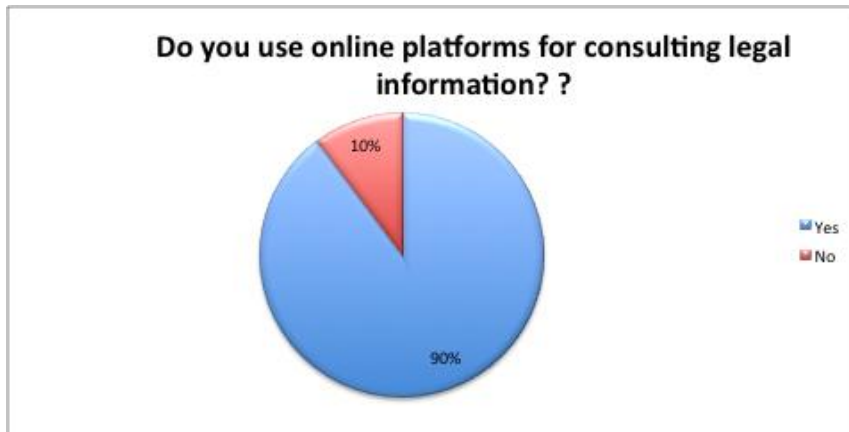

Fig. 11: The use of online platforms for legal information

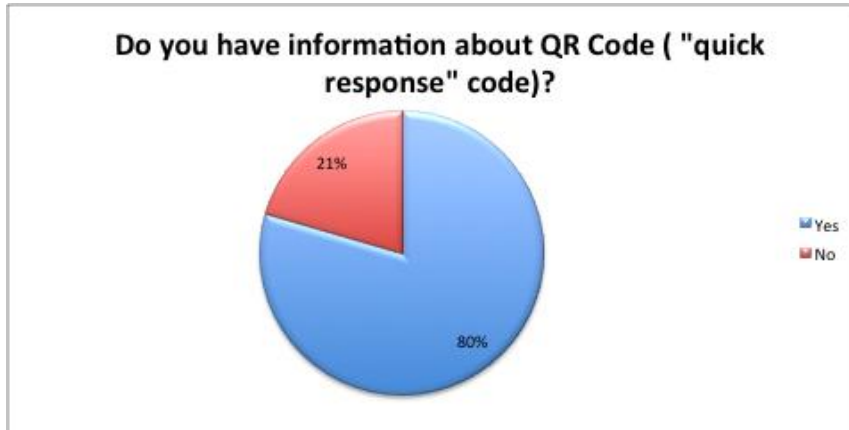The QR Code is known among our subjects in proportion of 80% (Figure 12).

Fig. 12: Subjects' knowledge about QR Codes

76% of subjects have used a QR Code and 78% used it by scanning the code with the mobile phone camera (Figure 13).
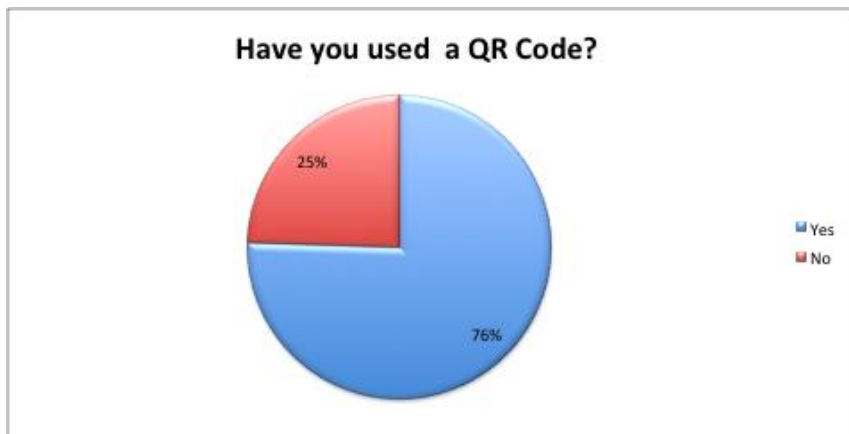

Fig. 13: The use of QR Codes

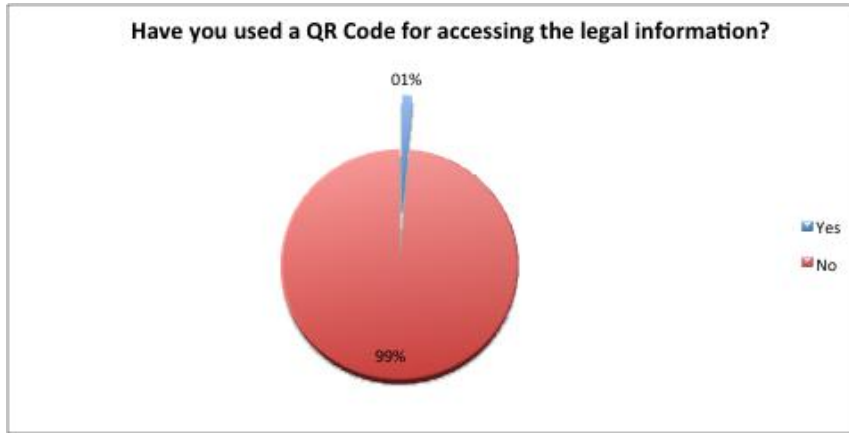The survey revealed the fact that QR Code is not used for accessing the legal information (Figure 14).

Fig. 14: The use of QR Code for accessing the legal information

The subjects, 82% of them, think that QR Code can be useful for accessing legal information, being a quick way to find the information needed by scanning the QR Code (Figure 15).
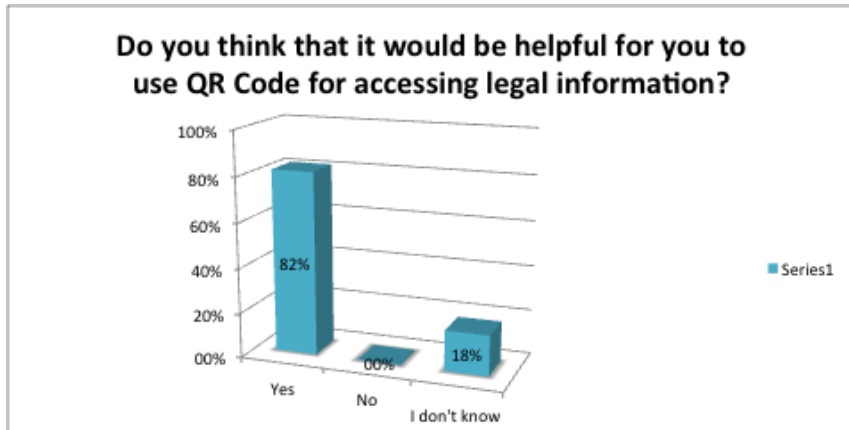

Fig. 15: Subjects' opinion about the usefulness of using QR Codes for accessing legal information

The conclusion was that if they can have access to online platforms with legal information with QR Codes, the will use it for this purpose (Figure 16).
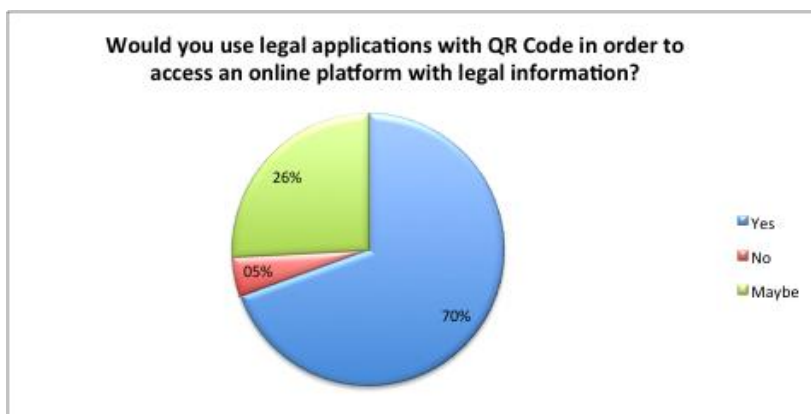
Fig. 16: Opinion about using QR Codes for accessing legal information

4. Application of QR Code using DSpace Platform

DSpace is a software application (platform) designed for academic, non-profit and commercial organisations in order to develop and manage digital repositories. DSpace preserves and enables easy and open access to all types of digital content including text, images, moving images (video) and data sets (Repanovici, 2010).

For example, we have picked a law which has been saved in online legislative databases in PDF format and then loaded in the ASPECKT DSpace digital repository belonging to University of Transilvania of Brasov (Figure 17).
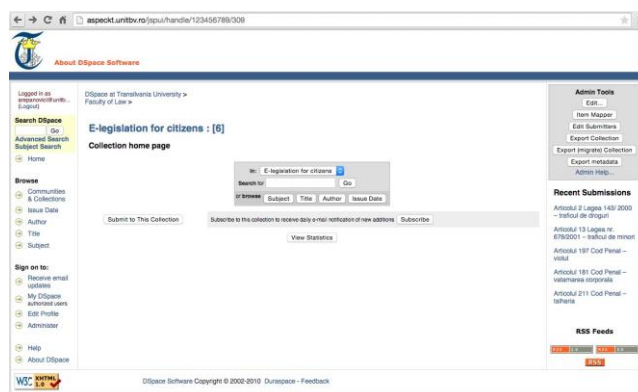

Fig. 17: Collection E-legislation for citizens in ASPECKT DSpace institutional repository

To illustrate how QR Code works, the following steps have been achieved and it was made the application:

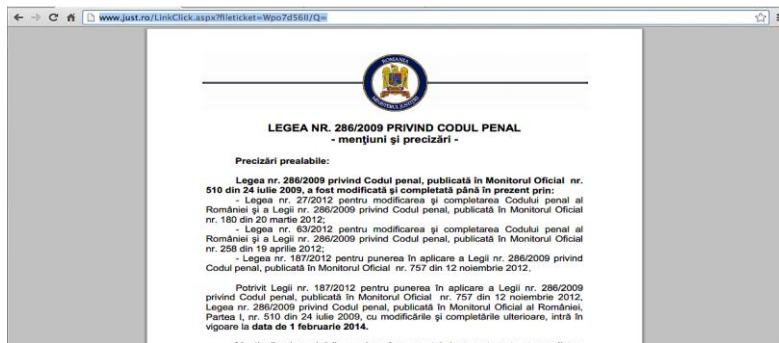i. It was selected the link of the New Penal Code (Figure 18):
http://www.just.ro/LinkClick.aspx?fileticket=Wpo7d56II%2FQ%3D

Fig. 18: Web page – New Penal Code

     ii.   It was selected a site for generating the QR Code (Figure 19):
http://www.qr-code-
generator.com/?PID=100&gclid=CPK4ybjf3b8CFfMZtAod6mkAbg
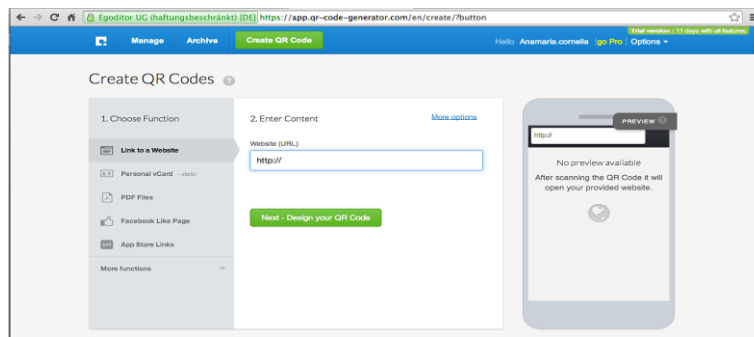

Fig. 19: Web page of a site that generates QR Code

     iii.   The link was paste on the gap designed for it (Figure
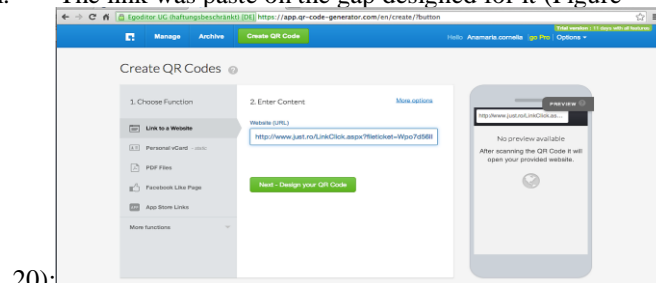

20):
Fig. 20: Pasting the link into the gap for generating the QR Code

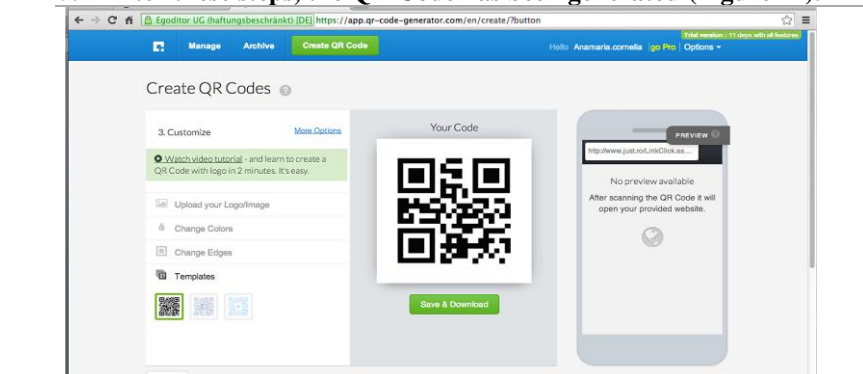**5. After these steps, the QR Code has been generated (Figure 21).**

Fig. 21: Generating QR Code for the web page of New Penal Code

5. After code generation, with the aplication QRReader for IOS (iPhone), it has been scanned and opened the web page

6. Conclusion

The survey we have applied indicates that QR Code is known among persons in the field of law. The analysis of the results shows that the subjects consider QR Code easy available to majority people and it can be easily recognized by them.
Unfortunately, in Romania, QR Code is not applied in the legal information field.
The conclusion is that legal practitioners have showed their interest in using QR Code for accessing and retrieving legal information, if this code will be implemented in the field of law.
Further development directions:
 - developing mechatronic device for reading information
 - making database coded by QR codes
 - producing audio mechatronic device information
Persons imprisoned can access via existing kiosk in prison the legislation that will be encoded by using QR codes with mechatronic device for reading information (scanner / mobile phone). Thus, according to what law they want to access, using this device, they will scan the QR code corresponding to the law and will be directed to a voice file that will play the desired law, which could be heard using audio mechatronic device.

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