12. Саченко, О.А. Управління портфелем інноваційних проектів щодо модернізації обладнання. [Текст] / О.А. Саченко // Управління проектами та розвиток виробництва: Зб. наук. пр. – Луганськ: СНУ ім. В. Даля, 2013. – № 4(48). – С. 129-135.

13. Feurer, R., Chaharbaghi, K. (1995). Strategy development: past, present and future. Management Decision, 33 (6), 11-21.

14. Плахотний, М.В. Деякі аспекти захисту даних комерційного обліку електроенергії в енергоринку України [Текст] / М.В. Плахотний, О.В. Коцар, І.О. Коцар // Вісник Хмельницького національного університету, 2014. – №3(213). – С.61-65.

UDC 005.52:005.71

N.Y. Liashenko

APPROACHES TO MEASURING VALUE OF A WEBSITE

The study provided analysis of existing approaches to measuring value of a website and highlighted their advantages and disadvantages in the particular cases. The new definition of the website was conducted; the taxonomy of evaluation methods and subsidiary vocabulary was suggested. Fig. 2, table 4, ref. 24.

Keywords: monetary measuring, evaluation of the website, web analytics, intellectual capital, market value, comparative approach, cost-based approach, profitable approach.

JEL C13

Formulation of a problem and its relation with scientific tasks. Nowadays, one cannot underestimate the meaning of information resources as intangible assets of business. The market of consulting in web-measurement solutions is a developing area that indicates abnormal growth compared to other services. It offers many commercial schemes, and new ones are becoming available every day.

However, one can note that the mentioned market is still far away from its maturity. There are several problems that are unsettled in this area. First and the most important one is lack of a single conceptual system. Therefore, accountants and insurers do not understand CIOs and vice versa. They literary speak different tongues. Second problem is tightly related to the first one: without the single conceptual system and vocabulary it is impossible to create a standard for monetary estimation of a website and other data resources even if the enterprise obviously gains the value thanks to the hidden assets. Third problem is lack of competent specialists who can provide a high-quality service of web-measurement. According to the listed problems, the purpose of this research was settled.

The purpose of the article is to analyze existing approaches to measuring value of a website and to highlight their advantages and disadvantages in the particular cases for the further work on creating the single standard for monetary estimation of websites

Main findings. First of all, it is crucial to develop a basic vocabulary for the terms such as the website, its valuation, and other related notions. One can notice that here is a problem of existence of multiple definitions immediately occurs. However, if to formulate a task clearly, one can find that only one definition is possible for each term. In the case of monetary valuation, which is obviously a reference point of finding right

definitions or formulating the new ones, the website is not only a set of related web pages with relevant information, graphics, and/or media.

According to the dictionaries (*American Heritage Dictionary of the English Language*, 2011; *Collins English Dictionary*, 2014) website is a set of interconnected webpages on the World Wide Web containing information on a particular subject, usually including a homepage, generally located on the same server, and prepared and maintained as a collection of information by a person, group, or organization. Unfortunately, the definition of the term "website" as the asset that is able to generate profit and, thus, can be monetary estimated is nowhere to find. Let us use the Method of the System Triple Definitions that was developed by Rach and Antonyan (2010) to formulate the definition for the term "website" for valuation purposes (table 1).

Table 1

Formulation of the notion "website" by the Method of the System Triple Definitions in valuation purposes

Elements of the Triple		
Elementness	Connectness	Completeness
1	2	3
Tangible object in digital form	Can be owned or controlled	Value or other benefits

Therefore, one can define the website as a tangible object (an asset) in digital form, which presents itself as a set of interconnected webpages on the World Wide Web containing information on a particular subject, which can be owned or controlled by a person, group, or organization with a purpose to produce value or other benefits to its owners.

According to the online dictionary ("investopedia.com"), valuation is the process of determining the current worth of an asset or company. There are many techniques that can be used to determine value, some are subjective and others are objective. It is also true to the valuation of the website. Even if the company does not plan to sell its website, due to indicate it in the balance sheet among other assets, it should estimate it by a relevant market value on the particular date. The same opinion occurs in the International Valuation Standard 2 "Bases Other Than Market Value:" market value is the most appropriate basis of value for a wide range of application (*IVS 2*, 2007).

The International Valuation Standard 1 "Market Value Basis of Valuation" contains the definition of the market value: the estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arm's-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently, and without compulsion (*IVS 1*, 2003). Those are proper circumstances for website valuation.

However, before considering approaches for valuation, it is important to discuss whether a market value is an appropriate basis for a website monetary estimation in all cases. For instance, many entrepreneurs are tending to believe that it is better to take into account a promised amount of money that could be generated by the website. In the International Valuation Standard 1 "Market Value Basis of Valuation," it is recommended to use the mentioned basis in case when the property under consideration is viewed as if for sale on the (open) market, in contrast to being evaluated as a part of a going concern or for some other purpose (*IVS 1*, 2003).

Therefore, the International Valuation Standard 2 "Bases Other Than Market Value" provides valuators with other bases, such as the fair value, the special value,

the investment value, and the synergistic value (*IVS 2*, 2007). For instance, the special value is often used as an additional amount above the market value that reflects particular attributes of an asset that are only of value to a special purchaser. The website will be priced with the special value in the case when purchaser ordered one for his or her needs and according to his or her tastes. It often corresponds to the contract price fixed between one seller and one byer. Another subjective value is the investment value, or worth, which is monetary measurement for a specific property to a specific investor, group of investors, or entity with identifiable investment objectives and/or criteria. One can see that application of the bases other than market value requires specific circumstances or, otherwise, the valuation will be provided in a manner that could be misleading.

Thus, it should be emphasized that the choice of the basis highly depends on the purpose and objectives of valuation. Also, one can say that the market value basis is an objective one that uses comparative approach to the website's value estimation while bases other than market value are subjective ones that depend on many factors and circumstances.

Generally, there are only three approaches of monetary valuation of any asset whether is tangible or intangible object. They are illustrated at the figure 1.
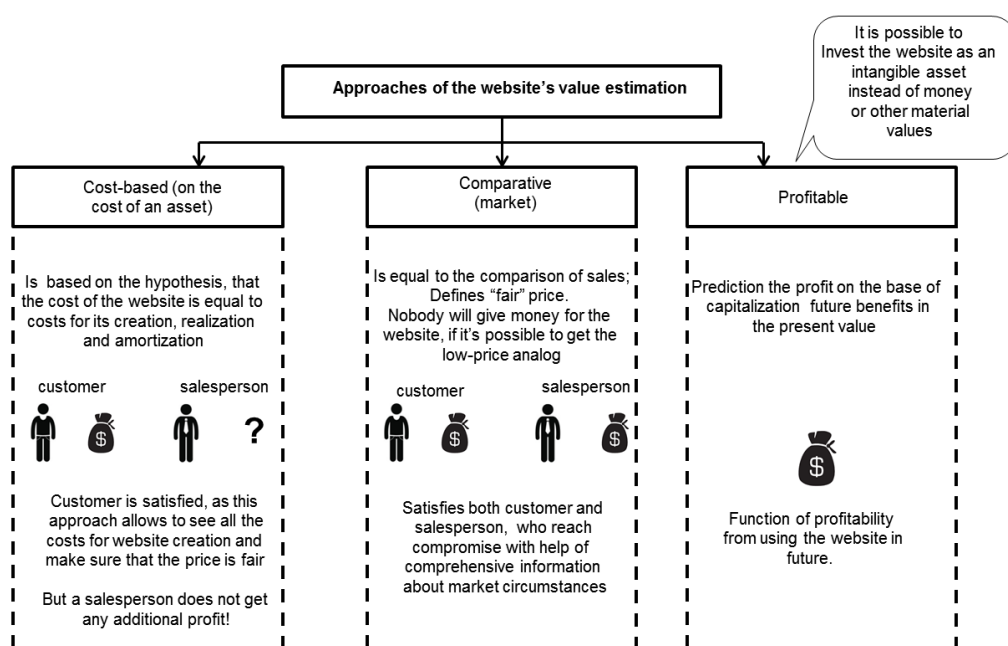

Fig.1. Approaches to the website's value estimation

In the table 2 one can find other specific terms in the area of buying or selling a website or web business that, according to the site ("experienced-people.co.uk"), accountants soon will want to include into their vocabulary to reduce the gap between the potential and the realized value of such intangible resources. It is worth mentioning that the definitions were borrowed from webmasters and web analysts' vocabulary.

After considering terms related to the website's value measurement, let us continue with a review of its whole process in order to understand the place of the step of choosing approaches of evaluation in it. The sequence of website's value

measurement is illustrated at the figure 2. It inherits all characteristics of valuation of a common tangible asset.

Table 2

Subsidiary vocabulary for the single conceptual system of website evaluation

Term	Abbreviation	Definition
Database	DB	often used to mean the list of subscribers to the site's newsletters but could also refer to database of forum posts or other material
Google Analytics	GA	a traffic stats program from Google.
Page Rank	PR	Google's numerical value (1-10) given to pages based on the quantity and quality of incoming links they've got vs the outgoing links on the page.
Pay/Cost Per Action	PPA/CPA	a monetising method where the site owner gets paid each time one of his visitors completes a pre-defined action at the advertiser's site e.g. filling a form
Pay/Cost Per Click	PPC/CPC	an advertising model where the retailer pays per visitor who clicks through to his website.
Pay/Cost Per Lead	PPL/CPL	a business model where the site owner gets paid per lead he generates for an advertiser or merchant
Pay/Cost Per View	PPV/CPV	an advertising model that pays for each video that is viewed through a website
Paid To Click	PTC	an online business model where Visitors are paid to complete certain actions such as viewing pages, completing surveys or clicking ads
Reserve Price	RP	the price below which the seller won't sell his site. The reserve price is often undisclosed by the seller
Revenue Per Milli	RPM	revenue per thousand page views
RSS Signups		people who've signed up to a blog's feed (quoted as an asset when blogs are sold)
Top level domain	TLD	a domain such as .com, .org, .net
Unique Visitors	Uniques/ UV	a traffic measurement of the visitors to the site. Visitors returning within a specified time (usually a month) are excluded from the count as they are Returning Visitors

Above it was already considered the first three steps: identification of the object (website); defining objectives of valuation (for instance, including the website into the balance sheet and thus to identify it as one of the enterprise's value-creating assets); choosing of the basis of valuation (the market value, the fair value, the special value, and the synergistic value). It was also considered three general approaches of monetary evaluation of any physical object. To understand whether contemporary web-measurement solutions (or methods) are based on the mentioned approaches to evaluation, let us review the most popular ones and try to classify them by the profitable, comparative, or cost-based approach. Such a tactics also allows us to find out commonalities between the following methods, their advantages and disadvantages in the monetary measurement.

Zahran, Al-Nuaim, Rutter, and Benyon in the study "A comparative approach to web evaluation and website evaluation methods" (Zahran et al., 2014) argue that most of scientists in the field of web evaluation do not differentiate Web evaluation methods and website evaluation methods, neither do they consider the purpose of the evaluation. Site ranking, usability problems, or visibility of sites are examples of the multipurpose evaluation that rarely ends up in monetary expression. For instance, Alexa, an automatic web analytics tool that is often compared to the Google Analytics, shows such indicators of the website's worth as ranked relative to other sites, monthly unique visitor metrics, audience geography, engagements of visitors, search traffic, top keywords from search engines, linked in and related sites, velocity loading compared to other sites, and audience demographics ("alexa.com", 1996).
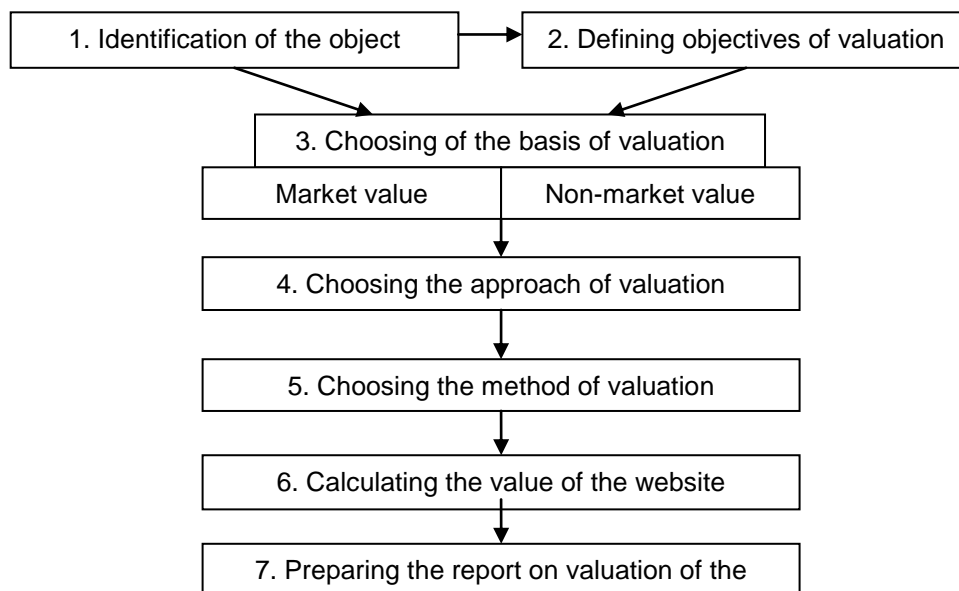

Fig. 2. The sequence of website's value measurement

Basing on Stolz, Viermetz, Skubacz, Neuneier, Hasan's, and Zahran et al. works (Hasan, 2009; Stolz et al., 2005; Zahran et al., 2014), the taxonomy of evaluation methods that is illustrated in the table 3 is suggested in this study. One can see that objective methods are based on the analysis of the entire Web area, in other words, site's market. Therefore, their indicators could be interpreted as ratios for monetary estimation.

Table 3

The taxonomy of evaluation methods

Website evaluation methods			Web evaluation methods	
User-based usability evaluation methods	Evaluator-based usability evaluation methods	Automatic website evaluation tools	Web analytics tools	Link analysis methods
Subjective methods			Objective methods	
Bases Other Than Market Value			Market Value Basis of Valuation	
Profitable or cost-based approach			Comparative approach	

Now, let us consider closer each of the mentioned evaluation methods for determination of what approach could be applied, precisely. According to the previous study (Lárusdóttir, 2009), user-based usability evaluation methods are aimed to measure the usability of the system and identify usability problems that can lead to user confusion, errors, or dissatisfaction. The most preferable methods in this category are user-testing and the Think-aloud methods.

According to Stone, Jarrett, Wodroffe, and Minocha (2005), when users use a system, they work towards accomplishing specific goals in their minds. The set goal should be short and directly linked to the user's everyday tasks and concerns. The point of the test is to see if a user can figure out the required steps alone. Usually, to find out about 85% of usability problems, user-testing requires from three to five participants (Nielsen, 1993; Stone et al., 2005).

Nielsen (2012) in his article "Thinking Aloud: The #1 Usability Tool" writes that by verbalizing their thoughts, the test users enable us to understand how they view or interpret the system and what parts of the dialogue cause problems. The users' comments can be included in the test report to make it more informative.

Thus, user-based usability evaluation methods are surely subjective methods of evaluation, which results could be hardly interpreted by monetary tools. However, many "soft" components of the enterprise value, such as brand or company's image are even more difficult objectives of evaluation, and there are means to estimate them. If the website is a part of company's image, one can consider its value as a part of the whole and study how it affects the value of the enterprise. Therefore, it is no doubt, that the better approach for user-based usability evaluation methods is the profitable approach.

Evaluator-based usability evaluation methods are methods for expert evaluation. Competent people inspect the interface and assess system usability using interface guidelines, design standards, users' tasks, or their own knowledge, depending on the method, to find possible user problems (Lárusdóttir, 2009). The most common method in this category is the heuristic evaluation. During the heuristic evaluation, each evaluator goes individually through the system interface at least twice, and the output of such evaluation is a list of usability problems with reference to the violated heuristics (Matera, Rizzo, and Carughi, 2006). In fact, participants of evaluator-based usability evaluation methods are people who are specialists in creating websites, so they can not only present the report with usability problems but also name the cost of the particular site or its parts. Therefore, one can suggest the group of evaluator-based methods as the cost-based approach of the site monetary measurement.

Automatic website evaluation tools, such as W3C validators and link popularity check, are software that automates the collection of interface usage data and identify potential Web problems (Zahran et al., 2014). Their data could be indirectly used as some basis for monetary estimation. However, one cannot use only automatic website evaluation tools for the purpose of valuation because they cannot be considered efficient (Al-Juboori, Na, and Ko, 2011).

The Web evaluation methods study the Web as a whole phenomenon by calculating statistics about the detailed use of a site and providing web-traffic data, visibility, connectivity, ranking, and the overall impact of a site on the Web (Zahran et al., 2014). It is no-doubt the category of market approach as the Web evaluation methods work on comparison the particular website with other similar ones and the whole area of Web. The two data collection methods for Web analytics are server-based log files (traffic data is collected in log files by Web servers) and client-based page-tagging (requiring the addition of JavaScript codes to webpages to capture information about visitors' sessions) (Hasan, 2009). The Web analytics tools were

already mentioned in this study. The most popular of them are Google Analytics and Alexa.

Once signed up for Google Analytics, Google offers users code that must be inserted into each web page to be tracked. Visual data results are displayed with a wealth of information as to where visitors came from, what pages they visited, how long they stayed on each page, how deep into the site they navigated, etc. (Fang, 2007). These are reliable data of market research that could be used in the monetary evaluation of the website. The task for the further study is to create the system of interconnected indicators based on the GA or other similar service to show the value of the website.

Alexa is a website metrics system owned by the Amazon Company. It calculates traffic rank by analyzing the Web usage of Alexa toolbar users for three months or more as a combined measure of page views and the number of visitors to the site. Although this information is useful, Alexa ranking is biased towards MS Windows and Internet Explorer users (Scowen, 2007). Thus, GA is more convenient and universal tool among other Web evaluation methods.

Link analysis studies websites' topology, assuming that the quality of a Web page is dependent on its links. There are two important methods that use link analysis: PageRank and webometrics (Zahran et al., 2014). The PageRank tool was invented together with the Google search engine by its creators, Page and Brin. Google PageRank is a link analysis algorithm named after Larry Page that assigns a numerical weight to each hyperlink, and each page has a calculated PageRank based on the number and quality of links pointing to it (Scowen, 2007). It is ought to be mentioned that Google takes over 100 factors in link analysis, but PageRank is the main one in search-result ordering. This tool is a reliable source of information about the popular and long ago created websites. However, it is negatively biased against unpopular pages, especially those created recently (Cho and Adams, 2005).

Björneborn (2004) in the study "Small-World Link Structures across an Academic Web Space: A Library and Information Science Approach" has proposed webometrics as "the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the Web, drawing on bibliometric and infometric approaches." The Web Impact Factor (WIF) is the central indicator of webometrics. It can be understood by scientists because WIF operates by the same technology as the Journal Impact Factor (JIF). The latter represents the ratio of all citations to a journal to the total references published over a period of time (Dhyani, Ng, and Bhowmick,, 2002). By WIF, the more people link to a website, the more WIF the site is getting and, in turn, the higher the impact factor, the higher the reputation and influence of a site. Therefore, this tool is very useful for monetary estimation of the website. First, the calculation of intellectual capital can be easily applied to the reputation of the website because methods are similar. Second, WIF allows comparing the particular website in its field. Nowadays, webometrics studies were already conducted on universities, research centers, hospitals, business schools, and government sites ("Cybermetrics Lab.," 2010). Sometimes the WIF is wrongly compared to the PageRank method. PageRank does not afford equal weight to links, and weightings vary depending on from where a link is coming (Zahran et al., 2014).

It is worth mentioning that there are many automatic calculators of website value are available online. They claim to calculate the market price for the analyzed website. However, the algorithm of calculation is hidden so it is impossible to understand and discuss how they actually work. It is only known that such services base their calculations on indirect data of sources that was considered in this study, both website and Web evaluation methods. For instance, Webuka website evaluation ("webuka.com", 2015) is the free website worth calculator working with: Google API,

Yahoo API, Alexa API, Compete API, and W3C Markup Validation Service. It claims that its mathematical formulas behind the website evaluation algorithm are calibrated using real website transactions, so it marks not popular websites as $0 worth, which cannot be true because they still have visitors and a history in Web.

Let us conduct the analysis of the discussed methods to find out their advantages and disadvantages depending on the purpose of valuation. In the table 4 one can see the analysis of approaches to measuring value of a website.

In this study, there was an attempt to relate web analytics and monetary measurement methods with purpose to find the solid basis for website valuation. After all discussed problems and objectives, it became clear that there are factors that have a great impact on the value of the site and they should be found in the web analytics area of knowledge not the financial or economic ones.

Table 4

Analysis of existing approaches to measuring value of a website

Approach	Method	User of information	Purpose of valuation	Advantages of the method	Disadvantages of the method
Profit-able	User-based	Investors	Sale or purchase Attracting investment	High quality results in a limited time	Inconsistent results between testers
Cost-based	Evaluator-based	Accountants and auditors	Donations or inherit property Inclusion in an authorized capital of an enterprise	High quality results in a limited time	Additional costs for hiring experts Inconsistent results between experts
Comparative	Web analytics and Link analysis	Shareholders and Managers	Sale or purchase Calculating the current value of the company for owners	Fast, consistent, unbiased results, obviate the shortage of experts and inconsistent results between them Provide traffic data, Web ranking of a site, or its online visibility among others.	High link rate may not always be associated with high quality Negatively biased against unpopular pages, especially those created recently

Among external, market factors one can name page rank of the website, its popularity compared to other similar sites. Internal factors that affect the value of the website are visibility and usability of the site, the velocity of its pages loading, internal linking etc. One cannon provide efficient monetary estimation without understanding web analytics. Therefore, to evaluate its website for any purpose, the enterprise needs new generation of estimators: people with deep knowledge of web analytics and website building together with economic education.

Thus, the standard for monetary estimation of a website should contain all existent purposes of valuations; basic terms borrowed from web analytics dictionary and should be based on data that was presented in the table of analysis of approaches to measuring value of a website. The single conceptual system of website evaluation should be based on all of the discussed methods to eliminate their disadvantages.

Summary and prospects for further research in this area. In this study, analysis of existing approaches to measuring value of a website was provided and highlighted their advantages and disadvantages in the particular cases. The choice of the appropriate evaluation method depends greatly on the purpose of the evaluation. For instance, the purpose of tracking the impact of the website value on the whole value of the enterprise requires comparative approach based on the objective indicators such as ones of web analytics and link analysis. If the accountant needs to put the value of the site into balance sheet, he or she wants to know the primary cost of website creation including purchase of the domain and payment for web designers, coders, and programmers. However, it is highly recommended to understand and consider every approach to measuring value of a website in each particular case, because there are many factors besides purpose of evaluation that can affect the choice of the method.

By means of an academic method of the System Triple Definitions, the new definition of the website was conducted for the purposes of monetary estimation. Besides the description of what site is, it includes approach to the object of evaluation that can be a valuable asset of the enterprise or a buy and sell product.

Also, the taxonomy of evaluation methods and subsidiary vocabulary was suggested for the needs of creating the single conceptual system for monetary estimation of such objects as websites. It is an attempt to combine web analytics and monetary measurement methods due to find the solid basis for website valuation. After that, it becomes clear, that a practice of website evaluation requires competences that yet cannot be found among contemporary professionals. Accountants or web analytics do not have enough of multidisciplinary knowledge to conduct appropriate evaluation.

Therefore, prospects for further research in this area are broad. First and the most important is creating the single conceptual system for website monetary estimation. Second, publish the standard for website evaluation. The third prospect is to outline the range of competences for specialist who can provide a high-quality service of web-measurement with the purposes of site's sale or purchase, attracting investments, donations or inherit property, inclusion in an authorized capital of an enterprise, or calculating the current value of the company for owners. The latter is one of the most wanted and popular yet unexplored matter in this area.

REFERENCES

1. Alexa.com (1996). Retrieved from http://www.alexa.com.
2. Al-Juboori, A. F. M. A., Na, Y., & Ko, F. (2011). Web Site Evaluation: Trends and Existing Approaches. In Networked Computing (INC), 2011 The 7th International Conference, IEEE, 155-160.
3. Björneborn, L. (2004). Small-World Link Structures across an Academic Web Space: A Library and Information Science Approach. Royal School of Library and Information Science, Denmark. Retrieved from http://vip.db.dk/lb/phd/phd-thesis.pdf.
4. Cho, J., & Adams, R. (2005). Page Quality: In Search of an Unbiased Web Ranking. In Proceedings of the 2005 ACM SIGMOD conference, Baltimore, Maryland, 551-562.
5. Cybermetrics Lab. (2010). Webometrics Ranking of World Universities. Retrieved from http://www.webometrics.info/.
6. Definition of 'Valuation.' [Web log post]. Retrieved from http://www.investopedia.com.

7. Dhyani, D., Ng, W., & Bhowmick, S. (2002). A Survey of Web Metrics. Nanyang Technological University. ACM Computing Surveys, 34(4), 469–503.

8. Fang, W. (2007). Using Google Analytics for Improving Library Website Content and Design: A Case Study. Library Philosophy and Practice, 2007, 1-17.

9. Hasan, L. (2009). Usability Evaluation Framework for E-commerce Websites in Developing Countries. A Doctoral dissertation. Loughborough University.

10. International valuation standards 1, 2, and 3 (2007). Retrieved July 31, 2007 from http://www.api.org.au/assets/media_library/000/000/033/original.pdf.

11. IVS 1 – Market Value Basis of Valuation (2003). International Valuation Standards, Sixth Edition. Retrieved from http://www.romacor.ro/legislatie/07-ivs1.pdf.

12. Lárusdóttir, M. (2009). Listen to Your Users: The Effect of Usability Evaluation on Software Development Practice. A Doctoral Dissertation, Department of Information Technology, UPPSALA University, Sweden.

13. Lárusdóttir, M. (2009). Listen to Your Users: The Effect of Usability Evaluation on Software Development Practice. A Doctoral Dissertation, Department of Information Technology, UPPSALA University, Sweden.

14. Matera, M., Rizzo, F., Carughi, G. (2006). Web Usability: Principles and Evaluation Methods. Department of Electronic Information, Milano, Italy.

15. Nielsen, J. (1993). Usability Engineering. San Francisco, CA: Morgan Kaufmann

16. Nielsen, J. (2012). Thinking Aloud: The #1 Usability Tool. Retrieved from http://www.nngroup.com.

17. Rach, V.A., Antonyan, O.A. (2010). Розробка термінологічної бази системного підходу до виявлення дієвих показників оцінки реалізації стратегій розвитку соціально-економічних систем. Науковий вісник ДАСОА., 2, 57-65.

18. Scowen,G. (2007). Increased Website Popularity through Compliance with Usability Guidelines. A Doctoral Dissertation. Information Science, University of Otago, New Zealand

19. Site Selling - Site Buying Glossary [Web log post]. Retrieved from http://www.experienced-people.co.uk.

20. Stolz, C., Viermetz, M., Skubacz, M., & Neuneier, R. (2005). Guidance Performance Indicator-Web Metrics for Information Driven Web Sites. IEEE/WIC/ACM International Conference on Web Intelligence 2005, 186–192.

21. Stone, D., Jarrett, C., Wodroffe, M., & Minocha, S. (2005). User Interface Design and Evaluation. San Francisco, CA: Morgan Kaufmann.

22. Website - definition of website by the Free Online Dictionary, Thesaurus and Encyclopedia. [Web log post]. Retrieved July 02, 2011 from thefreedictionary.com.

23. Webuka Website evaluation. (2015). Retrieved from http://www.webuka.com/

24. Zahran, D. I., Al-Nuaim, H. A., Rutter, M. J., Benyon, D. (2014). A comparative approach to Web evaluation and website evaluation methods. International Journal of Public Information Systems, vol 2014:1. Retrieved from http://www.ijpis.net.