Search Engine Visibility Indices Versus Visitor Traffic on Websites

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Abstract. "Search engine (optimization) visibility indices" or also called "SEO visibility indices" are a widespread and important key performance indicator in the SEO-Communities. SEO visibility indices show the overall visibility of a website regarding the search engine result page (SERP). Although search engine visibility indices are widespread as an important KPI, they are highly controversial regarding the aspect of a correlation between real website visitor traffic and search engine visibility indices. Furthermore, only a few online-publications examine this controversial aspect. Therefore, we designed a study, analyzing the correlation between organic visitor traffic and search engine visibility indices, the correlation amongst the indices themselves and the impact of Google Updates on the indices. The study is based on 32 websites of German enterprises from various business branches. Key findings imply that there is no high correlation between organic visitor traffic and search engine visibility indices, but a high correlation between the indices themselves. Furthermore, there is no identifiable pattern relating to the expected effect that Google Updates influence the search engine visibility indices.

Keywords: Search engine · Visibility · Indices · Traffic · Websites

1 Introduction

Based on emerging markets and a number of new technologies like mobile computing, cloud-computing and big data the importance of internet services is growing rapidly [2, 9, 26]. According to ITU [13], the volume of worldwide internet users surpassed 2.9 billion in 2014 – a growth by a factor of 8 over 14 years and is expected to continue its rise in the future. In the context of these developments, a widespread use of digital marketing activities appeared.

On B2C markets, Social Media Marketing and especially Search Engine Marketing became important [6, 37]. Especially online information search is a very important activity for customers in e-commerce [6, 10]. Google is the most used search engine with a global market share of 88.1 % (Jan 2015) [32] and registers 5.74 billion searches

W. Abramowicz et al. (Eds.): BIS 2016, LNBIP 255, pp. 91–101, 2016.
DOI: 10.1007/978-3-319-39426-8_8

averagely per day (2014) [33]. For enterprises it is very important to be ranked within the first few search results of Google. According to Mediative's recent eye tracking study 83 % of all people participating looked at the top organic listing of the SERP (search engine results page). 76 % of page clicks went on the top four organic listings of the SERP [24]. Enterprises being ranked within the first few ranks of the SERP have a higher chance of gaining web traffic as a result.

Current research shows the importance of Search Engine Optimization e.g. according to ranking quality, visitor satisfaction etc. [1]. In almost all enterprises on emerging markets, increasing budgets for digital marketing have to be stated [24]. In some industries the budgets have even exceeded the spending for traditional marketing.

Digital marketing does not only represent the planning and coordination of electronic supported marketing campaigns, it also means the monitoring of success. We can distinguish two approaches to control the success of digital marketing [16, 29]. The first approach is represented by off-the-page tools which check single digital marketing activities and especially the visibility rank of hosted websites. The second approach is represented by on-the-page Webanalytic-Tools (e.g. Google Analytics (GA)) which check the utilization figures and client data [25].

Regarding the first approach there are various companies offering a large range of different tools. A very important segment are SEO-Tools (e.g. [30, 31, 35]) which are calculating search engine visibility indices as KPIs (Key Performance Indicators). For our research we chose SISTRIX, XOVI and SEOlytics, one of the most important Tool-Providers of the German SEO-Community.

By enlarging the visibility, an increase of the web traffic is usually expected [7]. With focus on e-business a higher number of website visitors are expected. Therefore, it can be assumed that there is a high correlation between organic visitor traffic and search engine visibility indices. Although experts note that there could be a growing divergence between both KPIs based on the implementation of several Google algorithm updates by Google itself [34]. Google uses as many as 200 factors for its algorithm and there are more than 500 changes per year [38]. Important updates are the so called Penguin and Panda updates. Penguin 2.0 was launched in May 2013 (2.1 in Jan 2014) and relevant update Panda 4.0 in May 2014. Both updates were responsible for major changes in the ranking structure of SERPs.

Despite the divergence, the visibility indices are highly valued in the industry and the SEO community. Therefore, we designed a study to examine the research questions of the divergence between web traffic and the visibility index by comparing their correlations. The study is based on data gathered from 48 websites. Having eliminated incomplete and inconsistent data sets, 32 websites were used for data analysis. Each website data set contains real website visitor traffic (extracted from Google Analytics) and three search engine visibility indices (extracted from SISTRIX, XOVI and SEOlytics) over an extended period of 126 weeks, beginning in the second week of August 2012 and ending in the last week of December 2014.

Our paper proceeds as follows: First we discussed the basic properties of the foreign search engine visibility index. In Sect. 2 we introduce the function and the method of calculation of the search engine visibility index. In the Sect. 3 the research design and the process of data collection is presented. The results of our research are given in Sect. 4. To top off our paper, we present further thoughts on the topic in Sect. 5.

2 Search Engine Visibility Index

The search engine visibility is highly valued and important [11] and therefore tools for search engine visibility indices are widespread. The KPI is calculated by several tools offered by SEO-Tool providers and shows the visibility of a domain for the search engine result pages of Google. Within our examination we covered the visibility indices of three SEO-Tool providers, as already mentioned in chapter one (please refer to the introduction).

The visibility index of a website is generally created by a keyword pool in which each keyword is being ranked and weighed within the Google search results [19]. SISTRIX GmbH for example calculates the index through a keyword pool of one million keywords and keyword combinations weekly. 10 % of these keywords are formed by current and important occasions whereas 90 % always stay the same. Every week the top 100 positions in Google are being registered and analyzed for the specific keyword pool. The results are weighed regarding the aspects of position and anticipated search volume for each keyword [15]. Providers although vary their approaches and keep the exact algorithm for their calculation of the KPI a secret.

A huge impact factor on the development of search engine visibility indices are changes in rankings of keywords which can also be caused by updates of the Google algorithm. Each Google update targets different aspects of a website and each website is constructed differently. As a result, websites show different developments regarding their website visibility [21]. Regarding the SEO-Tool suppliers' statement on correlation developments between visibility indices and organic traffic, a drop of the visibility index should result in a drop in organic traffic. The following Figs. 1 and 2 show quite a different development for a selected enterprise website.

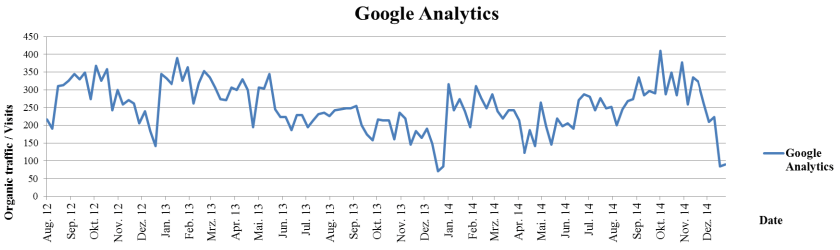

Fig. 1. Organic traffic by Google analytics

The three visibility indices show a significant drop after the Google Panda 2.0 update in May 2013 whereas the organic traffic develops differently. Current research focuses on aspects like the importance of Search Engine Optimization [1] and e.g. the constructions of visibility indices (e.g. [7, 27, 28]) as well as specific visibility factors and influences [18] of on- and off-the-page SEO-activities. There is no extensive research in the field of "established visibility indices in the real world versus visitor traffic on websites" based on a literature review [5] in scientific databases such as SpringerLink, IEEExplore, EbscoHost, Sciencedirect.

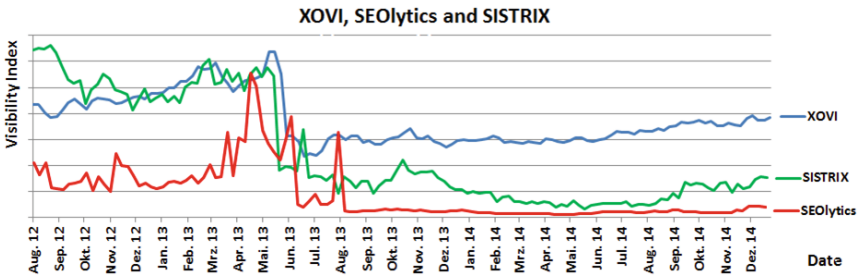

Fig. 2. Visibility indices by XOVI, SEOlytics and SISTRIX

3 Research Design

In order to investigate the assumed correlation between organic visitor traffic and search engine visibility indices in a deeper way, we designed an empirical observation study based on the following three hypotheses. Several sources of the German-speaking SEO-community indicate a high correlation between the organic visitor traffic and the search engine visibility index of several SEO-Tools [12]. To investigate this statement, we created our hypothesis 1:

> ***H1: Search engine visibility indices are highly correlating with the organic (visitor) traffic on websites.***

The next hypothesis discovers the relation of the search engine visibility indices among each other. According to [23] case studies, the visibility indices of different providers of SEO-Tools have similar performances, even if the exact characteristics of the indices are not published by the providers. Therefore, we designed the following hypothesis 2:

> ***H2: Search engine visibility indices are correlating amongst each other.***

A further field of our research is the impact of Google Updates on search engine visibility. Based on hypothesis 1 and in reference to [12] we can also indicate an influence on the correlation between organic visitor traffic and search engine visibility indices. Therefore we created hypothesis 3:

> ***H3: Google updates influence the correlation between the search engine visibility indices and the organic traffic.***

4 Research Methods and Data Collection

To investigate our empirical research model, we implemented an empirical study with real data based on extracted and collected SEO data of different commercial websites in Germany according to general empirical research guidelines [36].

We asked different leading internet marketing enterprises and their customers in 2015 to get real data for our research. In contrast to e.g. survey researches or laboratory settings, the analysis of real data can generate real insights in correlations as well as real world implications. We collected various search engine and SEO data (e.g. Google Analytics organic traffic, SISTRIX, XOVI, SEOlytics visibility indices) from 48 different enterprises to ensure a good quality of research. All enterprises are small or medium sized. Their business is mainly focused on BtoC-markets. E-commerce is very important.

After data cleaning (e.g. missing data), we got a final sample of 32. All websites are developed in German language. The timeframe of the collected data comprised the second week of August 2012 until the last week of December 2014 (126 weeks).

Table 1. Industry sector in percentage terms

Industry sector	Percentage
Online-retailer	46.875 %
Service industry	21.750 %
Recommendations sites	9.375 %
Offline-retailer	6.250 %
Real estate	6.250 %
Medicine	6.250 %
Education	3.125 %

Regarding the whole time frame and all 32 websites, the overall average was 100.55 visitors per website weekly. The investigated websites represent a wide area of different sectors (e.g. online retailer, service enterprises) according to Table 1.

For analyzing our hypothesis, we used correlation analysis [14] to investigate the linear relationship between the different factors. The correlation analysis is often used in research [37]. According to [4, 14, 17], the correlation coefficient r can be interpreted as follows (e.g. in behavioral sciences): Table 2

Table 2. Correlation coefficient r according to Cohen [4]

Correlation coefficient	Interpretation
r = 0	No correlation
r > = |0.1|	Weak correlation
r > = |0.3|	Moderate correlation
r > = |0.5|	Strong correlation

To ensure a high quality of our research, we tested the significance of the results of the correlation analysis according to general statistical guidelines [22]. All analysis were based on IBM SPSS 22 and Microsoft Excel [8, 20].

5 Results

According to our research model (hypotheses) we tested our collected empirical data via the research approach we stated in the last section. The first hypothesis explores the correlation between search engine visibility indices and the organic website traffic measured via Google Analytics (GA) [3, 15]. Based on the correlation analysis, we got the following results:

Table 3. Correlation matrix between GA and visibility indices

Enterprise	Correlation coefficient R / P-value		
	GA - XOVI	GA - SEOlytics	GA - SISTRIX
1	**0.70004967**	**0.6378532**	**0.69764889**
	p = 0	p = 0	p = 0
2	-0.4092155	0.3335812	0.15931457
	p = 0	p = 0	p = 0.075
3	**0.58921932**	0.47852415	**0.63475365**
	p = 0	p = 0	p = 0
4	0.13882503	0.1177219	0.1475417
	p = 0.121	p = 0.189	p = 0.099
5	0.12055815	0.00010472	0.06712095
	p = 0.179	p = 0.999	p = 0.455
6	0.42899444	-0.3959563	-0.35883255
	p = 0	p = 0	p = 0
7	0.09264655	0.33058752	0.10906778
	p = 0.302	p = 0	p = 0.224
8	-0.200939	0.1701752	0.04470587
	p = 0.024	p = 0.057	p = 0.619
9	**0.90105743**	0.14250452	**0.73440312**
	p = 0	p = 0.111	p = 0
10	0.46615647	0.20220485	**0.5954684**
	p = 0	p = 0.023	p = 0
11	−0.11268737	0.19409895	0.17169686
	p = 0.209	p = 0.029	p = 0.055
12	−0.5810689	**0.62416979**	**0.61793799**
	p = 0	p = 0	p = 0
13	**0.86117132**	**0.79395815**	**0.84526154**
	p = 0	p = 0	p = 0
14	**0.85507914**	**0.86238761**	**0.90542583**
	p = 0	p = 0	p = 0
15	**0.53465695**	0.13133665	**0.51189498**
	p = 0.143	p = 0,143	p = 0

(*Continued*)

Table 3. (*Continued*)

Enterprise	Correlation coefficient R / P-value		
	GA - XOVI	GA - SEOlytics	GA - SISTRIX
16	−0.29170908	−0.02862762	0.15882151
	p = 0.001	p = 0.75	p = 0.076
17	−0.3240669	−0.25480318	−0.38461682
	p = 0	p = 0.004	p = 0
18	**0.72030351**	**0.5494804**	**0.76038277**
	p = 0	p = 0	p = 0
19	0.28363493	0.30987148	0.37363679
	p = 0.001	p = 0	p = 0
20	0.29076247	0.30231945	**0.51135295**
	p = 0.001	p = 0,001	p = 0
21	0.43304034	−0.52622806	−0.66358449
	p = 0	p = 0	p = 0
22	0.46860094	0.1225066	0.09210708
	p = 0	p = 0.172	p = 0.305
23	−0.18371463	−0.12090527	0.20658401
	p = 0.039	p = 0.177	p = 0,02
24	**0.88745965**	0.47034633	**0.82426966**
	p = 0	p = 0	p = 0
25	**0.5618975**	**0.85226357**	**0.83268613**
	p = 0	p = 0	p = 0
26	0.41310372	0.36040141	0.48386392
	p = 0	p = 0	p = 0
27	−0.02235333	0.16923673	−0.07972043
	p = 0.375	p = 0.058	p = 0,375
28	0.48248523	0.24522369	0.40909071
	p = 0.006	p = 0,006	p = 0
29	**0.76633391**	0.4857807	**0.80676352**
	p = 0	p = 0	p = 0
30	−0.43770324	−0.50382589	−0.25085629
	p = 0	p = 0	p = 0.005
31	**0.79020062**	**0.69313593**	**0.76376549**
	p = 0	p = 0	p = 0
32	**0.89987365**	**0.67190309**	**0.87920129**
	p = 0	p = 0	p = 0

Regarding the correlation between GA and XOVI, there are 12 out of 32 (37.5 %) websites with a significant correlation of $r > 0.5$ (see bold results in Table 3). Only 8 of 32 (25 %) websites show a significant correlation of $r > 0.5$ for GA and SEOlytics. Examining the correlation between GA and SISTRIX 15 of 32 (46.875 %) websites

show a significant correlation of $r > 0.5$. Based on these results we cannot confirm hypothesis 1 (***search engine visibility indices are highly correlating with the organic (visitor) traffic on websites***).

Hypothesis 2 explores the correlations among the three different visibility indices. The search engine visibility indices of XOVI and SEOlytics only show a moderate as well as a significant correlation ($r = 0.48884375$). XOVI and SISTRIX show a high significant average correlation of $r = 0.60246875$ regarding their search engine visibility indices. SEOlytics and SISTRIX also show a high average correlation of $r = 0.574125$. The exact index-characteristics are not published by the tool-providers. But the results suggest that the calculation of the KPI is based on similar criteria and keyword pools. Therefore, we can confirm hypothesis 2 (***search engine visibility indices are correlating amongst each other***).

Finally, hypothesis 3 explores the influence of the different Google Updates on the visibility indices vs. organic traffic via a correlation analysis (according to Fig. 3 with significant values $p < 0.05$):

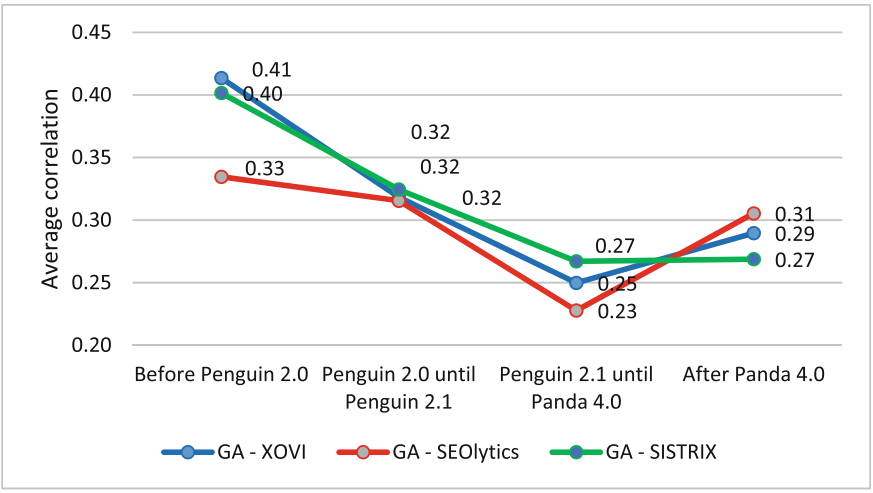

Fig. 3. Correlation diagram influenced by Google updates

Based on these results, we can confirm hypothesis 3 (***Google updates influence the correlation between the search engine visibility indices and the organic traffic***). On the one hand, each website is reacting individually to Google updates. The correlation between organic visitor traffic and search engine visibility indices can either increase, decrease or stay the same, depending on the website itself. On the other hand, there is a general downward trend for the average correlation of all three indices with the organic traffic until the introduction of the update Panda 4.0.

6 Conclusion

Our paper discovered the important practical and research topics influencing the search engine visibility indices and the real organic traffic measured with Google Analytics. After theory and hypotheses development, we designed a quantitative study of different German enterprises and analyzed these data with correlation analysis. Based on the results, we found a gap between the indices and the organic traffic. The indices mostly correlate with each other and there are different degrees of correlation between each of the three indices and the organic traffic.

Practical users can apply our results to choose an adequate index. They get a deeper understanding of the indices and are able to develop more accurate interpretations. Research can benefit from new knowledge about the indices and search engine behavior.

Our data set consists only of German enterprises in different industry sectors. Future research should enlarge the sample and integrate more countries.

Furthermore, there are additional explanations for a negative or weak correlation between the examined KPIs. One influencing aspect we investigated are Google updates. Google updates influence the search engine visibility indices and the correlation with organic visitor traffic. Correlations can increase, decrease or stay the same for each website itself. But our research showed a pattern for the average correlation of all data.

Another aspect for a weak correlation can be all traffic that is not being sufficiently considered by the SEO-Tool providers and their calculation of the search engine visibility indices. Examples are traffic from social media and bookmarks or type-in traffic. A further feature is the limited keyword-pool being used to calculate the indices. Keywords of niche industry branches are often not represented in the keyword pools. The same situation applies for strongly regional oriented websites.

Final aspects may be that SEO-Tool providers do not update their data records and keep the exact algorithm for the calculation of the search engine visibility indices secret. These aspects are up for discussion and would profit from further research.

References

1. Berman, R., Katona, Z.: The role of search engine optimization in search marketing. Mark. Sci. **32**(4), 644–651 (2011)
2. Bughin, J., Chui, M., Manyika, J.: Clouds, big data, and smart assets: Ten tech-enabled business trends to watch. McKinsey Q. **56**(1), 75–86 (2010)
3. Clifton, B.: Advanced web metrics with Google Analytics, 3rd edn. Wiley Inc., Indianapolis (2012)
4. Cohen, J.: Set correlation and contingency tables. Appl. Psychol. Meas. **12**(4), 425–434 (1988)
5. Cooper, H.M.: Synthesizing research: a guide for literature reviews, vol. 2, 3rd edn. SAGE Publications Inc., New York City (1998)
6. Dou, W., Lim, K.H., Su, C., Zhou, N., Cui, N.: Brand positioning strategy using search engine marketing. MIS Q. **34**(2), 261–279 (2010)

7. Drèze, X., Zufryden, F.: Measurement of online visibility and its impact on Internet traffic. J. Interact. Mark. **18**(1), 20–37 (2004)
8. Field, A.: Discovering statistics using IMB SPSS statistics, 4th edn. SAGE Publications Ltd., London (2013)
9. Gantz, J., Reinsel, D.: The digital universe in 2020: Big data, bigger digital shadows, and biggest growth in the far east (2012). http://www.emc.com/collateral/analyst-reports/idc-the-digital-universe-in-2020.pdf
10. Grefen, D., Straub, D.W.: The relative importance of perceived ease of use in IS adoption: a study of e-commerce adoption. J. Assoc. Inf. Syst. **1**(1), 8 (2000)
11. Goodman, A.: Winning Results with Google AdWords, 2nd edn. McGraw-Hill, New York City (2009)
12. Härting, R., Steinhauser, P.: Insights of the German SEO-Community regarding the relevance of Search Engine Visibility Indices (2015). http://www.kmu-aalen.de/kmu-aalen/?page_id=169
13. International Telecommunication Union: ICT Facts and Figures 2014, (2014). http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf
14. Kendall, M.G.: Rank Correlation Methods. Charles Griffin & Company Limited, London (1948)
15. Kronenberg, H.: Wie wird der Sichtbarkeitsindex berechnet? (2013). http://www.sistrix.de/frag-sistrix/was-ist-der-sistrix-sichtbarkeitsindex/
16. Kumar, L., Kumar, N.: SEO technique for a website and its effectiveness in context of Google search engine. Int. J. Comput. Sci. Eng. (IJCSE) **2**, 113–118 (2014)
17. Weinberg, L., Knapp, S., Abramowitz, S.: Exploring Relationships Between two Variables. Data Analysis for the Behavioral Sciences Using SPSS. Cambridge University Press, Cambridge (2002)
18. Lim, Y.S., Han, W.P.: How do congressional members appear on the web? Tracking the web visibility of South Korean politicians. Govern. Inf. Q. **28**(4), 514–521 (2011)
19. Maynes, R., Everdell, I.: The Evolution of Google Search Results Pages and Their Effects On User Behaviour (2014). http://www.mediative.com/whitepaper-the-evolution-of-googles-search-results-pages-effects-on-user-behaviour/
20. McCullough, B.D., Wilson, B.: On the accuracy of statistical procedures in Microsoft Excel 2003. Comput. Stat. Data Anal. **49**(4), 1244–1252 (2005)
21. McGee, M.: Winners & Losers As Panda 2.0 Goes Global? eHow, Bing's Ciao.co.uk & More (2011). http://searchengineland.com/winners-losers-panda-goes-global-ehow-bings-ciao-more-72895
22. Miles, J., Shevlin, M.: Applying regression and correlation: a guide for students and researchers. SAGE Publications Ltd., London (2001)
23. Missfeldt, M.: Case Study: Sichtbarkeitsindex und Traffic im Vergleich (2013). http://www.tagseoblog.de/case-study-sichtbarkeitsindex-und-traffic-im-vergleich
24. Rivera J., Meulen, R.V.D.: Gartner Survey Reveals Digital Marketing Budgets Will Increase by 8 Percent in 2015, (2014). http://www.gartner.com/newsroom/id/2895817
25. Roebuck, K.: Web Analytics: High-impact Strategies -What you need to know: Definitions, Adoptions, Impact, Benefits, Maturity, Vendors. Emereo Publishing, Brisbane (2012)
26. Schmidt, R., Möhring, M., Härting, R.-C., Reichstein, C., Neumaier, P., Jozinović, P.: Industry 4.0 - potentials for creating smart products: empirical research results. In: Abramowicz, W. (ed.) BIS 2015. LNBIP, vol. 208, pp. 16–27. Springer, Heidelberg (2015)
27. Schmidt-Mänz, N., Gaul, W.: Measurement of Online Visibility. In: Ahr, D., Fahrion, R., Oswald, M., Reinelt., G. (ed.) Operations Research Proceedings 2003, pp. 205–212. Springer, Berlin Heidelberg (2004)

28. Schmidt-Mänz, N., Gaul, W.: Web mining and online visibility. In: Weihs, C., Gaul, W. (eds.) Classification - the Ubiquitous Challenge. Studies in Classification, Data Analysis, and Knowledge Organization, pp. 418–425. Springer, Heidelberg (2005)
29. Schroeder, B.: Publicizing your program: website evaluation. Des. Mark. Stratge. AACE J. **15**(4), 437–471 (2007)
30. SEOlytics GmbH: SEO Software for Professionals (2015). http://www.seolytics.com/
31. SISTRIX GmbH: The secret of successful Websites (2015). http://www.sistrix.com
32. Statista Inc.: Worldwide market share of leading search engines from January 2010 to January 2015 (2015). http://www.statista.com/statistics/216573/worldwide-market-share-of-search-engines/
33. Statisticbrain LLC: Google Annual Search Statistics (2015). http://www.statisticbrain.com/google-searches/
34. Tober, M.: Update: Google "Bad" SEO Update - Now named Penguin Update (2012). http://blog.searchmetrics.com/us/2012/04/25/google-bad-seo-update-a-first-earthquake-on-the-short-head/
35. XOVI GmbH: SEO and Social Monitoring made in Germany (2015). http://www.xovi.com/
36. Zikmund, W., Babin, B., Carr, J., Griffin, M.: Business Research Methods, 9th edn. South-Western College Pub, Nashville (2012)
37. Gruen, T.W., Summers, J.O., Acito, F.: Relationship marketing activities, commitment, and membership behaviors in professional associations. J. Mark. **64**(3), 34–49 (2000)
38. Killoran, J.B.: How to use search engine optimization techniques to increase website visibility. IEEE Trans. Prof. Commun. **56**(1), 50–66 (2013)