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Visualization analysis on the research hot spots and fronts of knowledge management

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ABSTRACT

A total of 28082 publications regarding knowledge management indexed by Web of Science during 2009 to 2014 were used for a detailed analysis of the research fronts and hot spots on knowledge management. The literature statistics shows a steady growth of high level academic papers, which means research of knowledge management is still one of the important field in current research. The regional analysis shows researches in USA plays the most important role in the world, while the cooperation and communication between universities need to be promoted. Through journal co-citation analysis, some important journals in KM field are indicated according to the citation frequency and centrality of journals. The co-word network analysis of hot spots and knowledge mapping analysis of research fronts are also conducted. The results shows that management, knowledge, performance and system are the research hot spots in knowledge management, and the research fronts include the semi-structural-interviews, natural-resource, American-society, first-case and so on. The paper may provide valuable suggestions for better understanding on the research status of knowledge management.

KEYWORDS

Knowledge management; Knowledge maps; Research hot spots and fronts; Literature statistics.



INTRODUCTION

The research of knowledge management has attracted a large number of researchers for many years^[1-3]. Among the researches, it is necessary for us to find out the related fields that knowledge management involved. And for further research, we need to identify the research fronts and hot spots in these years.

In this paper, the related quantitative analysis on knowledge management in recent years was conducted by the information visualization tool CitespaceII, such as, the analysis of the current research status of knowledge management by statistics on authoritative literature; the knowledge maps of countries, institutions and journals involved in the research field of knowledge management; and the research hot spots and development trend through the analysis on the word frequency and the frequency change of the words^[4].

DATA SOURCES AND RESEARCH METHODS

Data sources

To ensure that the analysis of this paper can represent the mainstream of the current research status, we chose literature from Web of Science as data sources. Data was collected on March 23, 2014, by selecting the retrieval theme for "knowledge management" and the time span for 2009-2014, including databases of SCI - EXPANDED, SSCI, CPCI - S, the CPCI - SSH, CCR - EXPANDED, and IC. The type of literature was refined to "Article" with data download mode as "all records". Then a total of 28082 articles were acquired for further analysis.

Research method

The visualization tool, CitespaceII, which was developed by Dr. Chen Chaomei of Drexel University based on Java platform, is a method of drawing knowledge maps on quantitative analysis. It is often used to find out the research progress, research fronts and corresponding knowledge foundations^[4]. This paper mainly used CitespaceII to analyze the literature records to find out the main countries, the core institutions and journals in knowledge management field; analyze the co-occurrence of keywords and detect the burst terms to identify the research hot spots and fronts.

LITERATURE DISTRIBUTION STATISTICS

Annual distribution

Figure 1 shows the quantity of publications from Jan 1, 2009 to March 23, 2014. As we can see, the amount of papers published has been gradually growing since 2009 (data of 2014 is incomplete).

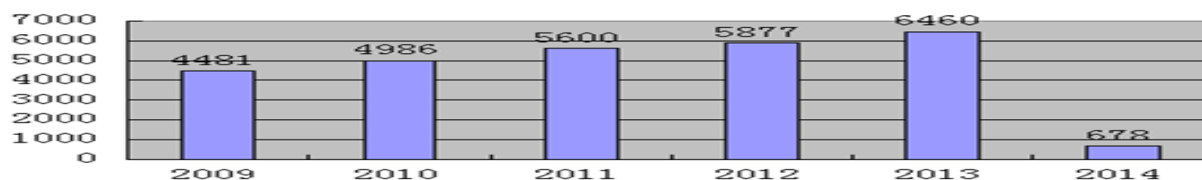


Figure 1 : Quantity of publications from 2009 to 2014

From Figure 1, we can see that with the steady development of the related researches, knowledge management is still one of the hot spot of current research. This suggests that with healthy development trend of this subject, the research of knowledge management would have good prospect for the next few years.

Regional distribution

In this part, data was input into the CitespaceII by selecting 1 year as the time interval, country as the node type, and then the critical path (Pathfinder) algorithm and appropriate threshold were chosen to acquire the visualization map of country network, as shown in Figure 2.

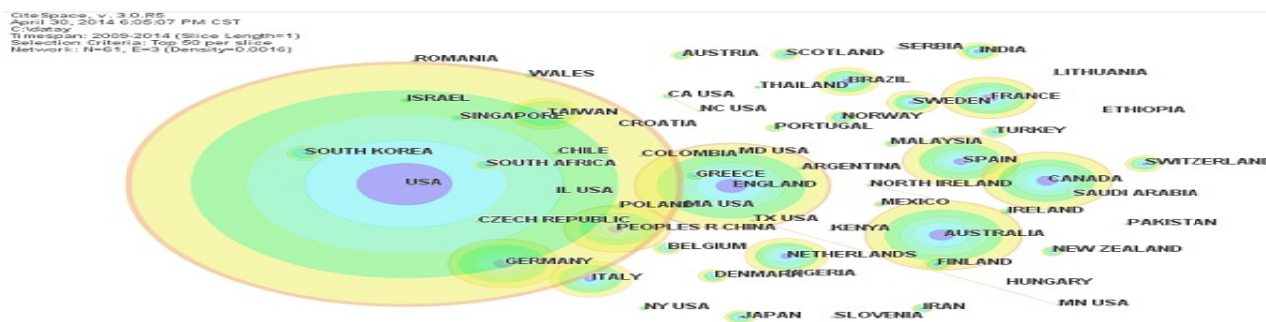


Figure 2 : Regional distribution of knowledge management research

In Figure 2, we got 61 nodes and 3 lines. Each node represents a country, and the size of nodes represents the quantity of papers, in which the greater the node is, means the more papers the country published. The line between nodes represents the cooperation between countries. The more lines the countries exist, means the more closely cooperation between countries^[4].

From Figure 2, we can see that the node of USA is significantly bigger than others. That is to say, USA has published the most papers and occupies an important position in the field of knowledge management, followed by England, Australia, Canada, Spain, Germany, China, France, Italy, the Netherlands, etc. But we can also see that there are only 3 lines among 61 countries. This suggest that the cooperation among countries in recent years is not enough, which may bring negative effect to the future development of knowledge management research.

Institution distribution

In Figure 3, we got 79 nodes and 1 line. Each node represents an institution, and the size of nodes represents the quantity of papers. The lines between nodes represent the cooperation between institutions.

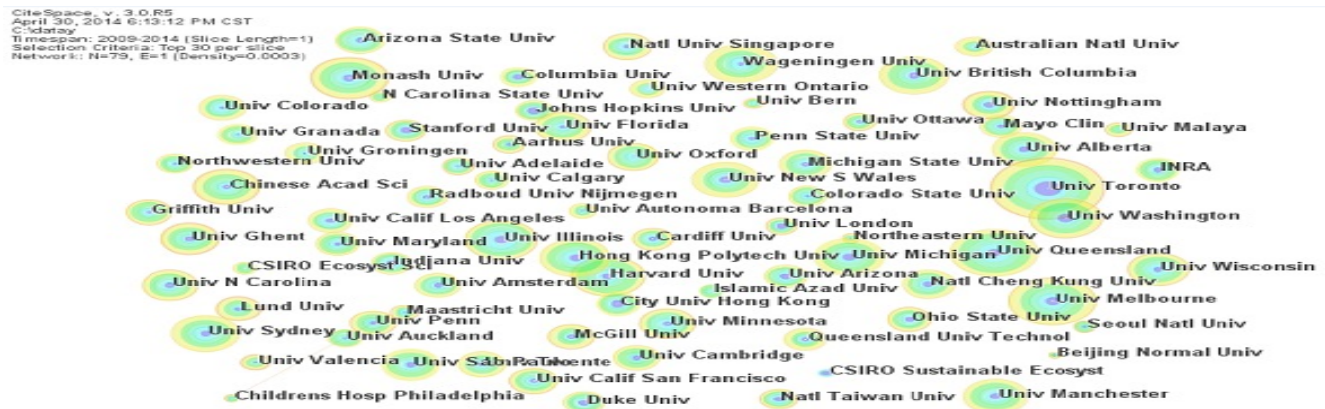


Figure 3 : Institution distribution of knowledge management research

According to the quantity of papers in Figure 3, Toronto University takes the first place which is up to 182 published papers^[5-7], followed by University of Melbourne^[8], University of Queensland^[9], Monash University, Harvard University, University of Washington, Wageningen University, University of Illinois, University of British Columbia, University of Michigan, etc. Among the top ten institutions, there are 4 universities from USA, 2 universities from Britain, 3 universities from Australia, 1 university from Netherlands, which is basically consistent with the results of Figure 2.

However, it is clearly from the Figure 3 that there is only 1 line among 79 institutions, which reveals the blocked communication between institutions on the research field of knowledge management. which will be adverse to the long-term development of knowledge management research. Universities are the important institutions for academic research, that it is necessary to break the blocks between universities. For the further development of the research, we need to promote the cooperation and communication between universities.

Journal co-citation analysis

In Figure 4, we got 80 nodes and 179 lines. Each node represents a journal, and the size of nodes represents the quantity of papers. The lines between nodes represent the co-citation between journals.

It is common that the citation frequency of journal represents the importance of the journals in the research field. Therefore, we need to find out the journals with high citation frequency and centrality.



Figure 4 : Visualization map of journal co-citation

Figure 4 shows the knowledge map of journal co-citation, from which we can identify the important journals in the field of knowledge management, from which, we list some important journals with their citation frequency and centrality in the research of knowledge management.

TABLE 1 : Important journals in knowledge management

Journals ^o	Frequency ^o	Journals ^o	Centricity ^o
ACAD MANAGE REV ^o	3236 ^o	ORGAN SCI ^o	0.07 ^o
ORGAN SCI ^o	3053 ^o	J APPL PSYCHOL ^o	0.05 ^o
STRATEGIC MANAGE J ^o	2825 ^o	MIS QUART ^o	0.04 ^o
ACAD MANAGE J ^o	2808 ^o	J MANAGE INFORM SYST ^o	0.04 ^o
SCIENCE ^o	2683 ^o	TECHNOVATION ^o	0.03 ^o
ADMIN SCI QUART ^o	2486 ^o	STRATEGIC MANAGE J ^o	0.03 ^o
MANAGE SCI ^o	2435 ^o	J MANAGE STUD ^o	0.03 ^o
NEW ENGL J MED ^o	2379 ^o	CALIF MANAGE REV ^o	0.03 ^o

Combining with Figure 4 and TABLE 1, we can see that the node of "ACAD MANAGE REV" is the biggest which means its citation frequency was the highest, up to 3236, followed by ORGAN SCI, STRATEGIC MANAGE J, ACAD MANAGE J, SCIENCE, etc. From which we can conclude that these are representative journals in the research field of knowledge management. However, considering the centrality, "ORGAN SCI" shows the highest centrality, followed by J APPL PSYCHOL, MIS QUART, J MANAGE INFORM SYST, TECHNOVATION and so on. These journals could be seen as the core journals in the research field of knowledge management. Therefore, apart from the published quantities of related papers, we should pay attention to the citation frequency and centrality of the journals as well for the better understandings of the research field.

ANALYSIS ON RESEARCH HOT SPOTS AND FRONTS

Analysis on research hot spots

Keywords or terms are the core and essence of a paper, which is often used to represent the core meaning and the research field of papers^[4]. In this part, data was input into the CitespaceII, by choosing keyword and term as the node type, and then the critical path (Pathfinder) algorithm and appropriate threshold were chosen to acquire the following co-word network map.



Figure 5 : Knowledge map of research hot spots in knowledge management field

In the above co-word network map, each node represents a keyword or term (circular nodes represent keywords, and square nodes represent terms), and the different colours of the circle around the nodes extend outward describe time series of the keyword appeared in different years. The thickness of the circle is proportional to the keyword frequency in corresponding year which means the thicker the circle is, the higher frequency the keyword is. And nodes with purple circles are the key nodes which represent the hot spots in the research field^[4]. In this network, we can find out five key nodes which are "management"^[10-12], "knowledge"^[13-15], "performance"^[16-18], "systems"^[19,20], and "education"^[21,22]. It means that in these 5 years, the researches of knowledge management mainly focus on these 5 aspects. And the details of the hot spots in each year are listed in next table.

TABLE 2 : Lists of hot spots in knowledge management field

2009 ^o	2010 ^o	2011 ^o	2012 ^o	2013 ^o	2014 ^o
management ^o	model ^o	impact ^o	children ^o	diagnosis ^o	firm performance ^o
knowledge ^o	risk ^o	care ^o	outcomes ^o	perceptions ^o	gender ^o
performance ^o	quality ^o	system ^o	competitive advantage ^o	disease ^o	infection ^o
care ^o	education ^o	behavior ^o	environment ^o	therapy ^o	grasslands ^o
perceptions ^o	prevalence ^o	innovation ^o	surgery ^o	design ^o	consumption ^o
children ^o	United-states ^o	perspective ^o	primary-care ^o	governance ^o	landscape ^o
information ^o	guidelines ^o	attitudes ^o	strategies ^o	health ^o	childhood ^o
quality ^o	framework ^o	uncertainty ^o	questionnaire ^o	patient ^o	manufacturing performance ^o
challenges ^o	conservation ^o	technology ^o	quality-of-life ^o	experience ^o	infancy ^o
impact ^o	communication ^o	trust ^o	scale ^o	epidemiology ^o	buprenorphine ^o

Combining Figure 5 with TABLE 2, we can clearly see the change of the hot spots from 2009 to 2014. In 2009, the hot spots of knowledge management are management, knowledge, performance, care, perceptions, etc.; while in 2010, model^[23,24], risk^[25], quality, and education become the hot spots; in 2011 are impact^[26,27], care^[28], system, behavior, etc.; and during the first 3 months in 2014 firm performance^[29,30], gender, infection, grasslands become the hot spots.

Analysis on research fronts

It is commonly agreed that research fronts are the most advanced and the latest researches in the research field. Here, we use word frequency detection technology of CitespaceII to analyze the retrieved data to detect the words with high frequency rate (burst term) from a large number of keywords. Therefore, the change of word frequency was used to identify the fronts and developing trend of knowledge management research as well.

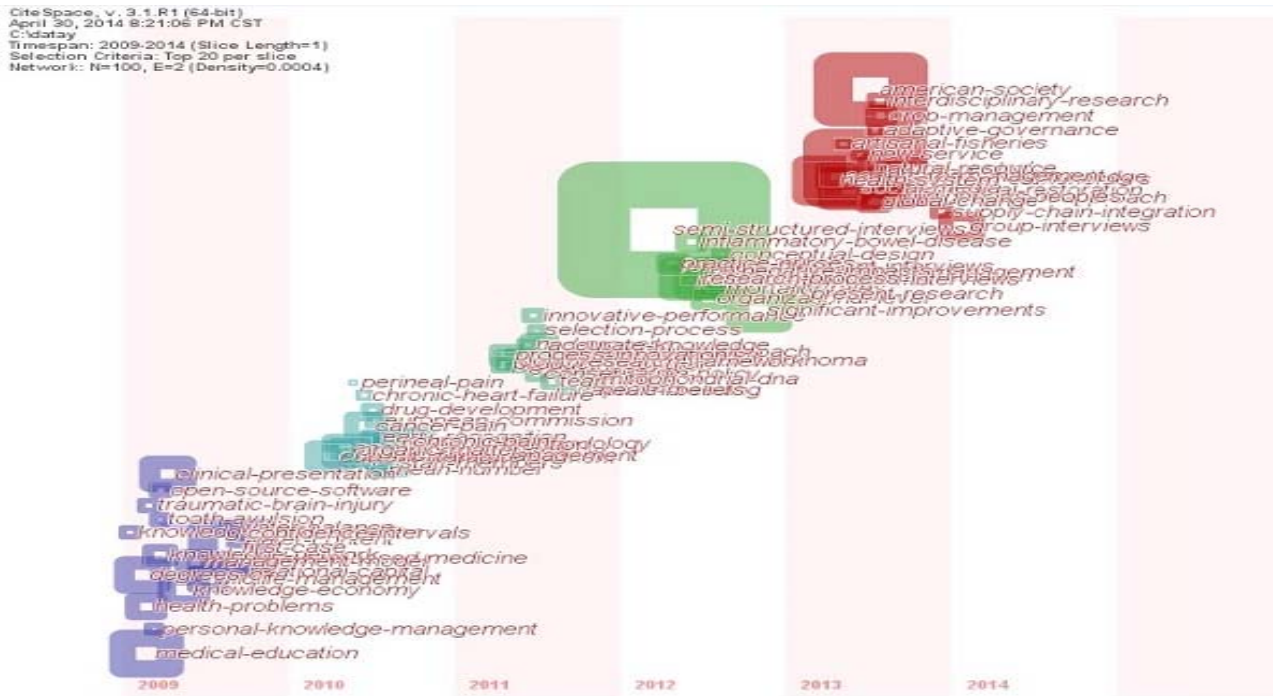


Figure 6 : knowledge map of research fronts in knowledge management field

From Figure 6, we can see that the biggest node is "semi-structural-interviews"^[31,32], with the highest frequency rate which is up to 93, followed by "natural-resource"^[33,34], "American-society", first-case^[35], health-system^[36,37], medical-education^[38-40]. These are considered as the important front fields of knowledge management. In addition, with the change of word frequency trends, we find that the research fronts in knowledge management also include social-medial^[41, 42], significant-literature, clinical-presentation^[43, 44], disaster-management^[45], group-interviews, health-problems, care-management, knowledge-economy, organic-matter, special-attention, chronic-pain, etc.

DISCUSSION AND LIMITATIONS

From the analysis above, we can draw the following conclusions. 1) Knowledge management is still one of the important fields in current research with steady growth of high level academic papers. 2) The study of knowledge management is becoming deepened and differentiated, for example, the research hot spots are dispersed and combining with other research fields more deeply. But there also exist the following problems, such as the inadequate cooperation between countries and the blocked communication between institutions. These problems will have negative influence on the knowledge management research. 3) According to the knowledge maps of regional distribution, institution distribution, journal co-citation, research hot spots and research fronts, we can draw the conclusions that The United States occupies the most important position in the research field of knowledge management, followed by England and Australia; University of Toronto has the most quantities of published papers, followed by University of Melbourne and University of Queensland; the research hot spots in these years are management, knowledge, performance, systems, education; and the research fronts are semi-structural interviews, natural-resource, American-society, first-case, health-system, medical-education, etc.

However, there are still some limitations in this study, for example, the threshold is selected by the researcher's experience and paper collection is not very comprehensive which would be improved in the future studies.

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REFERENCES

- [1] M.Alavi, D.E.Leidner; Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues, *J.MIS quarterly*, 107-136 (2001).
- [2] K.M.Wiig; Knowledge management: Where did it come from and where will it go?, *J.Expert systems with applications*, **13(1)**, 1-14 (1997).
- [3] A.H.Gold, A.Malhotra, A.H.Segars; Knowledge management: an organizational capabilities perspective, *J.Journal of Management Information Systems*, **18(1)**, 185-214 (2001).
- [4] C.Chen; Cite space II: Detecting and visualizing emerging trends and transient patterns in scientific literature, *J.Journal of the American Society for information Science and Technology*, **57(3)**, 359-377 (2006).
- [5] S.E.Straus, J.M.Tetroe, I.D.Graham; Defining knowledge translation, *J.Canadian medical association journal*, **181(3-4)**, 165-168 (2009).
- [6] S.E.Straus, J.M.Tetroe, I.D.Graham; Knowledge translation is the use of knowledge in health care decision making, *J.Journal of clinical epidemiology*, **64(1)**, 6-10 (2011).
- [7] S.Straus, R.B.Haynes; Managing evidence-based knowledge: the need for reliable, relevant and readable resources, *J.Canadian Medical Association Journal*, **180(9)**, 942-945 (2009).
- [8] P.Lee, N.Gillespie, L.Mann et al; Leadership and trust: Their effect on knowledge sharing and team performance, *J.Management Learning*, (2010).
- [9] D.Sedera, G.G.Gable; Knowledge management competence for enterprise system success, *J.The Journal of Strategic Information Systems*, **19(4)**, 296-306 (2010).
- [10] C.J.Chen, J.W.Huang; Strategic human resource practices and innovation performance-The mediating role of knowledge management capacity, *J.Journal of Business Research*, **62(1)**, 104-114 (2009).
- [11] M.Zack, J.McKeen, S.Singh; Knowledge management and organizational performance: an exploratory analysis, *J.Journal of Knowledge Management*, **13(6)**, 392-409 (2009).
- [12] D.Yates, S.Paquette; Emergency knowledge management and social media technologies: A case study of the 2010 Haitian earthquake, *J.International Journal of Information Management*, **31(1)**, 6-13 (2011).
- [13] W.Zheng, B.Yang, G.N.McLean; Linking organizational culture, structure, strategy, and organizational effectiveness: Mediating role of knowledge management, *J.Journal of Business Research*, **63(7)**, 763-771 (2010).
- [14] M.Levy; WEB 2.0 implications on knowledge management, *J.Journal of knowledge management*, **13(1)**, 120-134 (2009).
- [15] J.S.Holste, D.Fields; Trust and tacit knowledge sharing and use, *J.Journal of knowledge management*, **14(1)**, 128-140 (2010).
- [16] M.Zack, J.McKeen, S.Singh; Knowledge management and organizational performance: An exploratory analysis, *J.Journal of Knowledge Management*, **13(6)**, 392-409 (2009).
- [17] B.S.Fugate, T.P.Stank, J.T.Mentzer; Linking improved knowledge management to operational and organizational performance, *J.Journal of Operations Management*, **27(3)**, 247-264 (2009).
- [18] C.T.Ho; The relationship between knowledge management enablers and performance, *J.Industrial Management & Data Systems*, **109(1)**, 98-117 (2009).
- [19] R.Maier, T.Hädrich; Knowledge Management Systems, J., (2011).

- [20] W.He, Y.Fang, K.K.Wei; The role of trust in promoting organizational knowledge seeking using knowledge management systems: An empirical investigation, *J.Journal of the American Society for Information Science and Technology*, **60(3)**, 526-537 (2009).
- [21] P.D.Brewer, K.L.Brewer; Knowledge management, Human resource management, and higher education: A theoretical model, *J.Journal of Education for Business*, **85(6)**, 330-335(2010).
- [22] S.D.Ramachandran, S.C.Chong, H.Ismail; The practice of knowledge management processes: A comparative study of public and private higher education institutions in Malaysia, *J.Vine*, **39(3)**, 203-222 (2009).
- [23] M.L.Tseng; An assessment of cause and effect decision-making model for firm environmental knowledge management capacities in uncertainty, *J.Environmental Monitoring and Assessment*, **161(1-4)**, 549-564 (2010).
- [24] L.Kanapeckiene, A.Kaklauskas, E.K.Zavadskas et al.; Integrated knowledge management model and system for construction projects, *J.Engineering Applications of Artificial Intelligence*, **23(7)**, 1200-1215 (2010).
- [25] P.Massingham; Knowledge risk management: a framework, *J.Journal of Knowledge Management*, **14(3)**, 464-485 (2010).
- [26] R.M.Al-Adaileh, M.S.Al-Atawi; Organizational culture impact on knowledge exchange: Saudi Telecom context, *J.Journal of Knowledge Management*, **15(2)**, 212-230 (2011).
- [27] L.E.Sánchez, A.Morrison-Saunders; Learning about knowledge management for improving environmental impact assessment in a government agency: The Western Australian experience, *J.Journal of environmental management*, **92(9)**, 2260-2271 (2011).
- [28] C.Delaney, B.Apostolidis, L.Lachapelle et al.; Home care nurses' knowledge of evidence-based education topics for management of heart failure, *J.Heart & Lung: The Journal of Acute and Critical Care*, **40(4)**, 285-292 (2011).
- [29] Y.Xue, J.Bradley, H.Liang; Team climate, Empowering leadership, And knowledge sharing, *J.Journal of Knowledge Management*, **15(2)**, 299-312 (2011).
- [30] C.Camisón, A.Villar-López; Organizational innovation as an enabler of technological innovation capabilities and firm performance, *J.Journal of Business Research*, **67(1)**, 2891-2902 (2014).
- [31] N.Baninajarian, Z.Abdullah; Groups in context: A model of group effectiveness, *J.European Journal of Social Sciences*, **8(2)**, 335-340 (2009).
- [32] K.H.Shih, Y.T.Liu, C.Jones et al.; The indicators of human capital for financial institutions, *J.Expert Systems with Applications*, **37(2)**, 1503-1509 (2010).
- [33] C.Prell, K.Hubacek, M.Reed; Stakeholder analysis and social network analysis in natural resource management, *J.Society and Natural Resources*, **22(6)**, 501-518 (2009).
- [34] J.L.Apfelbaum, C.A.Hagberg, R.A.Caplan et al.; Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway, *J.Anesthesiology*, **118(2)**, 251-270 (2013).
- [35] C.P.Friedman, A.K.Wong, D.Blumenthal; Achieving a nationwide learning health system, *J.Science Translational Medicine*, **2(57)**, 57cm29-57cm29 (2010).
- [36] Y.Okuda, E.O.Bryson, S.DeMaria et al.; The utility of simulation in medical education: what is the evidence?, *J.Mount Sinai Journal of Medicine: A Journal of Translational and Personalized Medicine*, **76(4)**, 330-343 (2009).
- [37] B.Hughes, I.Joshi, H.Lemondé et al.; Junior physician's use of Web 2.0 for information seeking and medical education: a qualitative study, *J.International journal of medical informatics*, **78(10)**, 645-655 (2009).
- [38] Y.Okuda, E.O.Bryson, S.DeMaria et al.; The utility of simulation in medical education: what is the evidence?, *J.Mount Sinai Journal of Medicine: A Journal of Translational and Personalized Medicine*, **76(4)**, 330-343 (2009).
- [39] B.Hughes, I.Joshi, H.Lemondé et al.; Junior physician's use of Web 2.0 for information seeking and medical education: A qualitative study, *J.International journal of medical informatics*, **78(10)**, 645-655 (2009).
- [40] K.Barnett, S.W.Mercer, M.Norbury et al.; Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study, *J.The Lancet*, **380(9836)**, 37-43 (2012).
- [41] D.Zeng, H.Chen, R.Lusch et al.; Social media analytics and intelligence, *J.Intelligent Systems, IEEE*, **25(6)**, 13-16 (2010).
- [42] N.Dabbagh, A.Kitsantas; Personal learning environments, Social media, and self-regulated learning: A natural formula for connecting formal and informal learning, *J.The Internet and higher education*, **15(1)**, 3-8 (2012).
- [43] A.Jones, J.T.Murphy; Theorizing practice in economic geography: Foundations, Challenges, and possibilities, *J.Progress in Human Geography*, (2010).
- [44] G.A.Lanza, F.Crea; Primary coronary microvascular dysfunction clinical presentation, pathophysiology, and management, *J.Circulation*, **121(21)**, 2317-2325 (2010).
- [45] P.Tran, R.Shaw, G.Chantry et al.; GIS and local knowledge in disaster management: a case study of flood risk mapping in Viet Nam, *J.Disasters*, **33(1)**, 152-169 (2009).