



COMPUTER MODELLING AND NEW TECHNOLOGIES

2016
VOLUME 20 NO 2

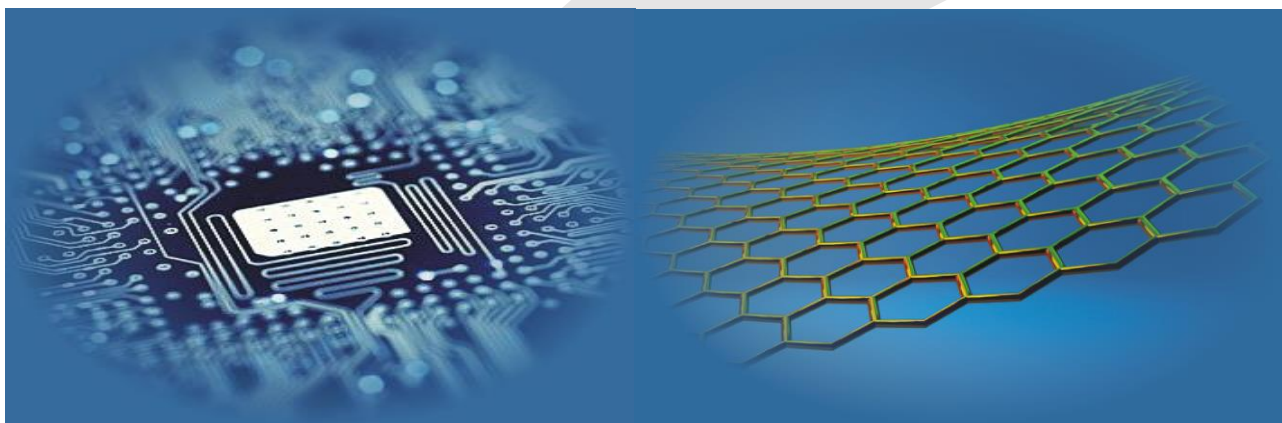
ISSN 1407-5806 ISSN 1407-5814 on-line

Latvian Transport Development and Education Association

Computer Modelling and New Technologies

2016 Volume 20 No 2

ISSN 1407-5806, ISSN 1407-5814 (*On-line: www.cmnt.lv*)



Riga – 2016

EDITORIAL BOARD

Prof. Igor Kabashkin	Chairman of the Board , <i>Transport & Telecommunication Institute, Latvia</i>
Prof. Yuri Shunin	Editor-in-Chief , <i>ISMA University, Latvia</i>
Prof. Adolfas Baublys	<i>Vilnius Gediminas Technical University, Lithuania</i>
Prof. Stefano Bellucci	<i>Frascati National Laboratories – National Institute of Nuclear Physics, Italy</i>
Dr. Brent Bowen	<i>Embry-Riddle Aeronautical University, United States of America</i>
Prof. Olgierd Dumbrajs	<i>University of Latvia, Solid State Physics Institute, Latvia</i>
Prof. Pavel D'yachkov	<i>Kurnakov Institute for General and Inorganic Chemistry, Russian Academy of Sciences, Russian Federation</i>
Prof. Dietmar Fink	<i>University of Mexico, United Mexican States</i>
Prof. Alytis Gruodis	<i>Vilnius University, Lithuania</i>
Prof. Arnold Kiv	<i>Ben-Gurion University of the Negev, Israel</i>
Prof. Vladimir Litovchenko	<i>V. Lashkaryov Institute of Semiconductor Physics of National Academy of Science of Ukraine, Ukraine</i>
Prof. Sergey Maksimenko	<i>Institute for Nuclear Problem, Belarus State University, Belarus</i>
Prof. Ravil Muhamedyev	<i>International IT University, Kazakhstan</i>
Prof. Eva Rysiakiewicz-Pasek	<i>Institute of Physics, Wroclaw University of Technology, Poland</i>
Prof. Michael Schenk	<i>Fraunhofer Institute for Factory Operation and Automation IFF, Germany</i>
Prof. Kurt Schwartz	<i>Gesellschaft für Schwerionenforschung mbH, Darmstadt, Germany</i>
Contributing Editor	Prof. Victor Gopeyenko, <i>ISMA University, Latvia</i>
Literary Editor	Prof. Tamara Lobanova-Shunina, <i>Riga Technical University, Latvia</i>
Technical Editor , secretary of Editorial Board	MSc Comp Nataly Burluckaya, <i>ISMA University, Latvia</i>

Journal topics:	Publisher	Supporting Organizations
<ul style="list-style-type: none"> mathematical and computer modelling computer and information technologies natural and engineering sciences operation research and decision making nanoscience and nanotechnologies innovative education 	Latvian Transport Development and Education Association	Latvian Academy of Sciences Latvian Operations Research Society Transport and Telecommunication Institute, Latvia Fraunhofer Institute for Factory Operation and Automation IFF, Germany International IT University, Kazakhstan

Articles should be submitted in **English**. All articles are reviewed.

EDITORIAL CORRESPONDENCE	COMPUTER MODELLING AND NEW TECHNOLOGIES, 2016, Vol. 20, No.2 ISSN 1407-5806, ISSN 1407-5814 (on-line: www.cmnt.lv)
Latvian Transport Development and Education Association	Scientific and research journal The journal is being published since 1996
68 Graudu, office C105, LV-1058 Riga, Latvia Phone: +371 29411640 E-mail: yu_shunin@inbox.lv http://www.cmnt.lv	The papers published in Journal 'Computer Modelling and New Technologies' are included in: SCOPUS INSPEC , www.theiet.org/resources/inspec/ VINITI , http://www2.viniti.ru/ CAS Database http://www.cas.org/ EI Compendex



Editors' Remarks

A Moments Indulgence*by Rabindranath Tagore*

I ask for a moment's indulgence to sit by thy side.

The works that I have in hand I will finish afterwards.

Away from the sight of thy face my heart knows no rest nor respite, and my work becomes an endless toil in a shoreless sea of toil.

Today the summer has come at my window with its sighs and murmurs;

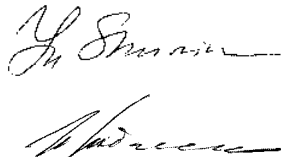
and the bees are plying their minstrelsy at the court of the flowering grove.

Now it is time to sit quite, face to face with thee, and to sing dedication of life in this silent and overflowing leisure.

Rabindranath Tagore (1861-1941)*

This 20th volume No.2 includes research papers on **Information and Computer Technologies** and **Operation Research and Decision Making**.

Our journal policy is directed to fundamental and applied scientific researches, innovative technologies and industry, which is the fundamentals of the full-scale multi-disciplinary modelling and simulation. This edition is the continuation of our publishing activities. We hope our journal will be of interest for research community and professionals. We are open for collaboration both in the research field and publishing. We hope that the journal's contributors will consider collaboration with the Editorial Board as useful and constructive.

EDITORS

Yuri Shunin**Igor Kabashkin**

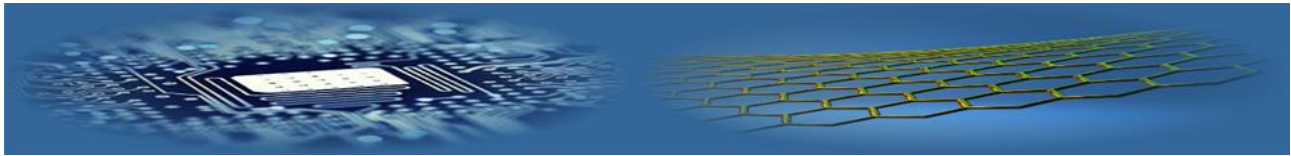
* **Rabindranath Tagore (7 May 1861 – 7 August 1941)**, was a Bengali poet, novelist, musician, painter and playwright who reshaped Bengali literature and music. As author of Gitanjali with its "profoundly sensitive, fresh and beautiful verse", he was the first non-European and the only Indian to be awarded the Nobel Prize for Literature in 1913. His poetry in translation was viewed as spiritual, and this together with his mesmerizing persona gave him a prophet-like aura in the west. His "elegant prose and magical poetry" still remain largely unknown outside the confines of Bengal.



CONTENT

OPERATION RESEARCH AND DECISION MAKING		
V Vasilienė–Vasiliauskienė, J Butviliene, T Butvilas	Project-based learning: the complexity and challenges in higher education institutions	7
E Valavichius, R Juodagalvyte, R Vipartiene	Assesment of competencies for IS specialists	11
A K Goel, Zh Tutkusheva	Impact of crude oil and US dollars price on the Indian stock exchange	15
Zh Tutkusheva, Y Mingazova	Way to leadership and competitiveness with Kaizen	23
INFORMATION AND COMPUTER TECHNOLOGIES		
I Buzko, Y Dyachenko, M Petrova, N Nenkov, D Tuleninova, K Koeva	Artificial Intelligence technologies in human resource development	26
Jian-min Liu, Min-hua Yang	CNN based learning: object classification on images from Aerial Photography	30
Authors' Index		33
Cumulative Index		34





Project-based learning: the complexity and challenges in higher education institutions

V Vasilienė–Vasiliauskienė^{1*}, J Butviliene², T Butvilas³

¹Vilnius Gediminas Technical University, Vilnius

²Vilnius Business College, Vilnius

³Mykolas Romeris University, Vilnius

Corresponding author's e-mail: virgilija.zinkeviciute@vgtu.lt

Received 1 March 2016, www.cmmt.lv

Abstract

Within the context of the 21st century education paradigm competence and new skill require new authentic learning methods. The growing popularity of the project-based learning (hereinafter PBL) paradigm, as an active, student-centric methodology, is related to extended opportunities in terms of knowledge attainment, facilitating the acquisition of several transversal competences such as team work, search and selection of information and synthesis and analysis abilities. Therefore in this paper authors would present main features of PBL identifying aspects that give both students and teachers a kind of drive for the involvement of all parties in the learning process; also discussion on the innovativeness within PBL paradigm is presented and finally some obstacles/challenges are dealt on the basis of leaving an open space for further considerations and possible explorations on the effectiveness using this approach in learning and teaching.

Keywords:

knowledge-based cooperation
networking
project-based learning

1 Introduction

The project-based learning is defined as “a teaching method in which students gains knowledge and skills by working for an extended period of time to investigate and respond to a complex question, problem or challenge” (see at Bie.org, 2014). To many scholars PBL is seen as a model, a philosophy of teaching and learning rather than as another educational strategy (Thomas, 2000; Markham, 2012; Bell, 2014; Mapes, 2009 et al.). Putting it in other words, a project-based learning is the model that organizes learning around projects. According to the definitions found in PBL handbooks for teachers, projects are complex tasks, based on challenging questions or problems, that involve students in design, problem-solving, decision making, or investigative activities; give students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations (Thomas, 2000 et al.). While other defining features found in the literature include authentic content, authentic assessment, teacher facilitation but not direction, explicit educational goals, (Moursund, 1999), cooperative learning, reflection, and incorporation of adult skills (Diehl, Grobe, Lopez, & Cabral, 1999, see in Thomas, 2000). Thus, according to Thomas (2000), we may identify some of main driving factors that enable all parties of education process to be extremely engaged within explorative activities in various fields of studies: i) PBL projects are focused on questions or problems that “drive” students to encounter (and struggle with) the central concepts and principles of a discipline; ii) projects involve students in a constructive investigation; iii) projects are student-driven to some significant degree; iv)

projects are realistic, not school-like.

Implementation of PBL concept addresses the European Higher Education Area (EHEA) call that urges students to be engaged in more autonomous work. Self regulated educational process is seen as an effective pathway to involve digital-age learners, engage them in real-time problem solving through creative thinking. The PBL learning is approached as a managed process through projects that comprise a set of complex tasks, based on challenging questions or problems, investigative activities, decision making resulting in creation of realistic and meaningful outputs and their presentations (Thomas, 2000; Arce et al., 2013; Mapes, 2009).

Therefore, the main goal of this paper is to describe theoretically the project-based learning process, define its content, main objectives and functions, and discuss some of the challenges for both learners and teachers in HEI.

Paper design and methods mainly go from the theoretical analysis and researches made by Thomas (2000) and Lidón, Rebollar & Møller (2011) on PBL models and content. Authors have chosen the analysis, interpretation and summary of educational findings on PBL's advantages and difficulties arising from implementation this method in various learning contexts, environments and the issue of the readiness of both students and teachers.

2 The model of Project-Based Learning process

Viewing learning from a holistic approach, the PBL enables creating an integrated multilayer context composed of element from pure educational content and activities, practical experience of learners, as well knowledge led cooperation arising from networking of research and

educational organisations and business companies (see Figure 1 below). This way the organised and managed learning-teaching continues process produces a qualitatively new learning environment, which ultimately not only enhances overall educational capacities, address the 21st century demands of business world and education but also puts in practice a culture of the learning organisation (Lidón, Rebollar & Møller, 2011).

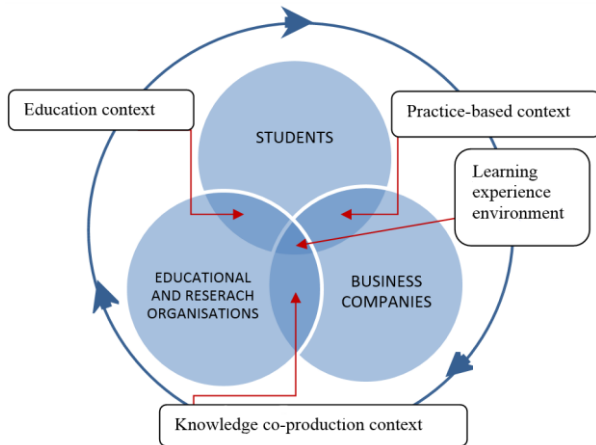


FIGURE 1 The PBL training model (Lidón, Rebollar & Møller, 2011)

These characteristics, as Thomas (2000) would stress out, can include the topic, the tasks, the roles that students play, the context within which the work of the project is carried out, the collaborators who work with students on the project, the products that are produced, the audience for the project's products, or the criteria by which the products or performances are judged. Shortly PBL incorporates real-life challenges where the focus is on authentic (not simulated) problems or questions and where solutions have the potential to be implemented. Putting in addition to the figure, shown above, along with Thomas (2000) we may state that PBL incorporates three possible paradigms based on the following aspects, such as: i) outward bound wilderness expeditions; ii) postsecondary models of "problem-based" learning, and finally iii) university-based research in cognition and cognitive science applications. Therefore figure 1 takes in it education, practice, and knowledge; all these components are mainly achieved and assessed by participating in real-life settings and in some cases – in simulative contexts. Through this model PBL incorporates and bridges up educational institutions with business corporations, and integrates students into the paradigm that goes from "theory-to-practice" and the way around.

3 The main objectives of Project-Based Learning processes

The main objectives of the method include increased student's motivation; training of valuable skills as planning and organization of the research-based learning process that will build a strong foundation for their future in a global economy; encouraging creative thinking and social skill.

According to Bell (2014), a student-driven and teacher-facilitated approach to the learning rests on such core pillars as:

- Questions-driven learning for building knowledge;
- Student choice based research under the teacher's supervision;

- Collaborative work and communication;
- Authentic projects focused on real-world problems to find solutions.

Projects as enablers to combine all mentioned aspects are seen as the curriculum. Learners through projects encounter and get familiar with central concepts of the discipline. Students are encouraged to think out of the box investigating problem related environment through open-ended questions. They must craft diverse activities in teams and individually. Projects support inter-disciplinary approach. They allow building connections between various themes and topics embracing two or more disciplines. Also, projects enable Millennial to exercise extensively their technological skills.

The uniqueness of the project based learning offers not only a greater flexibility to students, but also transforms teachers' role. In case of PBL, teachers undertake a role of facilitators, who can overcome the boundaries and limitations of the traditional classes. The method empowers academicians apply various tools combining them in a way to boost an interest and motivation of students. On the other hand, it fosters collaborative culture between teachers calling them to share knowledge and pool resources overcoming professional "silos", but also geographical boundaries and time zones. Admittedly that teachers, who are less familiar with technology-rich environment, 21st century project based teaching can be a challenge.

As Boss and Krauss (2007) admit, implementation of PBL turns teachers in lifelong learners. They are forced to conduct more research or seek out advice from business representatives. Designing projects requires long hours of planning. Also, PBL asks teachers to rethink and redesign students' assessment methods in order to reflect multiply grades and achievements doing projects.

4 The benefits of Project-Based Learning

Benefits arising from the PBL were acknowledged long before the 21st century. For instance, Dewey has already emphasized that "learning by doing has great benefit in shaping students' learning. High-quality experiences, as well as continuity of experiences, are paramount" (Dewey, 1938). Therefore for many years the PBL methodology has been exercised in fields of technical and engineering education. Nowadays it is becoming a preferred method worldwide across diverse discipline fields.

Also various research studies indicate that implementation of PBL bring tangible changes in learning-teaching experiences and learning environment. To Thomas (2000), project based learning transforms students work habits and effectiveness. As Boss and Krauss point out students acquire "new patterns of thinking, they learn how to capitalize on the wisdom of the group, and, most importantly, they continually learn how to learn together" (Boss and Krauss, 2007, p. 30). As a rule, students demonstrate a greater interest, engagement and mastery approaching various disciplines. Thus the project based learning contributes in growth of community of practice.

Professional learning of teachers differs from a peer-to-peer collaboration of students. The PBL brings together like-minded people forming teachers' learning communities. It enables increase of a critical mass of educators who share the same goal. Innovative thinking teachers together can

lobby seeking to decrease teachers' isolation through more extensive networking in- and out the educational sector; increase shared responsibility, improve time and resource management, better cope with technological challenges, gain more power promoting time needed changes in a systematic way.

From the perspective of business, PBL method is also a source of a set of benefits. Projects require real-life problems, and thus open door for business organisations to better articulate and share business needs, test new business ideas just at a symbolic cost. Being participants of learning environment, companies can shape teaching-learning process specifying existing gaps in education field, share special training modules, launch internships in order to grow talents for their own needs. The PBL enables business organisations to avoid additional investment and risks that are related with retraining of post- graduates and prevent misuse of managers' time involved in the development of specialists.

5 Challenges for teachers and learners using Project-Based Learning approach

As Thomas (2000) and other scientists (e.g. Edelson et al., 1999; Lidón, Rebollar & Møller, 2011; Bell, 2014; Mapes, 2009) would point out about the existing problems/difficulties while implementing PBL method with students, there could be such aspects of challenges indicated: i) research on PBL implementation is largely limited to research on project-based science administered by teachers with limited prior experience with PBL. From this research, there is evidence that PBL is relatively challenging to plan and enact. Keeping the limitations of this research in mind, it is probably fair to say that most teachers will find aspects of PBL planning, management, or assessment fairly challenging and will benefit from a supportive context for PBL administration; ii) there is some evidence that students have difficulties benefiting from self-directed situations, especially in complex projects. Chief among these difficulties are those associated with initiating inquiry, directing investigations, managing time, and using technology productively. The effectiveness of PBL as an instructional method may depend, to a greater extent than we recognize, on the incorporation of a range of supports to help students learn how to learn (see in Thomas, 2000).

For instance, Edelson et al. (1999) in their researches would mainly focus on inquiry-based learning approach, however, this is tightly linked to what we have just described as project-based learning and some of the issues arising within inquiry-based learning might appear almost the same in using PBL method as well. These major issues, as authors would identify, are as follows:

- 1) *Students' motivation, their willingness*: for students to engage in a way that can contribute to meaningful learning they must be sufficiently motivated. PBL as well as the inquiry-based learning require a higher level of motivation on the part of learners than is demanded by most traditional educational activities. To foster learning, that motivation must be the result of interest in the investigation, its results, and their implications. When students are not sufficiently motivated, they simply either fail to participate or they participate in a disengaged manner that does not

support learning.

- 2) *Knowing the ways of how to explore and investigate the cases*. For students to engage in both PBL and in inquiry, they must know how to perform the tasks that their investigation requires, they must understand the goals of these practices, and they must be able to interpret their results. Scientific investigation techniques such as data collection and analysis can be complicated and typically require a level of precision and care that are not required of students in their everyday experiences. If students are not able to master these techniques, then they cannot conduct investigations that yield meaningful results.
- 3) *Knowledge that students have from previous experience*. The formulation of research questions, the development of a plan, and the data collection, analysis, and interpretation of that data – all require both scientific and practical experience/knowledge. In designing an appropriate PBL process, the challenge might appear in providing opportunities for learners to both develop and apply that scientific understanding. If students lack this knowledge and the opportunity to develop it, then they will be unable to complete meaningful explorations.
- 4) *Managerial skills*. To achieve the ultimate goal, students must be able to organize and manage complex, extended activities. An investigation requires planning and coordination of activity and the management of resources and work products. Students are not typically asked to manage extended complex processes as part of traditional educational activities. If they are unable to organize their work and manage an extended process, students cannot engage in PBL.
- 5) *Limits of the learning contexts*. The technologies and activities of PBL must fit within the practical constraints of the learning environment. Meeting the constraints of the environment is a critical consideration in design that must be considered alongside learning needs in the design of curriculum and technology (see in Edelson et al., 1999).

On the other hand Mapes (2009) would talk about many similar issues that occur while implementing PBL method in educational practice, i.e. both students and teachers face a much more complex set of challenges in PBL experiences not associated with the application of more prescriptive lessons. Particularly students mainly face with:

- 1) generation of meaningful questions;
 - 2) management of complexity and time;
 - 3) transformation of data;
 - 4) development of logical rationale to support decisions.
- While teachers would encounter the following difficulties:
- 1) time: PBL investigative projects as such require more planning time and classroom time than typical lessons on both long term and daily bases;
 - 2) classroom management as teachers must balance student autonomy with order;
 - 3) subject depth: teachers need to focus on a driving question and link concepts and diverse activities,

helping the students to construct their own knowledge rather than didactically teach single subjects;

- 4) assessment: PBL requires alternative forms of evaluating the student's knowledge.

In order to effectively overcome these complexities, teachers must make profound changes in the way they teach.

Therefore, as Mapes (2009) states, that a primary criticism of project work is that it often leads to doing for the sake of doing. Project work is popular with both students and teachers and given that typical classroom initiatives are grass roots efforts unguided by research or theory this is a likely result. Unless challenged to do so by the conditions of the project it is unlikely that students will learn new skills or processes (Mapes, 2009; Bell, 2014 et al.).

6 Conclusions


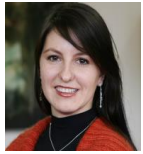

The project based learning is a student-centric methodology that extends opportunities of all participating parties of educational environment. Projects themselves are seen as curriculums that involve a wide range of tools and aspects necessary for a successful professional training.

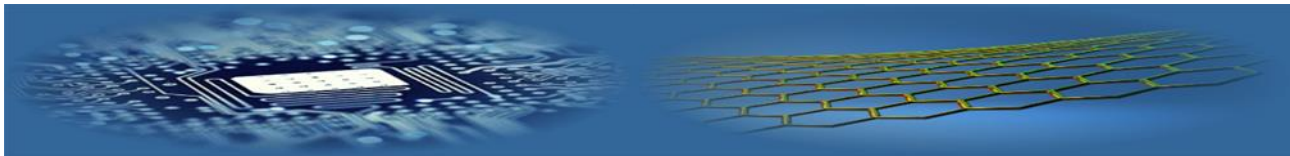
The PBL concept is based on a close networking of student groups, research and educational institutions and business organisations. Also the PBL learning is approached as a managed process through projects that comprise a set of complex tasks and activities, oriented towards real-time problems solving.

Through PBL, students, teachers and business companies can gain different benefits, which all together create favourable conditions to address the challenges of a changing society in this day and age.

References

- [1] Arce M, Míguez-Tabarés J, Granada E, Míguez C, Cacabelos A 2013 Project-based learning: application to a research master subject of thermal engineering *Journal of Technology and Science Education* **3**(3)
- [2] Bell S 2014 Project-Based Learning for the 21st Century: Skills for the Future *The Clearing House: A Journal of Educational Strategies* **83**(2) 39-43
- [3] Bie.org 2014 *What is PBL?* http://bie.org/about/what_pbl
- [4] Boss S, Krauss J 2007 *Reinventing project-based learning: your field guide to real-world projects in the digital age*
- [5] Edelson D C 1999 Addressing the Challenges of Inquiry-Based Learning through Technology and Curriculum Design *The Journal of the Learning Sciences* **8**(3-4) 391-450
- [6] Lidón L, Rebollar R, Møller C 2011 A collaborative learning environment *Innovations in Education and Teaching* **48**(3)
- [7] Mapes M R 2009 *Effects and Challenges of Project-Based Learning: A Review* https://www.nmu.edu/sites/DrupalEducation/files/UserFiles/Files/Pre-Drupal/SiteSections/Students/GradPapers/Projects/Junak-Mapes_Michele_MP.pdf
- [8] Thomas J 2000 *A review of research on project-based learning*

AUTHORS	
	<p>Virgilija Vasilienė-Vasiliauskienė, June 6 1974, Vilnius, Lithuania</p> <p>Current position, grades: Associate professor, Vilnius Gediminas Technical University</p> <p>University studies: logistics, transport management</p> <p>Scientific interest: business management, strategic planning</p> <p>Publications: over 30 scientific articles in international journals</p> <p>Experience: 12 years at the University</p>
	<p>Juraťė Butvilienė, December 6 1983, Vilnius, Lithuania</p> <p>Current position, grades: Associate professor, Vilnius Business College</p> <p>University studies: sociology</p> <p>Scientific interest: statistics, work sociology</p> <p>Publications: over 10 scientific articles in international journals</p> <p>Experience: 8 years at the College</p>
	<p>Tomas Butvilas, December 5 1976, Vilnius, Lithuania</p> <p>Current position, grades: Associate professor, Mykolas Romeris University</p> <p>University studies: Social research methodology, educational psychology</p> <p>Scientific interest: Social welfare, didactics, children rights</p> <p>Publications: over 50 scientific articles in international journals</p> <p>Experience: 15 years at the University</p>



Assesment of competencies for IS specialists

E Valavichius^{1*}, R Juodagalvyte², R Vipartiene²

¹Vilnius Business College, Kalvarijų 129, LT-08221, Vilnius

²Vilnius Cooperative College, Konstitucijos 11, LT-09308, Vilnius

Corresponding author's e-mail: eugenijus.valavicius@leu.lt

Received 1 April 2016, www.cmnt.lv

Abstract

Vilnius Cooperative College conducts a study program “Information systems implementation and support” (informatics engineering). Before starting the study program a survey was conducted to clarify demand of such specialists and to assess program’s competencies (Valavičius, 2012). During program existence IT companies encountered with new challenges: cloud computing, big data, using of smart devices (BYOD) etc. Committee of study program decided to repeat the survey in order to improve the study program. The aims of the survey are to identify new demand and needed skills. This article analyzes results of the survey and makes conclusions.

Keywords:

information systems
skills of IS specialists
new skills for IS study program

1 Introduction

In 2011 Vilnius Cooperative College started to create a study program “Information systems implementation and support”. Idea for program arrived from social partners: IT companies “Rivilė“, „Stekas“, „Labbis“, „Informacinės konsultacijos“ etc. Working group collected a set of IT competencies for this program and conducted a survey to identify the importance of these competencies. Weights of study program’s subjects were selected using the table of importance. Results of this survey identified that the biggest importance have deep knowledge of specific IS implementation and applying it in company’s activity and less important are knowledge of programming, computer hardware, computer networks.

During existence of study program IT industry encountered with new challenges. One of most known new areas is cloud computing. As the beginners of cloud computing can be mentioned “Elastic Compute Cloud” service starting 2009 from Amazon and some later Google Docs [Velte, 2010]. IT companies through the whole world start to use virtualization of IT services, to move hardware and software to the “cloud”.

Almost at the same time started a tendency to use smart devices (smartphones, tablets) in workplaces. Such possibilities are attractive for many users but there can be a challenge to adapt information to such devices and a risk for data security. This tendency has a name Bring Your Own Device (BYOD) [S.L., 2015]

Automatical collecting of data and powerful data storages allow to keep huge amount of information in each company. But most traditional software (e.g., relational databases, statistics packages) are not suitable to analyze very big amount of data. This is “Big Data” challenge [Rankin, 2015].

Computer systems, computer networks were created thinking only about limited trusted environments. But areas of IT appliances spread very rapidly and users faces data security and privacy problems [Shilling, 2011].

New areas of computing establish new workplaces and demand new competencies and skills. Creators of any IT program have to consult constantly with social partners and to respond to actual trends of security development.

Competencies of IT specialists are analyzed in many articles. V. Denisovas [Denisovas, 2011] states that studies of informatics are influenced by many factors: wide spectrum of evolving new areas, many sources of potential requirements, standards of education etc. K. Figl [Figl, 2010] suggests that the main competence for IS specialists is teamwork ability. The same study mention most important knowledge and skills of IT specialists: data structures and algorithms, software testing, ability to choose the most appropriate model of implementation, databases and computer networks, ability to select software development model, ability to apply mechanisms of OS control and security, professional ethics. S. Ivanikovas [Ivanikovas, 2014] states that employers sometimes need more personal competencies (e.g., teamwork, responsibility) than specific IT skills.

2 Survey characteristics

Survey tool: questionnaire placed in internet-based system www.apklausa.lt. 4 point scale (Very important, Not so much, Not important, Completely irrelevant) was used to assess importance of study results. Invitation to participate in survey with links to questionnaire were sent to college partners and some other IT enterprises – about 100 companies. Only less than 1/3 of them (30 companies) answered questions. Characteristics of respondents are presented in Table 1.

TABLE 1 Distribution of respondents by enterprise profiles

Characteristic	Number of respondents	%
Area of activities		
Service company	24	80
Trade	4	13,3
Production	2	6,7
Status		
Closed JSC	25	83,3
JSC	3	10
State enterprise	2	6,7
Size		
1 – 49 employee	21	70
50 – 249	4	13,3
250 and more	5	16,6
Total	30	100

The majority of respondents belong to small (about 70%) closed joint stock capital (>80%) companies. Remaining part of respondents work in big joint stock companies or state enterprises. Figure 1 represents relations of companies with information systems.

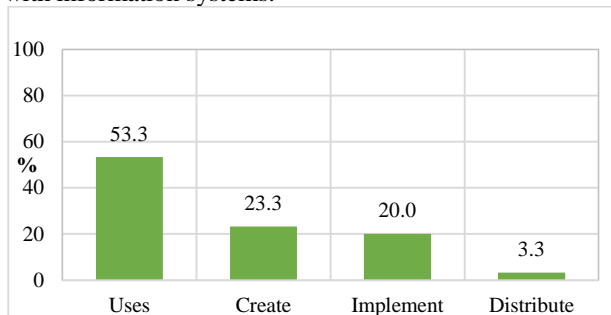


FIGURE 1 Relations of companies with information systems

More than half (53%) of respondents are users of information systems, other companies create, implement,

distribute them.

3 Importance of different competencies. This study program has 5 main aims. Each aim generates 3-5 study results. In this article will be commented only study results with maximum ($\geq 80\%$ respondents answer „Very important“) and minimum ($\leq 40\%$ respondents answer „Very important“) importance.

3 study results were graded with 80% or more answers „Very important“. But only 1 of them („to try functioning of IS, to prepare it for operation...“) belongs directly to informatics study field. One result („to consult users“, the most important - >86%) is located near the middle of informatics and general competencies, the remaining important result („to comply with the principles of cooperation and ethics“) belongs to general competencies group. 2 of mentioned results had no negative answers. These results show the importance of general (personal) competences.

The next diagram (Figure 3) show results with minimum importance – 40% or less respondents choosed an answer „Very important“.

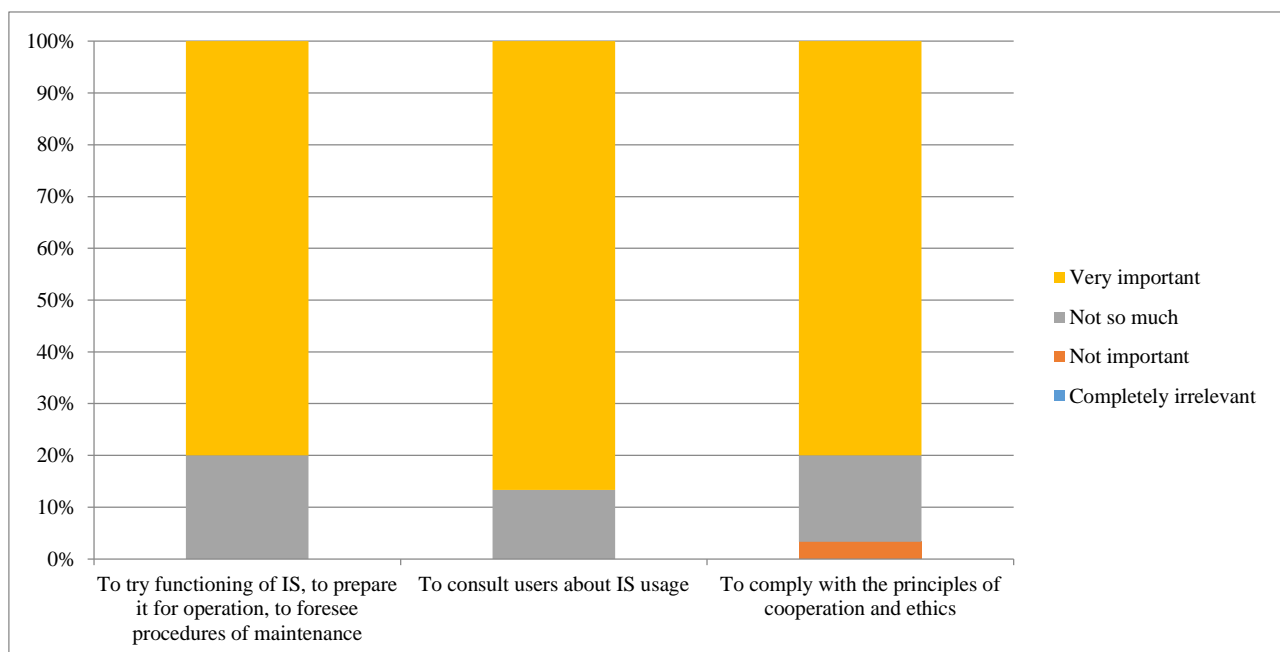


FIGURE 2 The most important competencies

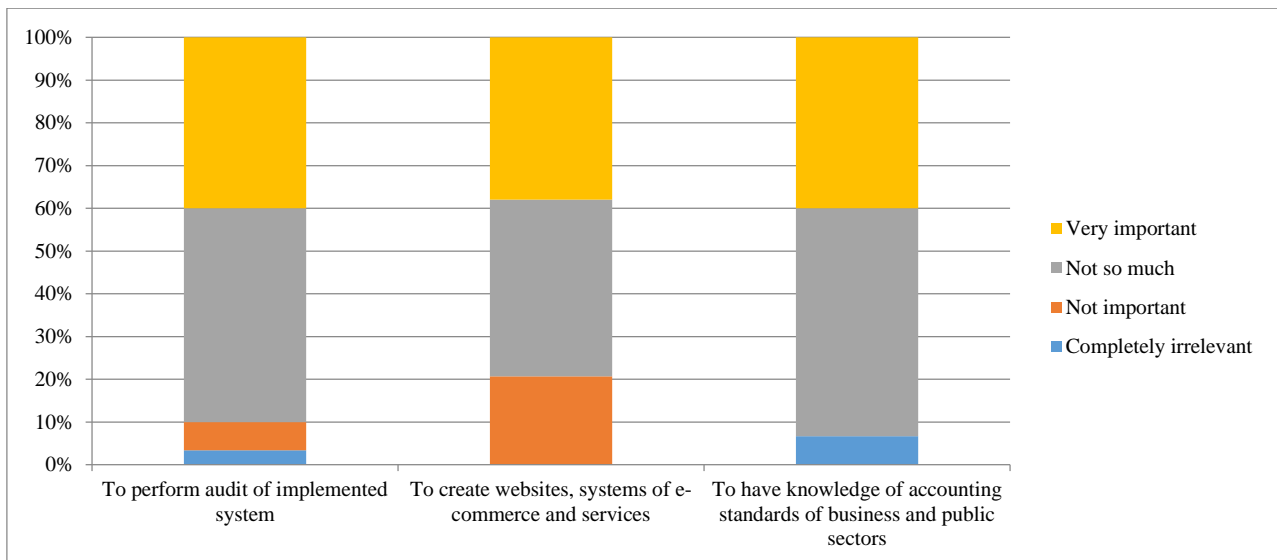


FIGURE 3 Study results with minimum importance

One result with minimum importance („To create websites, ...“, about 36% answers „Very important“ and >10% answers „Not important“) belong to informatics field, one answer („To perform audit of implemented system“, 40% answers „Very important“) is near the middle between informatics and business subjects, one result („To have knowledge of accounting standards...“, 40% answers „Very important“) belongs to business subjects. At least 2 of 30 respondents mentioned this answer as „irrelevant“.

The questionnaire also had a question about desired number of such specialists to have an internship or to work. Answer to this question was rather upsetting (Figure 4).

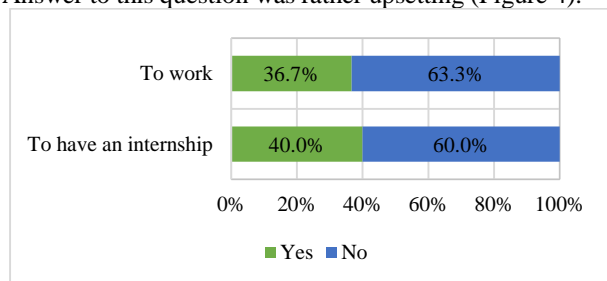


FIGURE 4 Demand of IS specialists

4 Conclusions




Only about 40% of companies need such specialists for internship of work. Authors of this survey tried to find reasons of such answers. One of reason can be an economic situation in the world which is near stagnation. During phone interview some companies mentioned they are not planning expansion in the nearest future and even more – big companies plan to cut a number of workplaces. But the summary number of desired specialists are about 40 workplaces and average number of graduates in Vilnius Cooperative College is some more than 20 students. It shows that analyzed study program is reasoned enough.

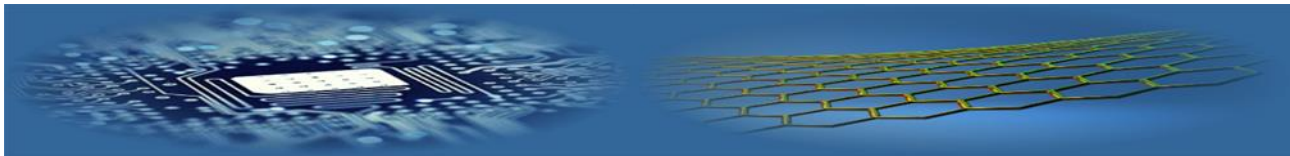
Information systems specialists need competences from IT area but personal competences have the same of even higher importance. There are not so much possibilities that graduates of this study program will remain unemployed. The demand of specialists only from social partners is higher than a number of graduates.

This study program has to reconsider workload dedicated to learn accounting and website creating competences and to strengthen personal competences.

References

- [1] Denisovas V 2011 *Bendrosios ir dalykinės kompetencijos informatikos studijų kryptyje, jų nustatymas ir ugdyimas* <http://www4066.vu.lt/Files/File/Vitalijus%20Denisovas0427.pdf>.
- [2] Valavičius E, Vipartienė R, Juodagalvytė R 2012 IS specialistų kompetencijų ir poreikio tyrimas *Studijos šiuolaikinėje visuomenėje* **3**
- [3] 2010 *Information Systems Education Journal for Information Systems Education* **21**(3)
- [4] Figl K A *Systematic Review of Developing Team Competencies in*
- [5] Ivanikovas S, Valavičius E 2014 Studentų, absolventų ir darbdavių požiūrio į informatikos krypties studijų programas analizė *Vadyba* **1**(24)
- [6] Rankin J G, Johnson M, Randall D 2015 *Research on Implementing Big Data: Technology, People, & Processes*
- [7] S. L. 2015 Tech Trend: Re-thinking BYOD *Black Enterprise* **46**(4)
- [8] Shilling C G 2011 Privacy and data security: new challenges of the digital age *New Hampshire Bar Journal* **52**(2)
- [9] Velte T, Velte A, Elsenpeter R 2010 *Cloud Computing A Practical Approach*

AUTHORS	
	<p>Eugenijus Valavichius, Lithuania</p> <p>Current position, grades: Vilnius Business College, lecturer University studies: Vilnius University Scientific interest: Information technologies, computer networks Publications: 20 Experience: IT, computer networks, algorithms</p>
	<p>Rasa Juodagalvytė, Lithuania</p> <p>Current position, grades: Vilnius Cooperative College, lecturer University studies: Vilnius University Scientific interest: Information technologies Publications: 5 Experience: IT, information systems</p>
	<p>Rita Vipartienė, Lithuania</p> <p>Current position, grades: Vilnius Cooperative College, docent University studies: Vilnius University Scientific interest: Information technologies Publications: 6 Experience: IT, information systems</p>



Impact of crude oil and US dollars price on the Indian stock exchange

A K Goel^{1*}, Zh Tutkusheva²

¹Integral University, Department of Business Management, Lucknow, India

²Karaganda Economic University Kazpotreboysuz, Department of Economics & Management, Karaganda, Kazakhstan

Corresponding author's e-mail: amitgoel53@gmail.com

Received 1 April 2016, www.cmnt.lv

Abstract

The speed and magnitude of the oil price decline has the potential to trigger financial strains, which could reduce the global benefits of lower oil prices, although the effects have so far been contained. Countries and companies dependent on oil revenues have already been significantly re-priced, especially those with existing vulnerabilities, but the impact may not yet have been fully felt. In particular, a number of energy firms accumulated sizable debt during the period of high oil prices, and some banking systems saw a marked increase in loan exposures to the energy sector. Moreover, the redistribution of wealth among investors with varying saving and portfolio preferences could have market repercussions, and those effects will also take time to play out. For those concerned about market infrastructure, there does not appear to be evidence of dislocations in the oil markets so far. This article is an attempt to analyse the various factors which are responsible for effecting Indian Stock market.

Keywords:

oil prices
US dollar
stock
impact

1 Introduction

Oil prices have been persistently low for well over a year and a half now, but as the April 2016 World Economic Outlook will document, the widely anticipated “shot in the arm” for the global economy has yet to materialize. We argue that, paradoxically, global benefits from low prices will likely appear only after prices have recovered somewhat, and advanced economies have made more progress surmounting the current low interest rate environment.

Since June 2014 oil prices have dropped about 65 percent in U.S. dollar terms (about \$70) as growth has progressively slowed across a broad range of countries. Even taking into account the 20 percent dollar appreciation during this period (in nominal effective terms), the decline in oil prices in local currency has been on average over \$60. This outcome has puzzled many observers including us at the Fund, who had believed that oil-price declines would be a net plus for the world economy, obviously hurting exporters but delivering more-than-offsetting gains to importers. The key assumption behind that belief is a specific difference in saving behavior between oil importers and oil exporters: consumers in oil importing regions such as Europe have a higher marginal propensity to consume out of income than those in exporters such as Saudi Arabia.

World equity markets have clearly not subscribed to this theory. Over the past six months or more, equity markets have tended to fall when oil prices fall—not what we would expect if lower oil prices help the world economy on balance. Indeed, since August 2015 the simple correlation between equity and oil prices has not only been positive, it has doubled in comparison to an earlier period starting in August 2014 (though not to an unprecedented level).

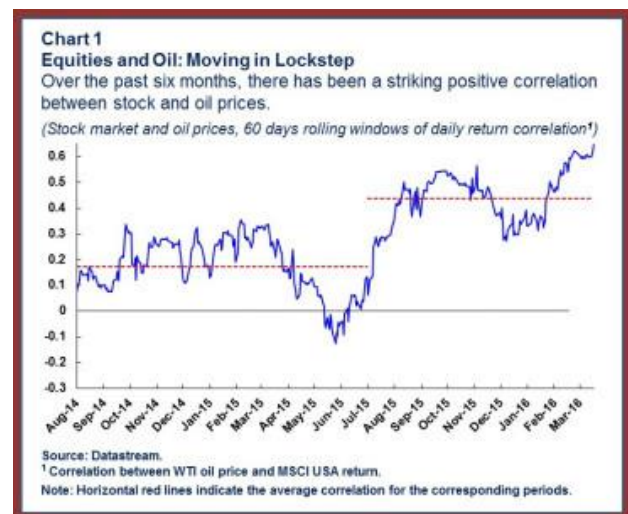


FIGURE 1

Past episodes of sharp changes in oil prices have tended to have visible countercyclical effects—for example, slower world growth after big increases. Is this time different? Several factors affect the relation between oil prices and growth, but we will argue that a big difference from previous episodes is that many advanced economies have nominal interest rates at or near zero.

2 The effect of falling oil prices

It has to be taken in context with domestic and international economic events to draw a more realistic picture of India's economic outlook.

Conventional thinking dictates that since India imports

~80% of its energy resources, there should be a net positive effect on the economy for the following reasons.

Lower oil prices will cut inflation, and will bring down our Current Account Deficit. This cut in inflation would lead to a fall in commodity prices, which would ameliorate consumer spending. A decrease in inflation could lead to further cuts in interest rates, increasing credit availability in the economy and boosting overall growth prospects since there would be more money available for infrastructural and corporate investment. This may have been the motivation behind Xi Jinping recently fast-tracking 3000 infrastructural projects worth \$1.1 trillion in China.

Many sectors of the economy would directly benefit from the resulting lower cost of fuel (the agricultural and automotive sectors in particular would benefit).

The Fiscal Deficit is likely to lessen as well since less money would be funneled into the subsidies the Indian Government provides on fuel and related derivatives due to the lower cost of procurement of oil.

The decrease in inflation, and the overall improved outlook on India's economic growth would buoy investor sentiment.

Economist Glenn Maguire at Australia & New Zealand Banking Group thinks this "confidence multiplier" will lead to higher-than-expected growth. The drop in oil prices so far could add as much as 1 percentage point to global output. "We think this will be the defining, constructive dynamic that underpins Asian growth in 2015 and most probably 2016," Maguire says.

However, geopolitical imbalances can dilute this positive effect on the Indian economy due to its continued reliance on FII/FDI fund inflows from foreign countries whose economies may be adversely affected by the fall in oil prices. India is also a major player in the global export market, which could contract as a result of falling market demand and the imposition of curbs on imports by other countries. Defaults in loans given to Russia and to shale gas developers in the USA could lead to instability in the global banking industry, which could cause investors to err on the side of caution and pull money out of developing countries like India.

Fears about Greece exiting the Eurozone and a global stock market sell off perpetrated by a further slide in oil prices pulled the sensex down by 855 points on the 6th of Jan 2015 - its biggest fall in over five years. Falling crude prices - which dipped to below the \$50 per barrel mark for the first time since 2009 - also unnerved FIIs that aggravated the fall further, brokers and analysts said. The sensex closed at 26,987 and the session left investors poorer by Rs 2.76 lakh crore (about \$43.5 billion) with BSE's market capitalization now at Rs 96.6 lakh crore.

3 Oil prices and India

Oil is one of the most important commodities in recent times. Much of the economy depends on oil. This is why prices of oil matter to almost every economy. Global crude oil prices are down nearly 40% this year to \$60 per barrel-levels from \$110/barrel at the start of the year. This has caused a crisis in countries like Russia, which depends on oil exports.

Fall in oil prices affects India:

- **Current account balance:**

India is one of the largest importers of oil in the world. It imports nearly 80% of its total oil needs. This accounts for

one third of its total imports. For this reason, the price of oil affects India a lot. A fall in price would drive down the value of its imports. This helps narrow India's current account deficit - the amount India owes to the world in foreign currency. A fall in oil prices by \$10 per barrel helps reduce the current account deficit by \$9.2 billion, according to a report by "Livemint". This amounts to nearly 0.43% of the Gross Domestic Product - a measure of the size of the economy.

- **Inflation:**

Oil price affects the entire economy, especially because of its use in transportation of goods and services. A rise in oil price leads to an increase in prices of all goods and services. It also affects us all directly as petrol and diesel prices rise. As a result, inflation rises. A high inflation is bad for an economy. It also affects companies - directly because of a rise in input costs and indirectly through a fall in consumer demand. This is why the fall in global crude prices comes as a boon to India. Every \$10 per barrel fall in crude oil price helps reduce retail inflation by 0.2% and wholesale price inflation by 0.5%, according to a "Moneycontrol" report.

- **Oil subsidy and fiscal deficit:**

The government fixes the price of fuel at a subsidized rate. It then compensates companies for any loss from selling fuel products at lower rates. These losses are called under-recoveries. This adds to the government's total expenditure and leads to a rise in fiscal deficit - the amount it borrows from the markets. A fall in oil prices reduces companies' losses, oil subsidies and thus helps narrow fiscal deficit. However, since diesel was recently deregulated, the fall in oil prices will likely have less effect on the government's fiscal deficit. Moreover, the government still has to pay for previous under-recoveries. Any benefit from the fall will be offset by payments for the past under-recoveries.

- **Rupee exchange rate:**

The value of a free currency like Rupee depends on its demand in the currency market. This is why it depends to a great extent on the current account deficit. A high deficit means the country has to sell rupees and buy dollars to pay its bills. This reduces the value of the rupee. A fall in oil prices is, thus, good for the rupee. However, the downside is that the dollar strengthens every time the value of oil falls. This negates any benefits from a fall in current account deficit.

- **Petroleum producers:**

The fall in global oil prices may be beneficial to India, but it also has its downsides. Directly, it affects the exporters of petroleum producers in the country. India is the sixth largest exporter of petroleum products in the world, according to media reports. This helps it earn \$60 billion annually. Any fall in oil prices negatively impacts exports. At a time when India is running a trade deficit - high imports and low exports, any fall in exports is bad news. Moreover, a lot of India's trade partners and buyers of its exports are net oil exporters. A fall in oil price may impact their economy, and hamper demand for Indian products. This would indirectly affect India and its companies. For example, the share prices of Bharti Airtel and Bajaj Auto fell because of the devaluation of the Nigerian currency - Naira. Both the companies have a significant presence in the African country.

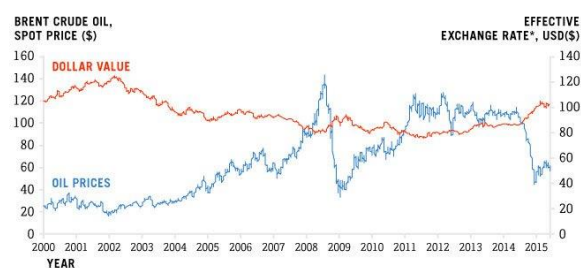
4 Oil and the dollar

Oil and the value of the U.S. dollar were the two assets that have the greatest impact on the day-to-day lives of most Americans. After all, the strength of the dollar is a quick way to gauge the strength of the U.S. economy relative to the rest of the world and we all feel the impact of oil prices, either at the pump or in prices of everyday products.

And for the last decade, the prices of these two assets have had an interesting - and perhaps surprising - relationship: they tend to move in opposite directions. Generally, when the price of oil rises the dollar falls, and vice versa. There is no one simple explanation for why these two assets tend to move in opposite directions. But understanding the complex forces that drive these two ubiquitous assets is nonetheless important for investors.

From a high point in February 2002, to a low point in March 2008 - when Wall Street banks were under tremendous stress - the value of the dollar relative to other major currencies fell by about a third. Meanwhile, U.S. Energy Information Administration data show that the price of West Texas Intermediate (WTI) oil, which is produced in the U.S., rose more than five-fold over the same time period. (The price of Brent crude oil, a more global benchmark for oil prices, more than quadrupled).

OIL AND THE DOLLAR: 2000 TO 2015



*The effective exchange rate shows the dollar's value relative to a basket of other currencies. The value is indexed so that the value in 1990 is equal to 100.

Sources: U.S. Energy Information Administration, Bank of England.

FIGURE 2

5 Oil-Dollar: Up and Down Game

But during the financial crisis, the directions reversed sharply. Between the bailout of Bear Stearns on March 14, 2008, and a turning point of the crisis in March 2009, the dollar's value increased 18 percent. Meanwhile, WTI prices fell about 60 percent.

Academic studies have been trying to understand this relationship. They show that even short-term market moves in either the dollar or crude oil affect the price of the other asset. For every 10 percent increase in the price of oil, the dollar declines 0.28 percent, European researchers wrote in a 2014 study. When the dollar declines 1 percent, oil prices nudge 0.73 percent higher, they found.

5.1 THE THINKING

The relationship between oil and the dollar is explained like this: Oil is an international commodity, bought and sold using U.S. dollars. When the value of the dollar rises, oil

becomes more expensive for countries that have to exchange their own currencies into dollars to pay for it. People in those countries thus cut back on how much oil they use, and the oil price falls – simple supply and demand.

But some see the relationship differently. “There is little empirical evidence that the global demand for oil is in fact responsive to changes in the dollar,” economist Christian Grisse wrote in a 2010 paper.

Both Grisse and the European researchers laid out a number of other possible explanations. One focuses on oil producers. When the dollar falls, exporting countries earn less money from sales of crude, and may raise prices.

Or perhaps it's the other way around: oil price moves bump the value of the dollar.

When oil gets more expensive, all goods and services requiring oil – either as a direct input or indirectly as in transportation costs – get more expensive. This puts pressure on the economy, slowing growth and ultimately weakening the dollar.

Along the same vein is another possibility that when foreign exchange investors see oil prices rising, they assume that the economy of the United States, currently a net oil importer and intensive energy user, will take a hit. They then bet on the appreciation of other currencies and the decline of the dollar.

5.2 THE COMPLICATED REALITY

Both Grisse and the European researchers conducted sophisticated analyses of oil prices, exchange rates, and other variables, such as interest rates. Both studies found that sometimes oil markets cause changes in the value of the dollar, and sometimes the dollar nudges the oil price. The correlation goes both ways.

The European paper also pointed out that big swings in other corners of the financial markets, such as the stock or bond market, can affect the prices of both oil and the dollar. In fact, between 11 and 25 percent of the movement in oil prices and the value of the dollar can be chalked up to price shocks that also affect other assets, according to the paper.

When the Chicago Board Options Exchange's Volatility Index (VIX) rises, for example, oil prices tend to fall and the dollar tends to rise. When the stock market gets rattled, investors will often flee to safe assets, like U.S. Treasury bonds. That tends to increase the value of the dollar, and thus, lower the price of oil, the researchers explain.

But perhaps the most important thing to note is that the inverse relationship between oil and the dollar is a relatively new phenomenon – and it has seemingly grown stronger over time.

Between 1984 and 2001, there was no evidence of a sustained link between the two assets, Grisse wrote. Sometimes, they rose and fell together. Other times, they moved in opposite directions.

The European researchers believe that the strengthening push-pull relationship between oil and the dollar over the last 15 years has been driven in part by the fact that oil has increasingly become a more accessible investment commodity.

They note that an increase in the number of open oil futures contracts (a measure of how many people are trading

around the future price of oil) prompts an increase in oil prices. They also note that in the early 2000s, when the inverse relationship between oil and the dollar began strengthening, a variety of exchange-traded funds, index funds, futures and options linked to the price of oil also became more popular among investors.

Though there is no easy explanation for the increase in trading of oil-linked products, one study by researchers at the Oxford Institute for Energy Studies suggests that when investors anticipate either greater demand or tighter supply, trading in oil-linked financial products tends to increase.

In the early 2000s, China's rapidly growing economy led to a major increase in oil demand, and production did not keep pace. Global oil consumption rose 12.7 percent between 2000 and 2007, while supply rose just 9.6 percent, according to statistics from the Energy Information Administration. With relatively tight supply keeping upward pressure on prices, it's conceivable that investors simply wanted to cash in on an appreciating financial asset.

6 Oil prices and the stock exchange

There are many empirical studies on the relationship between changes in oil price and stock market return. These mostly suggest an inverse relationship between these two variables for developed as well as emerging markets (Ciner, 2001; Jones et al, 2004; Basher and Sadorsky, 2006; Ewing and Thompson, 2007; Aloui et al, 2008; Driesprong et al, 2008; Park and Ratti, 2008; O'Neill et al, 2008; Nandha and Faff, 2008; Miller and Ratti, 2009; Chen, 2009; and Filis, 2010; among others). The inverse relationship is justified as follows: when the oil price goes up because of a supply-side shock, the cost of doing business rises and stock price factors this to account for the drop in earnings. Many other studies which consider the demand-side shock, on the other hand, report a direct relationship between oil price and stock market return (El-Sharif et al, 2005; Kilian and Park, 2009; Narayan and Narayan, 2010; Filis et al, 2011; Arouri and Rault, 2012). These studies indicate that a demand-side shock driven by global economic expansion leading to a higher oil price has a positive effect on stock market return. There are also studies showing that an oil price change may leave the stock market return unaffected (Huang et al, 1996; Bernake et al, 1997; Blanchard and Gali, 2007; Cong et al, 2008; Lescaroux and Mignon, 2008; Apergis and Miller, 2009; Al-Fayoumi, 2009; Miller and Ratti, 2009; and Jammazi and Aloui, 2010; among others).

After the oil price bubbles of early 2000, many countries started looking for means to insulate the price level against any kind of shocks (including oil price shocks). Moreover, technology advancement and the associated rise in firm productivity, R&D investment in renewable energy and non-conventional or advance fuels, and greater wage flexibility in some countries also played an important role in reducing the impact of oil price rise (Filis et al, 2011). Additionally, developed economies like the USA are now less dependent on oil than they used to be 30 years back. Thus, earlier empirical studies offer mixed support for the relationship between oil price and the stock market.

Over the last three decades or so (January 1986–January 2012), crude oil prices in the international market (measured here by the price of West Texas Intermediate, or WTI, crude

oil) rose considerably from the level of US\$10–15 per barrel (bbl) to US\$145/bbl. However, this rise took place mostly between January 2003 and July 2008, when the price reached US\$145/bbl. The post-2003 rise in oil price, which hit a record high of US\$145/bbl in July 2008, is ascribed largely to increasing demand for crude oil from Chinese and other emerging economies. This coincided with a phase of decline of the US dollar against major traded currencies and a phase of rising stock prices in emerging markets. After that, because of the onset of global recession in late 2008, oil price plunged to US\$34/bbl in February 2009. Following the subsequent improvement of the global economy and cutting down of OPEC supply, oil prices started rising again, now with a fair amount of temporal fluctuation, during 2009–2011. One would expect this kind of instability of crude oil price to affect financial and foreign exchange markets and also cause macroeconomic distortions in net oil-importing countries like India.

For India, a rise in global oil price may have a direct effect on the inflation rate and the trade balance, leading to a higher current account deficit and a deteriorating net foreign asset position. At the same time, a higher oil price may induce wage demands to offset the higher cost of living. This may also lead to a decline in private disposable income and corporate profitability, and thus reduce domestic demand and stock prices while also pulling down the exchange rate. In India, consumption of petroleum products in the year 2000 was 2,127.4 thousand barrels per day (TBD), which rose to 3,116.2 TBD in 2010. The corresponding domestic production figures were 770.1 and 953.9 TBD. This increased dependence on import led to a rise of the import bill from US\$79.55 billion in 2009–10 to US\$106 billion in 2010–11, the two figures being about 3 per cent and 2.8 per cent of GDP for the years 2009 and 2010, respectively. As International Energy Agency (IEA) estimates suggest, a US\$25 to US\$35 rise in the oil price causes a two-year drop in GDP of 0.3 per cent for the US, 0.4 per cent for Japan and 0.5 per cent for the euro zone. This sensitivity for the Indian economy may not be negligible.

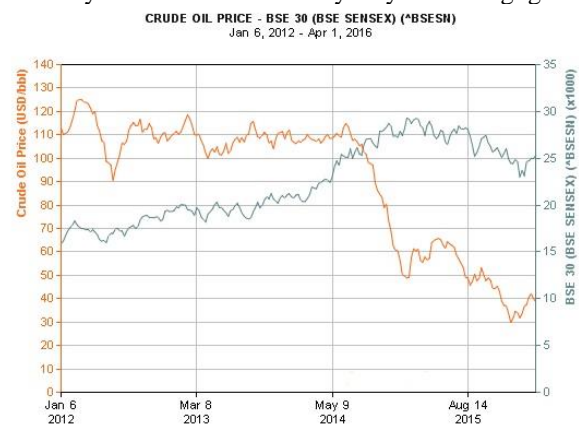


FIGURE 3 Crude Oil (\$) vs BSE Sensex (x1000)

7 Impacts of Rupee depreciation

• Increase in Import Bill

A depreciation of the domestic currency results in higher import costs for the country. Failure of a similar rise being

experienced in the prices of exportable commodities is going to result in a widening of current account deficit (CAD) of the country.

• Higher inflation

A weak rupee will increase the burden of Oil Marketing Companies (OMCs) and this will surely be passed on to the consumers as the companies are allowed to do so following deregulation of petrol and partial deregulation of diesel. If the OMCs increase fuel prices, there will be a substantial increase in overall cost of transportation which will stoke up inflation.

• Direct Impact on Consumers

- gold has become more expensive and hit an all-time highs first three quarters of 2013;
- travel expenses rise as crude oil gets costlier;
- foreign Travel and Overseas Education becomes costlier: Students who are studying abroad will bear the brunt most owing to depreciating rupee. Expenses incurred towards the university/college fee as well as that of living will shoot up, thereby spelling a huge burden on the students;
- inflation leading to price rise in essential goods.

• RBI's monetary policy

If the depreciation in rupee continues, it will further increase inflation. In such a situation RBI will have very less room to cut policy rates. No cut in policy rate will add to the borrower's woes who are eagerly waiting to get rid of the high loan regime. If RBI cuts rates further, the interest rate arbitrage (between Indian government bonds and US Treasury yields) becomes less attractive, thus compromising the possibility of further capital flows.

• Current Account Deficit

- exporters refrain from repatriating export proceeds because they knew that the dollar would earn more rupees if they wait a little longer;
- those holding stashed funds abroad continue to hold them in perpetuity. They watch the situation in silent appreciation, as they witness the rupee sinking to new depths effortlessly;
- repatriable yield in dollar terms of foreign investors (foreign direct investments as well as portfolio investments) diminishes, thereby dampening the investment climate in India;
- foreign currency non-resident (FCNR) deposits become less attractive for banks since the swap cost of funds soars due to a higher forward premium of the dollar;
- NRIs tend to avoid non-resident external (NRE) repatriable rupee deposits since repatriable yield in dollar terms diminishes.

• Capital Account deficit – Lower FII Investments and Lower FDI

The rupee's weakness may make foreign investors think twice before investing. Foreign capital inflows are typically at risk when the local currency weakens. Portfolio flows into both debt and equity will taper, with investors subscribing to the view that the local currency could depreciate further. This shoots up the Capital Account Deficits.

• Higher burden of Debt for Companies and Government

The interest burden would increase on foreign currency denominated debt. For companies that have availed of foreign currency loans for implementation of projects, the

rupee depreciation will stretch their balance sheets, as the amount of debt will increase in rupee terms. As these loans mature, the cash flows will also be impacted. According to government statistics, out of India's \$376 billion outstanding external debt, about 23% or \$85.3 billion comprises external commercial borrowings, or ECBs. Similar behavior can be observed in case of Government for repaying and servicing foreign debt.

• Slowdown of growth and Unemployment

Falling rupee is a recipe for slowdown in economic growth. If the fall of rupee continues, the foreign investment will dry in India thereby creating a gap between investment required for growth and the actual investment made. Although this does not impact immediately, over the period, unemployment rises in the economy.

• Volatile domestic equity market

Our equity market has been volatile for some time now. Equity is nothing but the investments in Indian companies made by Foreign Institutional Investors (FIIs). Some examples of Private equities investing in India are Blackstone, IFC, Berkshire Hathaway etc. So, the FII's are in a dilemma whether to invest in India or not because of the lack of overall confidence in the Indian economy. Even though they have brought in record inflows of dollar to the country this year, chances are they may be thinking of taking their money out of the equity market, which might again results in less inflow of dollars in India. Therefore, decrease in supply and increase in demand of dollars results in the weakening of the rupee against the dollar.

• Exporters

Importers will strongly feel the pinch of falling rupee as they will be forced to pay more rupees on importing products. Conversely, a feeble rupee will bring delight to the exporters as goods exported abroad will fetch dollars which in return will translate into more rupees. Also, a weak rupee will make Indian produce more competitive in global markets which will be fruitful for India's exports.

8 Research methodology

Research Type:

Descriptive Research:- Is a study designed to depict the data in an accurate way more simply put, descriptive research is all about describing data included in study.

Secondary Data:- Websites, Journals, Internet etc

Sample year:- 2006-2016, 10 years (121 months).

9 Objective of the study

- ✓ Understanding the relationship between Crude Oil Prices, US Dollars and Indian Stock Exchange (BSE/NSE) by using various Statistical techniques.
- ✓ Finding the Standard Deviation from the Mean of all the entities.
- ✓ Studying the Variance and Co-Variance of all the entities.
 - 1) to study Correlation between
 - 2) Crude Oil Prices and US Dollars;
 - 3) US Dollars and Indian Stock Exchange (BSE/NSE);
 - 4) Crude Oil Prices and the Indian Stock Exchange (BSE/NSE).

10 Data analysis

Months	Oil Prices (\$)	US Dollars (\$)	Sensex (INR)
1-Apr-06	69.77	44.79	11623.99
1-May-06	71.35	45.60	11250.10
1-Jun-06	71.86	46.04	10126.89
1-Jul-06	74.60	46.29	10551.56
1-Aug-06	72.69	46.51	11219.24
1-Sep-06	65.85	46.13	12020.84
1-Oct-06	60.35	45.35	12672.59
1-Nov-06	60.09	44.81	13356.33
1-Dec-06	61.99	44.42	13588.38
1-Jan-07	57.64	44.21	13886.96
1-Feb-07	59.64	44.09	13646.81
1-Mar-07	62.97	43.65	12947.22
1-Apr-07	64.95	42.02	13373.39
1-May-07	64.18	40.78	14165.74
1-Jun-07	67.44	40.54	14472.79
1-Jul-07	74.15	40.40	15185.97
1-Aug-07	74.85	40.66	14996.23
1-Sep-07	78.24	40.17	16344.40
1-Oct-07	87.48	39.45	18644.43
1-Nov-07	92.90	39.39	19470.12
1-Dec-07	92.13	39.41	19804.65
1-Jan-08	93.50	39.37	18628.29
1-Feb-08	95.62	39.61	17688.12
1-Mar-08	103.42	40.06	16194.20
1-Apr-08	108.63	40.16	16459.43
1-May-08	121.84	41.55	16976.86
1-Jun-08	133.23	42.59	15022.83
1-Jul-08	132.99	42.64	13869.97
1-Aug-08	119.87	43.03	14552.75
1-Sep-08	109.45	45.24	13633.50
1-Oct-08	83.45	48.07	10924.01
1-Nov-08	60.46	48.99	9640.97
1-Dec-08	46.56	48.74	9366.56
1-Jan-09	42.14	48.69	9561.53
1-Feb-09	41.34	49.75	9149.82
1-Mar-09	47.03	50.89	9161.41
1-Apr-09	49.45	50.10	10546.85
1-May-09	58.58	48.38	13203.08
1-Jun-09	68.68	47.59	14714.40
1-Jul-09	67.52	48.21	14782.39
1-Aug-09	69.87	48.15	15512.08
1-Sep-09	69.67	48.32	16329.34
1-Oct-09	74.36	47.08	16595.21
1-Nov-09	76.94	46.67	16346.47
1-Dec-09	76.33	46.41	17130.25
1-Jan-10	77.23	46.12	16900.96
1-Feb-10	75.63	46.21	16272.53
1-Mar-10	81.38	45.45	17049.42
1-Apr-10	84.28	44.53	17609.60
1-May-10	77.89	45.62	16994.63
1-Jun-10	74.62	46.42	17220.43
1-Jul-10	76.28	46.59	17795.19
1-Aug-10	76.15	46.56	18044.42
1-Sep-10	75.88	45.79	19097.84
1-Oct-10	81.24	44.41	20187.49
1-Nov-10	83.56	45.00	19964.30
1-Dec-10	87.68	45.26	19916.42
1-Jan-11	90.36	45.24	19413.16
1-Feb-11	94.11	45.49	18058.79
1-Mar-11	101.72	44.91	18698.71
1-Apr-11	110.01	44.33	19346.60
1-May-11	106.51	44.71	18691.83
1-Jun-11	97.76	44.84	18390.19
1-Jul-11	96.22	44.37	18608.93
1-Aug-11	89.83	45.02	17308.65
1-Sep-11	83.89	47.57	16607.56
1-Oct-11	85.43	49.13	16903.64
1-Nov-11	96.37	50.51	16711.24
1-Dec-11	98.58	52.59	16037.61
1-Jan-12	99.83	51.34	16336.30
1-Feb-12	102.71	49.24	17629.41

Month	Oil Prices (\$)	US Dollars (\$)	Sensex (INR)
1-Mar-12	105.63	50.09	17520.03
1-Apr-12	103.58	52.62	17355.76
1-May-12	95.93	51.72	16707.88
1-Jun-12	83.93	55.26	16711.23
1-Jul-12	86.94	54.44	17226.13
1-Aug-12	92.43	55.89	17418.38
1-Sep-12	94.49	55.93	18087.27
1-Oct-12	89.18	55.43	18705.18
1-Nov-12	87.22	55.41	18864.05
1-Dec-12	89.47	55.56	19382.69
1-Jan-13	94.76	55.58	19780.26
1-Feb-13	94.80	54.23	19382.35
1-Mar-13	93.92	54.22	19008.89
1-Apr-13	93.56	53.06	19040.47
1-May-13	93.08	53.04	19778.63
1-Jun-13	94.64	54.39	19395.60
1-Jul-13	101.75	54.39	19544.02
1-Aug-13	106.84	54.58	18770.23
1-Sep-13	105.29	54.66	19244.37
1-Oct-13	99.76	54.12	20271.68
1-Nov-13	94.37	54.18	20852.49
1-Dec-13	96.11	53.69	20998.60
1-Jan-14	96.55	53.77	20872.37
1-Feb-14	100.01	54.42	20675.70
1-Mar-14	101.79	54.13	21713.43
1-Apr-14	101.28	55.19	22502.46
1-May-14	101.42	58.27	23590.90
1-Jun-14	104.41	60.05	24947.20
1-Jul-14	101.83	63.87	25639.27
1-Aug-14	96.21	64.73	26074.81
1-Sep-14	93.33	61.92	26734.79
1-Oct-14	86.08	62.32	27088.10
1-Nov-14	73.35	61.88	28299.74
1-Dec-14	60.31	62.28	27881.68
1-Jan-15	50.17	62.27	28322.25
1-Feb-15	49.57	60.95	29027.49
1-Mar-15	47.89	60.26	28691.03
1-Apr-15	53.52	59.49	27739.58
1-May-15	59.80	59.67	27382.06
1-Jun-15	59.60	60.18	27456.86
1-Jul-15	52.94	60.84	27983.23
1-Aug-15	45.79	61.15	27022.05
1-Sep-15	46.32	61.52	25896.81
1-Oct-15	46.37	61.81	26696.97
1-Nov-15	43.86	62.68	26265.77
1-Dec-15	38.75	62.52	25860.74
1-Jan-16	33.95	61.94	25252.31
1-Feb-16	32.08	62.20	23870.29
1-Mar-16	36.88	62.88	24277.00
1-Apr-16	37.38	63.74	25309.52

11 Graphical representation

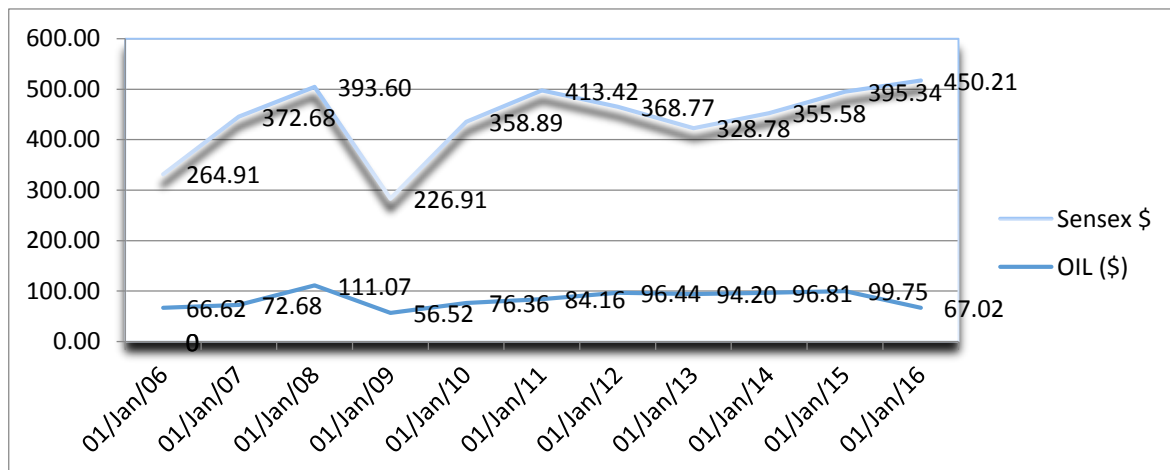


FIGURE 4 Oil(\$) vs USD yearly data 2006-2015

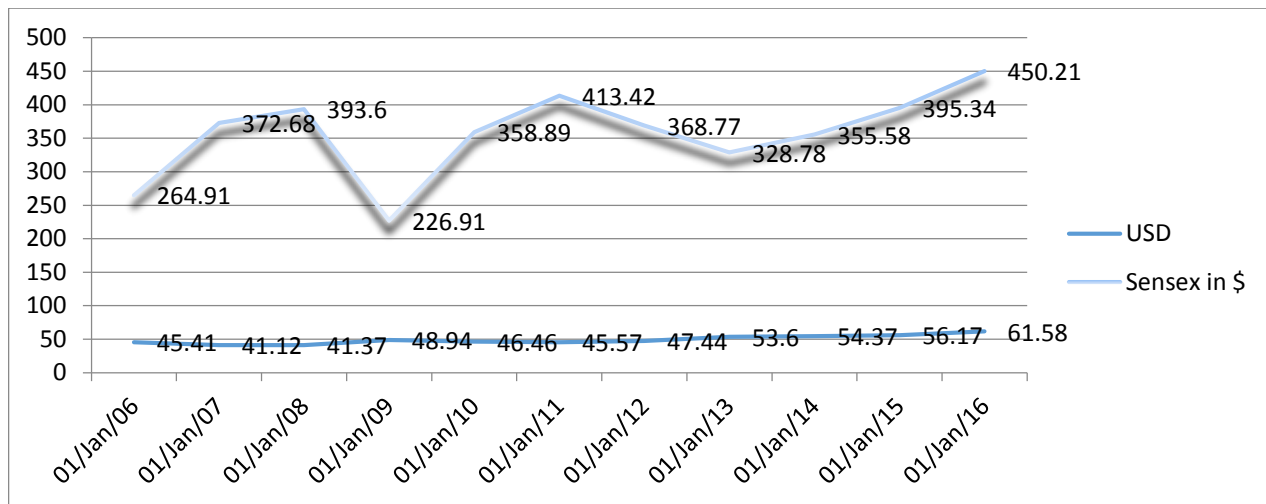


FIGURE 5 USD vs Sensex in \$ yearly data 2006-2015

12 Data analysis (findings)

Number of Months (Count) = 121

Values	Oil Prices (\$)	US Dollars (\$)	Sensex (INR)
Mean	80.08	50.43	18448.39
SD	21.90	7.14	5008.52
Variance	479.43	51.02	25085316.44
Skewness	-0.21	0.37	0.36
Kurtosis	-0.47	-0.99	-0.40

Correlations:

- Between the price of Crude Oil and USD = -0.30
- Between the price of Crude Oil and Sensex = -0.10
- Between USD and Sensex = 0.73

13 Interpretation of the analysis

Correlations:

- as per the analysis, Crude Oil prices and US Dollar prices have a "Negative Correlation" if one goes up the other goes down and vice-versa.
- Crude Oil prices and the Sensex have a "Negative Correlation" if one goes up the other goes down and vice-versa.
- US dollar prices and the Sensex have a "Positive Correlation" as one goes up or down the other follows.

14 Conclusion

The findings of this study conclude that despite the India's aggressive economic growth in the past fifteen years, the volatility of stock prices in India have a significant impact on the volatility of oil prices. While dynamics in the oil prices not impacted the price creation process of equities in Indian stock markets. India is quite unique in a sense that they are less affected by the recent Global financial crisis. Also, there are macroeconomic factors that have had a strong impact over equity returns and volatility in these equity markets. These factors appear to have had a much greater role in shaping the equity price dynamics in India than global oil price movements.

For determining the impact of Exchange rate on Indian Stock Market, monthly data has been employed and, firstly correlation test is applied which indicates that there is negative impact of exchange rate (USD/INR) on Indian stock market (SENSEX). There is very less degree of positive correlation between stock indices and foreign exchange rates. There is no significant relationship between the exchange rate and stock indices and the two are affected by various factors in spite of the increasing integration between the two markets.

References

- [1] www.thealertinvestor.com
- [2] www.infomine.com
- [3] www.worldfinancialwatch.com
- [4] articles.economictimes.indiatimes.com
- [5] www.businesstoday.in
- [6] www.kotaksecurities.com
- [7] zeenews.india.com
- [8] in.investing.com

AUTHORS



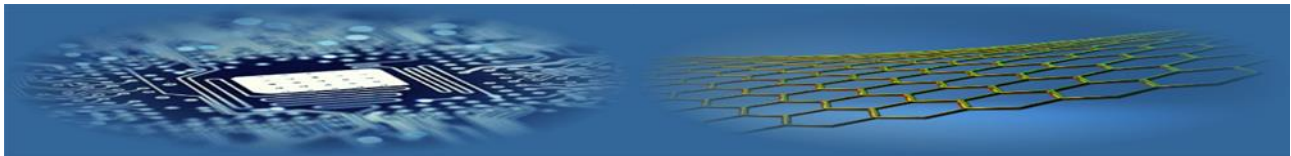
Amit Kumar Goel, Lucknow, U.P., India, 08th August 1978

Current position, grades: Assistant Professor
University studies: Integral University, Lucknow, U.P. India
Scientific interest: Accountancy & Finance
Publications: 9



Zhanna Tutkusheva, 1969, Kazakhstan

Current position, grades: Associate professor of the Department of Economics and Management, Karaganda Economic University of Kazpotreboyz, Kazakhstan
University studies: degree of Candidate of Economic Sciences, 2008
Scientific interest: entrepreneurship
Publications: 13



Way to leadership and competitiveness with Kaizen

Zh Tutkusheva, Y Mingazova*

Karaganda Economic University Kazpotreboysuz, Department of Economics & Management, Karaganda, Kazakhstan

Corresponding author's e-mail: Julia09071980@mail.ru

Received 1 April 2016, www.cmnt.lv

Abstract

This article describes the experience in crisis new models of enterprises activity, management of changes, relations with personnel are always looked for. One of the most efficient concepts of production and human relations is the concept of Kaizen. It is necessary to introduce modern management tools and principles of corporate management in the public sector. In conditions of WTO the Kaizen system, which is aimed at improving of efficiency and optimization of business processes, is a necessity for enterprises. Kaizen requires a systematic approach and considerable financial investments.

Keywords:

Kaizen system
concept
higher education

1 Introduction

One of the most efficient concepts of production and human relations is the concept of Kaizen. It is necessary to introduce modern management tools and principles of corporate management in the public sector.

In the coming years, Kaizen will be introduced into oilfield service, because now this requires optimization of business processes in order to compete properly with foreign partners. Kaizen must be seen not as an original management system, but as a method or program, for example, implemented as a part of a quality management program.

2 Overview of the study area

In crisis new models of enterprises activity, management of changes, relations with personnel are always looked for. One of the most efficient concepts of production and human relations is the concept of Kaizen. It is necessary to introduce modern management tools and principles of corporate management in the public sector.

In conditions of WTO the Kaizen system, which is aimed at improving of efficiency and optimization of business processes, is a necessity for enterprises. Kaizen requires a systematic approach and considerable financial investments. For example, the head will need to pay daily about \$1 000 and more in order to introduce Kaizen into the enterprise. However, they are reasonable investments, a sort of "refreshing shower" for a dying business or organization. Unfortunately, in the CIS countries Kaizen has not received such popularity as in European countries, but in the future it must become not a luxury but a necessity.

In the coming years, Kaizen will be introduced into oilfield service, because now this requires optimization of business processes in order to compete properly with foreign partners. Kaizen must be seen not as an original management system, but as a method or program, for example, implemented as a part of a quality management program. For instance, Kaizen can be very useful in quality management systems based on ISO 9001 international

standard. As it is well known, this standard has become extremely popular all over the world (more than one million companies have introduced it) and passed several reissues. Given that the requirement of ISO 9001 standard for continual improvement causes the greatest difficulties for users, the choice of Kaizen as a tool for improvement can be the best solution. It is not surprising, since Kaizen can be translated from Japanese language as "continual improvement."

The principles of Kaizen are focus on customers, continuous changes in all spheres of production management, an honest admission of problems, promotion of transparency between company departments, creation of working teams, development of self-discipline of employees and self-improvement of each of them. The companies, following the Kaizen philosophy, and their staff show impressive results in their work. In business development for entrepreneurs it is important not only to have state financial support in the form of loan subsidies, pledge guarantees and preferential loans, but also to improve the competence of entrepreneurs. Japanese philosophy affects very simple things that are used to optimize the production process. But as a result, Kaizen gives a significant effect of improvement in productivity.

The basic point of Kaizen is to work on eliminating of seven types of losses, shown in Figure 1, that arise in the production process and do not have any value for a customer, but leads to an increase in product cost.

As a result of introduction of a lean production companies will have productivity improving, improvement of services and goods quality, reduction of cost, safety improving in the enterprise. In particular, for start-up companies 5S tool from Kaizen can be very helpful, also it is known as the method of ordering. Notable improvements can be achieved through establishing a simple order in the workplace. The ISO 9001 standard also requires that. The order in the workplace reduces the level of defects, number of incidents, loss of time and raw materials, etc., and also improves manageability.

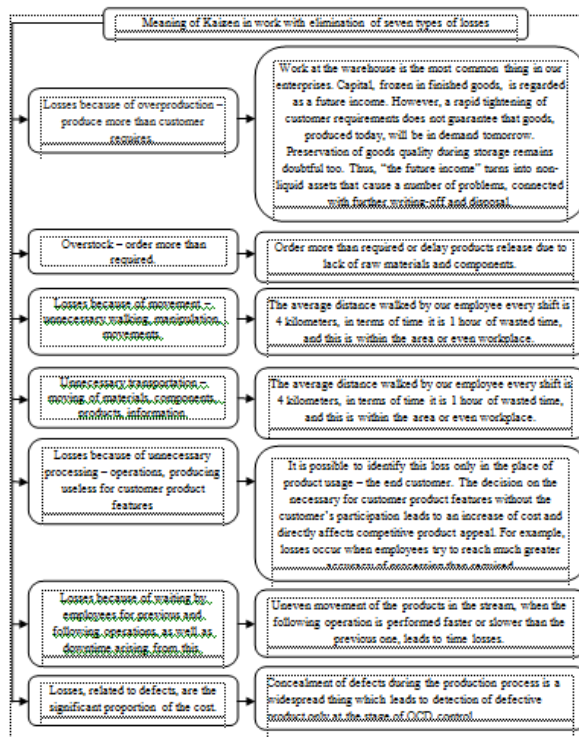


FIGURE 1 Meaning of Kaizen in work with elimination of seven types of losses

The implementation of these steps allows to take a fresh look at the situation in the workplace and throughout the organization which has become habitual. For successful change of the situation in our enterprises and preparation for use of Kaizen tools we need to learn to see production with customer's eyes and treat these losses as what we really lose, and not to look for excuses in technology, mentality, economic situation. All this reflects only a small part of the Kaizen philosophy. Only understanding of essence through the implementation of tools, changing attitudes, thinking and approaches to creating of value for the consumer can help us to understand that there are unlimited opportunities for improvement and development. The main advantage of 5S is that the order provides the basis for creating labor discipline and involvement of all employees in improvement programs.

Another Kaizen tool – PDCA cycle ("Plan-Do-Check-Act on improvement") is also in ISO 9001 and can be applied to almost any activity. This tool focuses on a continuous sequential accomplishment of stages, from planning to accomplishment of what was planned, then from checking of effectiveness and plans implementation problems to introduction of improvements through the elimination of causes for identified problems. It is expected that the accomplishment of the PDCA cycle never stops because problems will always be.

The most difficult part in the PDCA cycle is identification of the causes of the problems. For this purpose, Kaizen proposes to apply 5W and 5M methods. 5W method received its name from capital letters of interrogative prepositions in English language: What?, Who?, When?, Where?, Why?. It is sometimes suggested to add another preposition: How?. It is assumed that it is possible to reach the true cause of the problem by asking these questions consistently, approximately five times.

Another 5M method received its name from five (5) possible sources of problems: Machine, Men, Material, Method, Measurement.

It is necessary to analyze consistently all components of 5M, then almost all possible sources of the causes for the problems will be considered. Neither the PDCA cycle nor 5S method nor any other method of improvements cannot be implemented without all employees involved. Therefore, Kaizen, as well as ISO 9001, requires to make teams for improvements with employees, for example, Kaizen teams, quality circles or working groups on quality. At the stated time, the members of the team gather specially for searching of solution of problems or issue in the quality sphere. As a result, recommendations and proposals are made for senior management regarding improvements for organization activity. Kaizen, ISO 9001 and "Six Sigma" suggest a widespread use of tools for constant improvement implementation program. Start-up companies are first recommended to introduce seven simple tools of quality:

- Control chart (Shewhart);
- Bar chart;
- Pareto chart;
- Cause-and-effect diagram;
- Checklist;
- Process flow chart;
- Scatter diagram.

The top of Kaizen is considered to be JIT (just in time) and Lean (lean production) methods. In fact we are not dealing with two, but one method of lean production, the highlight of which is to eliminate any stocks both inside and outside the production cycle. Both undeveloped delivery system and non-optimized business processes prevent achievement of this goal. The most difficult part of lean production refers to arrangement of timely and accurate deliveries due to existing unsustainable logistics system. But non-optimized business processes within the organization are fully associated with lack of knowledge and skills in process management.

The concept of Kaizen is an integral part of Japanese everyday life. Focus on constant improvement permeates every activity of the inhabitants of the Land of the rising sun, both at work and at home, small improvements every day lead to significant changes in the future. This work has generalized many years' experience of Japanese management into a single concept which is understandable in the West. However, the Kaizen philosophy has not received proper development, limiting to mainly cursory tools usage. Even despite this, Western companies keep on obtaining impressive results from Kaizen.

The simplicity of Kaizen tools has the inevitable efficiency of their usage. Due to their simplicity these tools can be used by all employees at all levels of the enterprise. One of these simple tools is 5S, which is nevertheless a fundamental and universally applicable. The essence of the tool is to implement five steps which are aimed at maintaining an order. The implementation of these steps allows to take a fresh look at the situation in the workplace and throughout the organization which has become habitual.

All this reflects only a small part of the Kaizen philosophy. Only understanding of essence through the implementation of tools, changing attitudes, thinking and approaches to creating of value for the consumer can help

us to understand that there are unlimited opportunities for improvement and development.

We have a formed desire to get everything at once, here and now which is the most significant barrier to implementation of Kaizen by enterprises. Hope for an instant result and the attitude to Kaizen as another "pill of happiness" contradict the essence of philosophy.

In a market economy any business strives to improve its activities and maximize profits. Therefore, they must analyze their costs and look for ways to reduce them, and also organize the production system so that it works effectively. The effectiveness of the system is achieved by implementing of programs on improving of all business functions, from production to senior management.

For successful development of the enterprise under conditions of competition which becomes only harder every day, it is necessary to start from simple things and move in small



steps, leading to long-term and sustainable effect. Then it is possible that the Kaizen philosophy will become for us as natural and commonplace as for the Japanese.

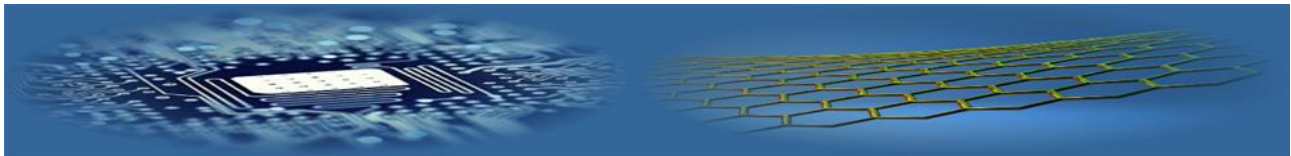
3 Conclusions

Kaizen must be seen not as an original management system, but as a method or program, for example, implemented as a part of a quality management program. The principles of Kaizen are focus on customers, continuous changes in all spheres of production management, an honest admission of problems, promotion of transparency between company departments, creation of working teams, development of self-discipline of employees and self-improvement of each of them.

References

- [1] Ono T 2005 *Toyota production system: Beyond large-scale production*
- [2] Gates B 2005 *Business at the speed of thought. Succeeding in the digital economy*
- [3] Shekhvatov D, Voronin A *Lean production as an element of Kaizen strategies* <http://www.cfin.ru>

AUTHORS	
	<p>Zhanna Tutkusheva, 1969, Kazakhstan</p> <p>Current position, grades: Associate professor of the Department of Economics and Management, Karaganda Economic University of Kazpotrebsoyuz, Kazakhstan</p> <p>University studies: degree of Candidate of Economic Sciences, 2008</p> <p>Scientific interest: entrepreneurship</p> <p>Publications: 13</p>
	<p>Yulia Mingazova, 1980, Karaganda, Kazakhstan</p> <p>Current position, grades: Master degree of the Department of Economics and Management, Karaganda Economic University of Kazpotrebsoyuz, Kazakhstan</p> <p>University studies: Master degree, 2006</p> <p>Scientific interest: entrepreneurship</p> <p>Publications: 15</p>



Artificial Intelligence technologies in human resource development

I Buzko¹, Y Dyachenko^{1*}, M Petrova², N Nenkov³, D Tulenina¹, K Koeva⁴

¹International Economics Relations Department, Volodymyr Dahl East Ukrainian National University, 59a Tsentral'nyi, Severodonetsk, 93406, Ukraine

²Director of Education Technologies Center, St. Cyril and St. Methodius University of Veliko Turnovo, 2 T. Turnovski, Veliko Turnovo, 5003, Bulgaria

³Department of Computer Systems and Technologies, University of Shumen "Episkop Konstantin Preslavsky", 115 Universitetska str., 9712 Shumen, Bulgaria

⁴Faculty of Mathematics and Informatics, Sofia University, 5 James Bourchier blvd., 1164, Sofia, Bulgaria

*Corresponding author's e-mail: yuriy.y.dyachenko@gmail.com

Received 17 March 2016, www.cmmt.lv

Abstract

An essential part of modern management is computing, particularly, Artificial Intelligence technologies. The Artificial Intelligence technologies which are based on reproduction of principles of human intelligence functioning. The Rising of General Artificial Intelligence is impossible without the acquisition of elements of self-consciousness and self-cultivation. But for the solution of applied problems we need applied Artificial Intelligence which performs particular tasks particularly in management. The most difficult task in Human Resource Development is to determine the effectiveness of training costs due to its branching and sophisticated feedback given by improved production results of staff who was involved in the process. To determine the impact of the performance of the company (labour costs, labour costs per person, income, profit, profit per person) based on indicators, characterizing the personnel training on the example of ALC "Severodonetsk factory of chemical non-standard equipment" we use cognitive system IBM Watson Analytics. Found that the main factor influencing the amount of training in the company is the net income of the company for the previous year. Considering this analysis, it could be argued that decisions on financing of Human Resource Development are carried out on the basis of income of the enterprise from the past period.

Keywords:

artificial intelligence
human resource
development

1 Introduction

An essential part of modern management is computing. Rapid changes in business environment requires quick responses. In these conditions traditional approaches to developing of information systems through programming on Turing machines should be replaced by creation of continuous adapting systems with natural interface. Artificial Intelligence technologies meet these requirements. Especially The Artificial Intelligence technologies that are focused on the reproduction of principles of human intelligence functioning.

In our opinion, the rise of Artificial Intelligence is impossible without the acquisition of elements of self-consciousness and self-cultivation. The realization of such elements through the Luhmann's system approach provides the independence of artificial intelligence and will simplify its training.

2 Artificial Intelligence as a reproduction of self-consciousness

The intelligence (particularly, artificial) forms the experience on the basis of past events and creates certain expectations concerning the future. The mediator between experience and expectations is the sense. According to Niklas Luhmann, the sense is formed on the basis of experience and "empowers ever actually doable experiences with the redundant features" [1]. The phenomenon of the sense itself "is presented in the

form of surplus guidance on further opportunities action experience" [1], i.e. the sense shapes intelligence expectations. The aim is to determine the intelligence expectations, as a result of free will of a intelligence, and these are not amenable to formalization and foresight according to [1]. They form structures, particularly in the form of institutions such as relations between the the ones responsible for system creation, preservation and restoration of these relations, and their means of interpretation and evaluation.

On the other hand, Friedrich Hayek affirms that "the passing of our cumulative knowledge in time" is the culture [2]. Thus, the form and content of the institutions are defined by cultural backgrounds. The institutions functioning also has an impact on the culture (Figure 1).

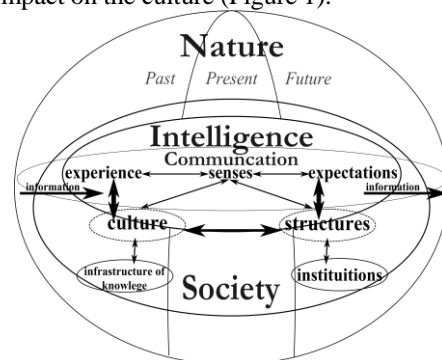


FIGURE 1 Interaction of economic reality fundamental components

Intelligence activities can be divided into the sub-conscious mind and consciousness. Desires of subconscious related to time period can be divided into: connected with the past (building a picture of the world), modern (satisfaction) and future (future certainty). In the intelligence these desires create the knowledge that formalize the information obtained in the past, the innovations as new ways to meet the needs and plans for future actions. Reflection as a method and form of identity is a fundamental intelligence capacity and allows to analyze the thoughts and actions. According to Immanuel Kant, free will is possible because of the freedom of thought from the time determinism [3].

Due to the unpredictability of intelligence behaviour through free will, the proposed ontology contains uncertainty in shaping the experiences and expectations of senses. And thus its actions, in particular, cultural and economic institutions, make it impossible to build a closed system that intends to give an opportunity to obtain pre-defined result of intelligence activity (including artificial). Preconditions of intelligence being is self-consciousness.

3 Self-consciousness fundamentals

As Plotinus stated “The Intellectual-Principle is a Seeing, and a Seeing which itself sees; therefore it is a potentiality which has become effective. This implies the distinction of Matter and Form in it— as there must be in all actual seeing – the Matter in this case being the Intelligibles which the Intellectual-Principle contains and sees. All actual seeing implies duality; before the seeing takes place there is the pure unity [of the power of seeing]. That unity [of principle] acquires duality [in the act of seeing], and the duality is [always to be traced back to] a unity” [4].

As Hegel stated in “Phenomenology of Spirit”, “but the distinction between the in-itself and knowledge is already present in the very fact that consciousness knows an object at all. Something is *for it* the *in-itself*; and knowledge, or the being of the object for consciousness, is, *for it*, another moment. Upon this distinction, which is present as a fact, the examination rests” [5, 85]. By Donald Verene, to put it simply:

1. a consciousness of something (something that is not a product of consciousness is there in itself before consciousness), and
2. a consciousness that this something is an object for consciousness (a consciousness of the consciousness of the object)” [6, 16].

As Niklas Luhmann stated “observations occasion the emergence of the systemic medium consciousness. Self-observation is the introduction of the system/environment distinction within the system, which constitutes itself with the help of that distinction; self-observation is thus the operative factor in autopoiesis, because for elements to be reproduced, it must be guaranteed that they are reproduced as elements of the system and not as anything else.” [1, 36-7].

Accordingly, mandatory components of intelligence are:

- 1) communication with external environment by means of information;
- 2) feedback in form of self-consciousness.

Present in most successful realizations of Artificial Intelligence based on Artificial Neural Networks (ANN) as systems of elements – “neurons”. These connections have numeric weights that can be tuned based on experience,

making neural nets adaptive to inputs and capable of learning. ANNs are related to cognitive modeling because in human brain cognition emerges from the activity of neural networks that carry information from one cell assembly or brain region to another. Training a neural network model essentially means selecting one model from the set of allowed models that minimizes the cost criterion. Supervised learning can be considered as learning with a “teacher” (particularly, as a specialized teaching ANN) in the form of a function that provides continuous feedback on the quality of solutions obtained so far.

According to above developed functional scheme of Artificial Intelligence (Figure 2).

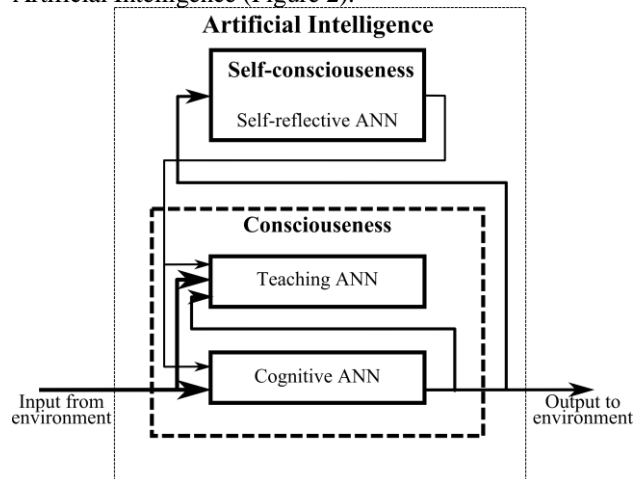


FIGURE 2 Functional scheme of Artificial Intelligence

It is in the basics of forming of strong Artificial Intelligence which has human-like (general) intelligence. This task is not yet solved. But we can use possibilities of applied Artificial Intelligence which perform particular tasks inter alia in management.

4 Artificial intelligence technologies in human resource development

Artificial intelligence technologies enable the prompt analysis (cleaning, investigating and making conclusions) of data by people that do not have special skills in data analysis. By Stefan Sfrohmeier and Franca Piazza, “potential or Artificial Intelligence in Human Resource (HR) Management is explored in six selected scenarios:

- turnover prediction with artificial neural networks,
- candidate search with knowledge-based search engines,
- staff rostering with genetic algorithms,
- HR sentiment analysis with text mining,
- resume data acquisition with information extraction,
- employee self-service with interactive voice response” [7, 149].

The most difficult task in HR Development is to determine the effectiveness of training costs [8] due to its branching and sophisticated feedback caused by improved production results of staff who took part in it. The aim of the HR Development system is to make the knowledge, skills and experience of the staff correspond to the desired indices at different levels: enterprise strategy, branch activity, work duties. The specification of employees who need this train-

ing, its content and duration is the supposition of the effective work of HR Development system [9]. The period during which learning outcomes have an impact on the performance of the company depends on many external factors regarding the company. Considering that the disclosure of financial opportunities for training and implementation of training going on for some time, changes in the financial situation of the enterprise affecting some delay on parameters that characterize training.

5 Finding the dependance between performance of the company and indicators characterizing the personnel training using Artificial Intelligence technologies

As an example of Artificial Intelligence used for HR Management we consider determining the impact of performance of the company (labour costs, labour costs per person, income, profit, profit per person) on indicators characterizing the personnel training, the analysis of this relationship for ALC "Severodonetsk factory of chemical non-standard equipment" (Table 1).

TABLE 1 Financial results, labour costs and share of employees trained in ALC "Severodonetsk factory of chemical non-standard equipment" in 2007-2014

Index	2007	2008	2009	2010	2011	2012	2013	2014
Number of employees	231	274	272	272	273	314	321	286
Labour costs, ths. UAH	4254,0	5849,6	2718,2	5044,5	6078,6	7109,6	6849,8	3640,0
Labour costs per person, ths. UAH per person	18,42	21,35	9,99	18,55	22,27	22,64	21,34	12,73
Income, ths. UAH	25740	49752	46250	47233	76628	70137	96649	98151
Profit, ths. UAH	-959	6022	1823	-6825	5711	7036	10766	14098
Profit per person, ths. UAH per person	-4,15	21,98	6,70	-25,09	20,92	22,41	33,54	49,29
Number of trained employees	49	46	36	25	43	42	21	14
Share of trained employees, %	21,2	16,8	13,2	9,2	15,8	13,4	6,5	5,0

This analysis is performed on the basis of cognitive system IBM Watson Analytics (Figure 2). This is a technology platform that uses natural language processing and machine learning. IBM Watson Analytics is an easy-to-use service for finding answers in data without downloading software. Discovery of visualization and smart solution available on the cloud, it guides data exploration, automated predictive analytics and makes creating dashboards and infographics almost effortless.



FIGURE 2 Results of IBM Watson Analytics [10] analysis of data set

Found that the main factor influencing the amount of

training the company is the net income of the company for the previous year. Considering this analysis could be argued that decisions on financing of HR Development carried out on the basis of income of the enterprise in the past period.

6 Conclusions

Transition from discrete paradigm of information processing (programming for Turing machines) to continuous paradigm (learning of artificial intelligence) allows faster and more accurate adapting to environmental requirements. In the modern conditions of business, it becomes more relevant to use the artificial intelligence technologies for decision making.

Acknowledgments

The publishing of this article was possible through support of the University of Shumen "Episkop Konstantin Preslavsky" and its program for development research project: „Models and algorithms for extracting knowledge from large data simulating neural networks and optimal training procedures“.

References

- [1] Luhmann N 1995 *Social Systems* Stanford University Press: Stanford
- [2] Hayek F 1960 *The Constitution of Liberty* Chicago: University of Chicago Press 570
- [3] Kant I 2010 *Critique of Pure Reason* Philadelphia: The Pennsylvania State University 566
- [4] Plotinus *Ennead* 3 Tractate 8 11
- [5] Hegel G W F 1977 *Phenomenology of Spirit*, trans. A V Miller Oxford: Oxford University Press
- [6] Verene D 1985 *Hegel's Recollection: A Study of Images in the Phenomenology of Spirit* Albany: State University of New York Press
- [7] Strohmeier S, Piazza F 2015 Artificial Intelligence Techniques in Human Resource Management - A Conceptual Exploration. in C Kahraman, Ç Onar *Intelligent Techniques in Engineering Management* Cham: Springer International Publishing 149-72
- [8] Buzko I, Dyachenko Y, Nemashkalo O 2011 Evaluation of human capital as a tool for management of human resource development *Actual Problems of Economics* **116** 117-23 (in Ukrainian)
- [9] Dyachenko Y 2010 Methodology of personnel development in the frames of economic paradigms *Information Technologies, Management and Society* 2010 **3** 96-7
- [10] IBM Watson Analytics <http://watson.analytics.ibmcloud.com>

AUTHORS	
	<p>Iryna Buzko</p> <p>Current position, grades: Head of International Economics Relations Department, Doctor of Science (Economics), Professor</p> <p>Scientific interest: Economics of Enterprises, Regional Economics</p> <p>Publications: more than 200 papers in national and international magazines</p>
	<p>Yuriy Dyachenko</p> <p>Current position, grades: Associate Professor at the International Economics Relations Department, Candidate of Science (Engineering), Docent</p> <p>Scientific interest: Human Research Development, Artificial Intelligence</p> <p>Publications: more than 100 papers in national and international magazines</p>
	<p>Mariana Petrova</p> <p>Current position, grades: Director of Education Technologies Center, Associate Professor at the Department of Information Technology, Ph.D. in Physics and Mathematics, Professor</p> <p>Scientific interest: Application of IT in the economy</p> <p>Publications: more than 100 papers in national and international magazines</p>
	<p>Nayden Nenkov</p> <p>Current position, grades: Associate Professor at the Department of Computer Systems and Technologies, Ph.D. in Physics and Mathematics, Associate Professor</p> <p>Scientific interest: Artificial Intelligence</p> <p>Publications: more than 100 papers in national and international magazines</p>
	<p>Daria Tulenina</p> <p>Current position, grades: Postgraduate at the International Economics Relations Department, Master (Economics)</p> <p>Scientific interest: Human Research Development, Economic Security System Of Entrepreneurship</p> <p>Publications: more than 10 papers in national and international magazines</p>
	<p>Katerina Koeva</p> <p>Current position, grades: 3rd year student at the Faculty of Mathematics and Informatics, Sofia University St. Kliment Ohridski</p> <p>Scientific interest: Artificial Intelligence</p>



CNN based learning: object classification on images from Aerial Photography

Jian-min Liu^{1, 2*}, Min-hua Yang¹

¹School of Geosciences and Info-Physics, Central South University, Changsha, 41000, China

²School of Information Science and Engineering, Hunan Institute of Humanities Science and Technology, Loudi, 417000, China

*Corresponding author's e-mail: liujianmin@csu.edu.cn

Received 6 July 2016, www.cmmt.lv

Abstract

These years, object recognition on remote sensing images with high resolution had boomed. We trained a multilayer convolutional neural network caffe based to classify the 79 thousand high-resolution and unlabeled optical remote sensing images via the Internet into the 4500 different classes. On the unlabeled test dataset, we obtained error rates of 19.7% which run really well than traditional machine learning techniques. With pre-trained model-aided, GTX750Ti GPU, Intel® Core™ i5-4590 processor, we sharply accelerated progress time. The results compared with the published ones, and good agreement is acquired.

Keywords:

CNN
remote sensing image
object recognition

1 Introduction

In planning, earth observation, coastal monitoring, terminal guidance of missile and many other civil fields, the demand for object recognition sharply increases. Over the past dozen years, scientists have worked on a variety of object classifiers with high efficiency and low cost, but high resolution also brought problems and challenges to the classification issues, the effect is just passable. [1, 2].

In recent years, deep learning technology gradually arisen, including but not limited to convolution neural network, boltzman machine, sparse autoencoder, etc, and applied to some fields including but not limited to speech recognition, image recognition, image retrieval, and other fields. Speech recognition is a classic application of neural network, in recent years, and deep learning has achieved remarkable results in speech recognition in recent years. Microsoft and Google have been gradually put deep learning's speech recognition algorithm into commercial applications. Microsoft's original speech recognition is based on the use of hybrid algorithm Gauss reduce the error rate of words to 16%. Bengio, Hinton and other scholars solved MNIST based classification problems, and breaking the old mark of 0.14% error rate set by traditional machine learning algorithm for many years [3, 4]. Krizhevsky had made significant progress on the ImageNet data set with a 15.3% error rate [5].

On the first hand, the planning image of city construction passed through stack autoencoder to generate specific activations, but on the other hand, status quo of city construction collected by law enforcement terminal also went through stack autoencoder to generate the corresponding features. The system compared the characteristics image of city construction with parity position and a different time. If the difference outpaced threshold, it triggered enforcement warning. Image change detection based on deep learning did not pay attention to non structural changes

based on related image pixels, such as gray scale change, brightness shading, but focused on abstract the features of structure overall image, and obtained core attributes [6].

This paper presents object recognition from high resolution remote sensing images without tag based on convolutional Neural Network which consists of convolutional layer, Max-Pooling layer, and fully-connected layer. Therefore, the convolutional layer is an image convolution in essence of activations of the preceding layer, where the convolution filter called learned kernel which is feature of 16x16 or 8x8 in fact. The layer after fully-connected layer works with a final 319-way softmax. The results are compared with those traditional supervised machine learning ones. Conclusive, because GPU's memory available is scarce, network dimension is cramped. Our network spends about 129 hours to train on one GTX 750Ti 2GB GPUs.

2 Theoretical analysis

We can illustrate this graphically as follows:

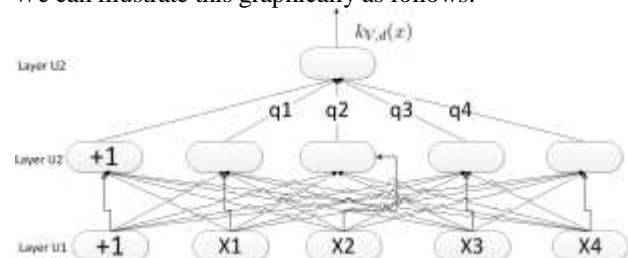


FIGURE 1 Feedforward computing from bottom to top

By executing a feedforward computing from bottom to top, we can obtain the activations for layers. We call this algorithm forward propagation. Figure 1 describe how the forward propagation works.

A convolutional neural network which consists of convolutional layer, max-pooling layer, and fully-connected

layer. As a result, the convolutional layer is an image convolution in essence of features of the previous layer, where the convolution filter called learned kernel or weights which is feature of 16x16 in fact specify the convolution filter. The layer after fully-connected layer works with a final 319-way softmax. The results compared with those traditional supervised machine learning ones.

The image come from natural has its own characteristics, that is to say, the statistical properties that are part of the image and the other part is the same. More appropriate interpretation is that when randomly selected from a large size images a small piece, such as sample 16x16, and learned some from this small sample characteristics, we can learn by the 16x16 sample to feature detectors, which is applied to any part of the image. This also means that the features we study in this part which can also be used in another part, so for all of the locations on this image, we can use the same features. In particular, we can learn by the 16x16 sample characteristics with the big size image convolution. Thereby contributing to the big size image of any location to get a different activation feature.

A specific example is given below: assuming that you have make a 384x384 image convolution using 16x16 sample characteristics, and then let them go through sparse autoencoder and trained to get the feature activation values. In this case, obviously we can get 400 sets, which each contains 369x369 characteristics of convolution.

It is convolved that the input of convolution layer come from the previous layer's activations with learned kernel which is feature of 16x16 in fact. We run it through pre-trained sparse autoencoder to compute the activations, i.e., convolved features.

$$x_i^u = g(d_i^u + \sum_{j \in N_i} x_j^{u-1} * h_{ji}^u) \quad (1)$$

Concern to the images with 400x400 pixels, and then we obtain each convolution results order of magnitude to square of $(400 - 16 + 1)$ or 148225. Given these results and consider 319 features each result, softmax layer will face the characteristics of the astronomical level will fail soon. Before inputting all the extracted features logistic or softmax layer, we need to significantly reduce the amount of calculation. In order to solve this problem, max pooling layer will take overall average operation of image. On the last layer, we choose softmax model which generalizes logistic model in multi-class classification and recognition, we obtain a working model of softmax which come into play in multi-class classification.

3 Experimental results and analysis

In this Experiment, We classify the 79 thousand high-resolution and unlabeled optical remote sensing images via the Internet into the 4500 different classes by a multilayer pre-trained convolutional neural network caffe based. On the unlabeled test dataset, we obtained error rates of 19.7% which run really well than traditional machine learning techniques. With pre-trained model-aided, GTX750Ti GPU, Intel Core i5-4590 processor, we sharply accelerated progress time. The results compared with the published ones, and good agreement is acquired.

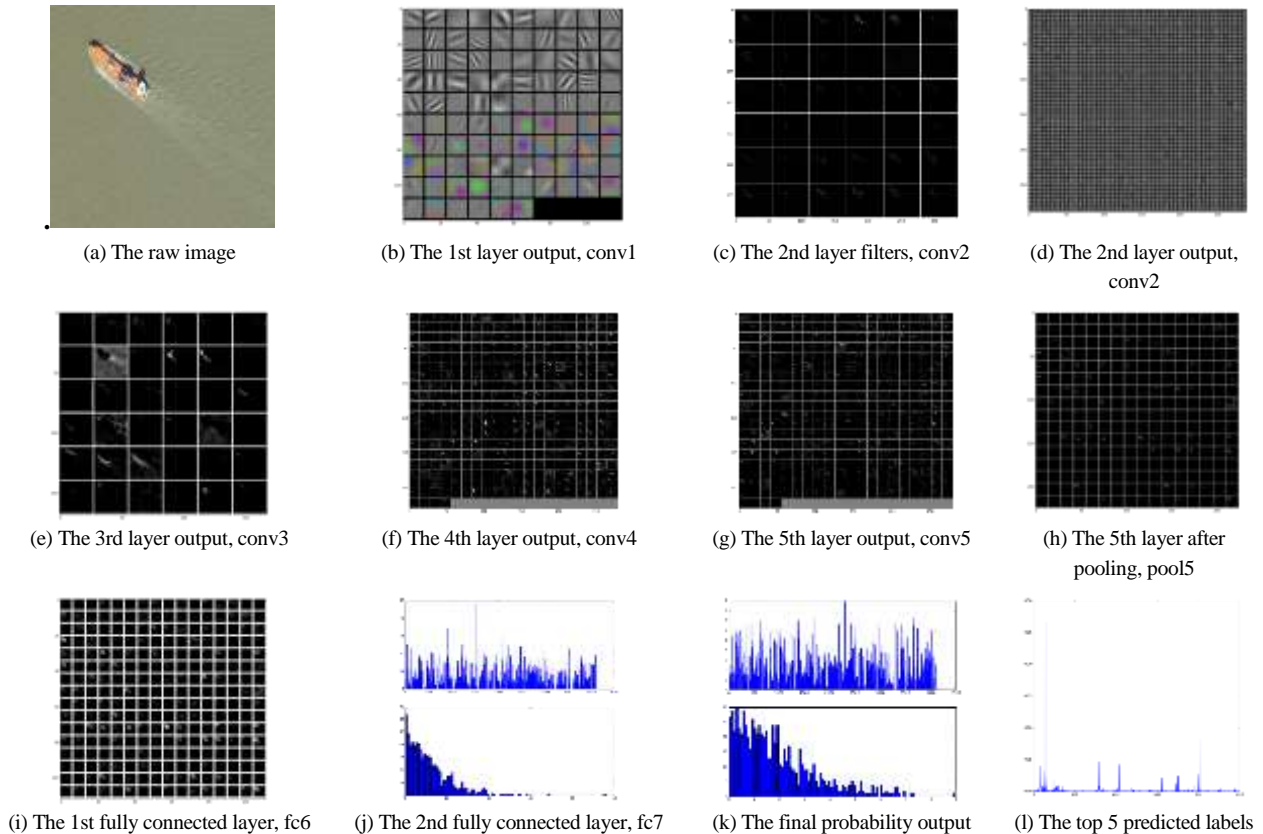


FIGURE 2 Experimental results

The process from the first layer to the seventh layer of the classification of an image is shown in Figure 2-(a-l). Figure 2-(a) show the input original image, Figure 2-(b) show the output of 1st layer called conv1 layer, Figure 2-(c) show the filters of 2nd layer called conv2 layer.

Figure 2-(d) show the output of 2nd layer called conv2 layer, Figure 2-(e) show the output of 3rd layer output called conv3 layer, Figure 2-(f) show the output of 4th layer called conv4 layer.

Figure 2-(g) show the output of 5th layer called conv5 layer, Figure 2-(h) show the 5th layer after pooling called pool5 layer, Figure 2-(i) show the 1st fully connected layer called fc6 layer.

Figure 2-(j) show the 2nd fully connected layer called fc7 layer, Figure 2-(k) show the output of final probability, and Figure 2-(l) show the top 5 predicted labels.

The top 1 predicted label is speedboat, the top 2 predicted label is steamer, the top 3 predicted label is water snake, ocean liner, the top 4 predicted label: leaf hopper, and the top 5 predicted label is terrapin. The predictions are in

agreement with the original picture.

4 Conclusion

Convolutional Neural Network naturally learn a hierarchical representation within a recurrent network, thereby implementing a deep network with parameter sharing between the layers. As the application of the Convolutional Neural Network method with GPU aided calculation to object recognition on remote sensing images with high resolution, we can not only obtain visual and numerical results with a high accuracy, but also enjoy many advantages over other traditional methods. A number of experimental results were listed in the paper which proves the effectiveness of convolutional Neural Network with GPU aided calculation in the field of object recognition on remote sensing images with high resolution. As a next work we commit to use a large and very deep Convolutional Neural Network to detect objects belong to a lot of different classes.

References

- [1] Foody G M, Mathur A 2004 A relative evaluation of multiclass image classification by support vector machines *IEEE Trans. Geosci. Remote Sens* **42**(6) 1335–43
- [2] Chen Yushi 2014 Deep Learning-Based Classification of Hyperspectral Data *IEEE Journal of selected topics in applied earth observations and remote sensing* **7**(6)
- [3] Hinton G E, Osindero S, Teh Y W 2006 A fast learning algorithm for deep belief nets *Neural Computation*
- [4] Bengio Y, Mesnil G, Dauphin Y, Rifai S 2013 Better mixing via deep representations *Machine Learning*
- [5] Krizhevsky A, Sutskever I, Hinton G E 2012 ImageNet classification with deep convolutional Neural Networks *NIPS Neural Information Processing Systems*
- [6] Jianmin Liu, Fan Huang, Jun Dai 2015 Image recognition technology for remote sensing based on research and application *Machine learning Journal of Xi'an University of Arts & Science*
- [7] Tallman D E, Wallace G G 1997 *Synth. Met.* **90** 13
- [8] Kroto H W, Fischer J E, Cox D E 1993 *The Fullerenes*
- [9] MacDiarmid A G, Epstein A J 1991 in ed. W R Salaneck, D T Clark, E J Samuelson *Science and Applications of Conducting Polymers* Adam Hilger: Bristol 117
- [10] Eaton D I 1975 *Porous glass support material*

AUTHORS

Liu Jian-min



Current position, grades: B.S. degree from the University of Hunan (UHN), the M.S. degree from the University of Xiamen (UX), pursuing the Ph.D. degree with the Department of GIS of the University of Central South (UCS)
Scientific interest: remote sensing, GIS and Machine learning

AUTHORS' INDEX	
Butvilas T	7
Butviliene J	7
Buzko I	26
Dyachenko Y	26
Goel A K	15
Juodagalvyte R	11
Koeva K	26
Liu Jian-min	30
Mingazova Y	23
Nenkov N	26
Petrova M	26
Tuleninova D	26
Tutkusheva Zh	15, 23
Valavichius E	11
Vasilienė–Vasiliauskienė V	7
Vipartiene R	11
Yang Min-hua	30

OPERATION RESEARCH AND DECISION MAKING**Project-based learning: the complexity and challenges in higher education institutions**

V Vasilienė–Vasiliauskienė, J Butvilienė, T Butvilas

Computer Modelling & New Technologies 2016 20(2) 7-10

Within the context of the 21st century education paradigm competence and new skill require new authentic learning methods. The growing popularity of the project-based learning (hereinafter PBL) paradigm, as an active, student-centric methodology, is related to extended opportunities in terms of knowledge attainment, facilitating the acquisition of several transversal competences such as team work, search and selection of information and synthesis and analysis abilities. Therefore in this paper authors would present main features of PBL identifying aspects that give both students and teachers a kind of drive for the involvement of all parties in the learning process; also discussion on the innovativeness within PBL paradigm is presented and finally some obstacles/challenges are dealt on the basis of leaving an open space for further considerations and possible explorations on the effectiveness using this approach in learning and teaching.

Keywords: knowledge-based cooperation, networking, project-based learning

Assessment of competencies for IS specialists

E Valavichius, R Juodagalvyte, R Vipartiene

Computer Modelling & New Technologies 2016 20(2) 11-14

Vilnius Cooperative College conducts a study program “Information systems implementation and support” (informatics engineering). Before starting the study program a survey was conducted to clarify demand of such specialists and to assess program’s competencies (Valavičius, 2012). During program existence IT companies encountered with new challenges: cloud computing, big data, using of smart devices (BYOD) etc. Committee of study program decided to repeat the survey in order to improve the study program. The aims of the survey are to identify new demand and needed skills. This article analyses results of the survey and makes conclusions.

Keywords: information systems, skills of IS specialists, new skills for IS study program

Impact of crude oil and US dollars price on the Indian stock exchange

A K Goel, Zh Tutkusheva

Computer Modelling & New Technologies 2016 20(2) 15-22

The speed and magnitude of the oil price decline has the potential to trigger financial strains, which could reduce the global benefits of lower oil prices, although the effects have so far been contained. Countries and companies dependent on oil revenues have already been significantly re-priced, especially those with existing vulnerabilities, but the impact may not yet have been fully felt. In particular, a number of energy firms accumulated sizable debt during the period of high oil prices, and some banking systems saw a marked increase in loan exposures to the energy sector. Moreover, the redistribution of wealth among investors with varying saving and portfolio preferences could have market repercussions, and those effects will also take time to play out. For those concerned about market infrastructure, there does not appear to be evidence of dislocations in the oil markets so far. This article is an attempt to analyse the various factors which are responsible for effecting Indian Stock market.

Keywords: oil prices, US dollar, stock, impact

Way to leadership and competitiveness with Kaizen

Zh Tutkusheva, Y Mingazova

Computer Modelling & New Technologies 2016 20(2) 23-25

This article describes the experience in crisis new models of enterprises activity, management of changes, relations with personnel are always looked for. One of the most efficient concepts of production and human relations is the concept of Kaizen. It is necessary to introduce modern management tools and principles of corporate management in the public sector. In conditions of WTO the Kaizen system, which is aimed at improving of efficiency and optimization of business processes, is a necessity for enterprises. Kaizen requires a systematic approach and considerable financial investments.

Keywords: Kaizen system, concept, higher education

INFORMATION AND COMPUTER TECHNOLOGIES**Artificial Intelligence technologies in human resource development**

I Buzko, Y Dyachenko, M Petrova, N Nenkov, D Tulenina, K Koeva

Computer Modelling & New Technologies 2016 20(6) 26-29

An essential part of modern management is computing, particularly, Artificial Intelligence technologies. The Artificial Intelligence technologies which are based on reproduction of principles of human intelligence functioning. The Rising of General Artificial Intelligence is impossible without the acquisition of elements of self-consciousness and self-cultivation. But for the solution of applied problems we need applied Artificial Intelligence which performs particular tasks particularly in management. The most difficult task in Human Resource Development is to determine the effectiveness of training costs due to its branching and sophisticated feedback given by improved production results of staff who was involved in the process. To determine the impact of the performance of the company (labour costs, labour costs per person, income, profit, profit per person) based on indicators, characterizing the personnel training on the example of ALC "Severodonetsk factory of chemical non-standard equipment" we use cognitive system IBM Watson Analytics. Found that the main factor influencing the amount of training in the company is the net

income of the company for the previous year. Considering this analysis, it could be argued that decisions on financing of Human Resource Development are carried out on the basis of income of the enterprise from the past period.

Keywords: artificial intelligence, human resource, development

CNN based learning: object classification on images from Aerial Photography

Jian-min Liu, Min-hua Yan

Computer Modelling & New Technologies 2016 20(1) 30-32

These years, object recognition on remote sensing images with high resolution had boomed. We trained a multilayer convolutional neural network caffe based to classify the 79 thousand high-resolution and unlabeled optical remote sensing images via the Internet into the 4500 different classes. On the unlabeled test dataset, we obtained error rates of 19.7% which run really well than traditional machine learning techniques. With pre-trained model-aided, GTX750Ti GPU, Intel® Core™ i5-4590 processor, we sharply accelerated progress time. The results compared with the published ones, and good agreement is acquired.

Keywords: CNN, remote sensing image, object recognition