EDITORIAL OFFICE AND ADMINISTRATION: *EDITURA ŞTIINŢIFICĂ F.M.R., CALEA GRIVIŢA, NR. 83, SECTOR 1, O.P.12, COD 010705, BUCHAREST, ROMANIA*
TEL..: +(40)-0372926401; +(40)-0724537051
+(40)-0722696187; +(40)-0724296800
+(40)-0722311272; +(40)-0735547316
FAX:+(40) 021-31512 32
E-MAIL:REDACTIA@METALURGIA.RO
WWW.METALURGIA.RO
Readers from abroad can subscribe through Editura Ştiinţifică *F.M.R.*
Conturile EDITURII ŞTIINŢIFICE *F.M.R.*
BANCPOST Sucursala Griviţa, Bucureşti
***RON:* 82BPOS70706464746RON01**
ATEBANK ROMANIASucursala Bucureşti-Griviţa
RON:RO53MIND001000007585RO01
***USD:* RO67 MIND 001 00000 7585 US01**
***EURO* :RO10 MIND 001 00000 7585EUR01**

METALURGIA
INTERNATIONAL SPECIAL ISSUE
NO. 8 - 2013
ISSN 1582 - 2214

Romanian Metallurgical Foundation
Scientific Publishing House
HONORARY PRESIDENT OF SCIENTIFIC PUBLISHING HOUSE *F.M.R.*

PRESS RELEASE

Pfeiffer Vacuum welcomed Röntgen Prize winner

- **Award for excellent research with innovative X-ray lasers**
- **Vacuum is essential for scientific experiments**

Asslar, December 3, 2012. This year, Dr. Christoph Bostedt was awarded the Röntgen Prize of the Justus-Liebig University of Gießen. For more than fifty years now, Pfeiffer Vacuum, together with the Dr. Erich-Pfeiffer Foundation and the Ludwig-Schunk Foundation, has sponsored the Röntgen Prize for young scientists in the field of radiation physics.

Dr. Bostedt is currently a researcher at Stanford Linear Accelerator Laboratory in the USA, where he is successfully engaged in the Linear Coherent Light Source (LCLS) as a team leader in the field of nuclear and molecular physics.

Dr. Bostedt was awarded the Röntgen Prize for his scientifically very broad-based and successful experimentation in the field of research into innovative X-ray lasers. His excellent work with the free-electron lasers FLASH and LCLS is especially highlighted. Dr. Bostedt was repeatedly able to also take advantage of vacuum solutions by Pfeiffer Vacuum in his scientific work.

On November 29, 2012, one day before the awards ceremony at the Justus-Liebig University in Gießen, Dr. Bostedt visited the sponsoring company, Pfeiffer Vacuum, and reported on his latest findings and research results.

components as well as vacuum chambers and systems. Ever since the invention of the turbopump by Pfeiffer Vacuum, the company has stood for innovative solutions and high-tech products that are used in the markets Analytics, Industry, Research & Development, Coating and Semiconductor. Founded in 1890, Pfeiffer Vacuum is active throughout the world today. The company employs a workforce of some 2,300 people and has more than 20 subsidiaries.
For more information, please visit www.pfeiffer-vacuum.com

Press Contact:

Pfeiffer Vacuum GmbH
Public Relations
Sabine Neubrand-Trylat
T +49 6441 802 1223
F +49 6441 802 1500
Sabine.Neubrand@pfeiffer-vacuum.de
www.pfeiffer-vacuum.de

About Pfeiffer Vacuum
Pfeiffer Vacuum (Stock Exchange Symbol PFV, ISIN DE0006916604) is one of the world's leading providers of vacuum solutions. In addition to a full range of hybrid and magnetically levitated turbopumps, the product portfolio comprises backing pumps, measurement and analysis devices,

METALURGIA INTERNATIONAL VOL. XVIII (2013), SPECIAL ISSUE NO. 8
ISSN 1582-2214

CONTENTS

MATERIALS SCIENCE

KNOWLEDGE AND INNOVATIONS TRENDS IN METALLURGY SUBFIELDS WITHIN STANDARDIZATION PLATFORM

[1]Živadin MICIĆ, [1]Nebojša STANKOVIĆ

[1] Faculty of Technical Sciences Čačak, University of Kragujevac, Serbia

==========

Key words: metallurgy, innovations trend, knowledge, subfield, standardization

Prof. Ph.D. Živadin MICIĆ

M.Sc. Nebojša STANKOVIĆ

Abstract: *The paper presents an original approach to ranking/clustering of standardized subfields presented on examples of innovation trends in metallurgy. A multi-criteria statistical analysis of knowledge database units was applied in the paper. A number of objectives have been realized on innovation pathways, both globally (ISO) and locally (SRPS – standard designation in Serbia), and initial hypotheses in PDCA (Plan, Do, Check, Act) methodology have been confirmed. Based on standardized quantities and values of knowledge database units, ranking/clustering indices were checked within standardized metallurgy subfields. Web-applications for analysis and singling out of samples from the entire Web-population (local (SRPS) and global (ISO) standardization) served as software support to statistical methodology. Original regression equations with accompanying indices of quantity, knowledge database values and ranking, given on examples within the field of metallurgy were developed. Study results aim at a more sensitive ranking of all classified fields of human endeavor, from the standpoint of innovation frequency*.

1. INTRODUCTION

1.1 What problem does the paper look at?

The paper deals with the development of methodology for ranking/clustering of standardized areas of human endeavor shown on examples of knowledge innovation in metallurgy. A comparative multi-criteria analysis was applied, and international (ISO) and local (SRPS, [1]) knowledge database units were valued in metallurgy subfields. Innovation trends and knowledge pathways were defined using regression equations. The importance of both local and global knowledge innovation was examined in all metallurgy subfields. Based on *International Classification of Standards* (ICS), metallurgy belongs to area 77 (ICS-1 = 77, classification level I) encompassing 10 subfields on classification level II (ICS-2 = 11.xyz, [2]):

77.020 Production of metals
77.040 Testing of metals
77.060 Corrosion of metals
77.080 Ferrous metals
77.100 Ferroalloys
77.120 Non-ferrous metals
77.140 Iron and steel products
77.150 Products of non-ferrous metals
77.160 Powder metallurgy
77.180 Equipment for the metallurgical industry.

Among the total of 40 standardized areas of human endeavor, the studied metallurgy field occupies positions from 6 to 12. The criteria are based on quantities and values (based on the studies 2012.01 and 2013.01), on both SRPS and ISO standardization platforms. However, it is frequency of standards publishing at the local level that appears to be a problematic issue, as only 299 SRPS units in 2011 were published. This innovations trend followed in 2012 with only 279 new SRPS units.

The issues of tracking knowledge and innovations trends as well as gaining access to original standardized database units are of utmost importance. According to [3], 'Quality is free' philosophy was employed in the past century. Nowadays, standards are extremely costly. The issues of leadership, *knowledge management* [4], *integrated promising innovation management* and *change management* [5] are becoming increasingly important.

1.2 The study objectives and initial hypotheses

The initial hypotheses of the study, which are important for other fields and subfields of human endeavor, are based on the presented problematics, and the analyzed knowledge and innovations trends in the field of metallurgy, as well as on the projected goals (PDCA methodology).

P) The analyses enable developing and selection of real regression equations by means of explicit mathematical relations – using trend lines so as to enable predicting and planning resources for the future knowledge innovation.

D) It is possible to define comparative indices of innovation quantity, as well as value indices and ranking criteria for each subfield and the area as a whole, whereby defining methodology of ranking/clustering of standardized fields or subfields is the final objective.

C) It is possible to identify clear correlations among innovations trends (including time index for checking – Check) in both time and space: global towards local (ISO towards SRPS), on standardization platform.

A) It is possible to identify the relationship between continuous (daily, weekly, monthly and yearly) and discontinuous (cumulative) knowledge innovation on the one hand, and the advancement of education on the other.

2. RESEARCH METHODOLOGY AND FRAMEWORK

The PDCA, statistical methodology for dynamic analyses and deductive–inductive reasoning methods were used for predicting the future development and innovation of the pragmatic framework. Methodologically, statistical indices were formed for the comparison of ISO–SRPS relations in the field of metallurgy (ICS-1 = 77) with other fields of human endeavor, including Quantity indices (Iq), value indices (Iv) and ranking index (Iqv).

Quantity indices (Iq), defined and determined for both ISO and SRPS, refer to the following: Samples (Iqs), Published standards (Iqp), standards under development (Iqu), standards withdrawn from use (Iqw), Deleted projects (Iqd), Innovations in various stages of development (Iqi = $Iqu_{/2012}$) – for the entire previous calendar year.

Value indices (Iv) are correlated with quantity indices, whereby the results are graphically presented both cumulatively and by trends, within the majority of 10 *metallurgy* subfields, shown by figures