# ZESZYTY NAUKOWE
## MAŁOPOLSKIEJ WYŻSZEJ SZKOŁY EKONOMICZNEJ W TARNOWIE

numer 4

Tarnów 2017

Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie, t. 36
Kwartalnik, nr 4, grudzień 2017


| | |
|---|---|
| Adres redakcji | Małopolska Wyższa Szkoła Ekonomiczna<br>Redakcja Zeszytów Naukowych<br>ul. Waryńskiego 14, 33-100 Tarnów, Polska<br>tel.: +48 14 65 65 553<br>faks: +48 14 65 65 561<br>http://zn.mwse.edu.pl<br>e-mail: redakcja@mwse.edu.pl |

Redakcja informuje, że wersją pierwotną (referencyjną) czasopisma jest wydanie papierowe.

Wszystkie artykuły zamieszczone w czasopiśmie są recenzowane.

Pełne teksty artykułów są zamieszczane
na stronie internetowej czasopisma: http://zn.mwse.edu.pl.

Zgodnie z wykazem Ministerstwa Nauki i Szkolnictwa Wyższego
publikacjom naukowym zamieszczonym w czasopiśmie przyznawane jest 9 punktów.

Indeksowane w POL-index, Index Copernicus (ICV 2016: 72,50), CEJSH, BazEkon



Printed in Poland

Wydanie I, nakład 100 egz.
Druk i oprawa: Drukarnia „Luxor”
ul. D. Jurandówny 22, 30-398 Kraków, Polska
tel.: +48 12 268 09 00
e-mail: biuro@drukarnialuxor.pl

# THE MAŁOPOLSKA SCHOOL OF ECONOMICS IN TARNÓW

# RESEARCH PAPERS COLLECTION

issue 4

Tarnów 2017

The Małopolska School of Economics in Tarnów Research Papers Collection, vol. 36
Quarterly, issue 4, December 2017


| Editorial Office | Małopolska School of Economics<br>Editorial Office<br>ul. Waryńskiego 14, 33-100 Tarnów, Poland<br>tel.: +48 14 65 65 553<br>fax: +48 14 65 65 561<br>http://zn.mwse.edu.pl<br>e-mail: redakcja@mwse.edu.pl |
|---|---|

The Editorial Board informs that the reference version of this magazine is its paper edition.

All articles published in the journal are subject to reviews.

Full-text articles are posted on the website of the journal: http://zn.mwse.edu.pl.

According to the regulations of the Ministry of Science and Higher Education, scientific publication in the journal is awarded 9 points.

Indexed in POL-Index, Index Copernicus (ICV 2016: 72,50), CEJSH, BazEkon



Printed in Poland

First edition of 100 copies
Printed and bounded at the Drukarnia 'Luxor'
ul. D. Jurandówny 22, 30-398 Kraków, Poland
tel.: +48 12 268 09 00
e-mail: biuro@drukarnialuxor.pl

# Contents



# Spis treści

# Foreword

Economics is a science whose fundamental goal and object of research is to find out the reasons of economic processes and social phenomena, as well as to assess the value of things, ideas. The goal can be achieved in two ways: by indicating the model of a well functioning enterprise, economy or the whole society or by diagnosing what the situation is like today in an economy or an enterprise. Therefore, we deal with theorizing, modelling the mentioned phenomena and processes, and with surveys. Both activities are necessary to operate more effectively. The first one sets the direction and the goal of activity, the other one defines the methods and means to achieve it. It is in these cases that the source of inspiration, assistance is provided by theory, knowledge from experience, creativity of individuals. It is included in each of the articles constituting this issue of *The Małopolska School of Economics in Tarnów Research Papers Collection*, already the 36th issue. It is worth mentioning that each presented approach adds new ideas to the current knowledge on management, and the process changes the mindsets of managers and their organizational behaviours.

The *Research Papers Collection* is the work of scientific and didactic workers of our School and employees from other Polish and foreign universities, such as: Polytechnic Institute of Beja in Portugal, Lviv Educational Institute of the Higher Educational Institution 'Banking University' in Ukraine, Trakia University in Stara Zagora, Bulgaria, Poznan University of Technology, Wrocław University of Science and Technology, AGH University of Science and Technology, Pedagogical University of Cracow, Jan Kochanowski University in Kielce, and Kielce University of Technology.

The papers, being the effect of scientific work conducted within basic and implementation research, provide a lot of interesting information in terms of cognition and application. The problems of the articles making up this Journal concentrate mainly around the issues of human capital management, ergonomics, as well as entrepreneurship and innovativeness of organizations.

In the collected articles, the Reader will find a lot of theoretical approaches concerning: innovation process and the method of studying the innovative ability of an enterprise, intellectual capital management, the methods of studying and improving the quality assurance system in an organization, the application of ergonomics principles in office work and teaching students, or tourism entrepreneurship. The Journal can be an interesting and useful reference for organization and management, tourism and pedagogics theoreticians, as well as students and practicians.

I would like to thank all those who co-created this issue of the *Research Papers Collection*, particularly the Editors who made an effort to give opinions about the articles sent in, the Reviewers for substantive and valuable remarks, and all the Editorial Team, as well as all collaborators.

*Leszek Kozioł*
Editor-in-Chief

# ECONOMICS

# Innovative engineering methods for quality evaluation and food safety

**Petya Veleva-Doneva**

Trakia University
Faculty of Economics

**Stefka Atanassova, Georgi Zhelyazkov**

Trakia University
Faculty of Agriculture

**Abstract:** The improvement of quality of life and human activity has many directions. One of them is providing high-quality and safe food. Advancements in sensor technologies, data mining and processing algorithms have provided technical capabilities for development of innovative engineering methods that guarantee certainty regarding the quality control of food and public health. The potential of Near Infrared Spectral Analysis and Aquaphotomics as non-destructive and rapid methods for monitoring food quality through observation of water absorbance bands is presented.

**Key words:** near infrared spectroscopy, aquaphotomics, multivariate data analysis, food safety and control

## 1. Introduction

A high level of public health is one of the main tasks for improving quality of human's life. The public interest relating to the quality and production methods of food and food control increases significantly in recent decades. Strategies of many countries are aimed towards determining regulatory standards against food fraud, low quality, bacterial control, etc. Their rules are connected to hygienic production, storage and transportation. Meanwhile, recent researches show a lot of cases of mass or sporadic poisoning with ready-to--consumption products dangerous to their users (Kitamoto et al., 2009; Rouger et al., 2017; Schmid et al., 2007; Zhang et al., 2012). It is also a fact that traditional techniques for food control are precise and objective but also too laborious, lengthy, expensive and destructive. The necessity of developing modern engineering methods that can be used directly in farms, on food production lines, is growing. Quick responses are particularly important to industry, where an answer is needed within minutes. That would allow to take appropriate corrective measures in a timely manner, directed towards protecting people's health (Cheng et al., 2013; Cozzolino and Murray, 2012; Rukchon et al., 2014; Teixeira dos Santos et al., 2013; Weeranantanaphan et al., 2011).

Correspondence to:
Petya Veleva-Doneva
Trakia University
Faculty of Economics
Department of Informathics and Mathematics
Studentski Grad
Stara Zagora 6000, Bulgaria
Tel.: +35 9896 601 537
E-mail: pveleva@uni-sz.bg

Near-infrared (NIR) spectroscopy opens a new area in biotechnology, food science, and engineering by exploring and describing biological systems through a rapid non-destructive monitoring of their interaction with NIR light. This method is based on the absorption of C-H, N-H, O-H, and S-H molecular bonds that are present in most organic raw materials and products and uses the range from 780 to 2500 nm of the electromagnetic spectrum (Sandorfy et al., 2007).

Near-infrared spectroscopy is a very flexible technology and has many advantages. This technique allows samples in different physical phases: solids, liquids, pasty and gases, to be measured directly without any pre-treatment (Feng and Sun, 2013; Jia et al., 2017; Huang et al., 2014). Water has less absorbance in the NIR region, compared to the absorbance in the mid-infrared one. Thus, aqueous solutions, food or biological samples, which usually contain a large amount of water, can be measured directly without complicated sample preparation procedures and waste materials such as toxic solvents. Samples could be measured through glass (glass cuvettes, glass vials or sample cups with glass windows) or even through transparent packaging (Veleva-Doneva, 2012; Zhang et al., 2012). Remote measurements using quartz fiber optics are possible and could be used for online process monitoring. Because of the non-destructive nature of the analysis, the samples can be used for further tests (Cheng et al., 2013; Feng and Sun, 2013; Veleva-Doneva et al., 2010). An additional advantage of NIR spectroscopy is that spectra often contains information about physical properties such as particle size, viscosity, density, temperature, pH, dry matter, fat, colour, etc. (Atanassova et al., 2017; Balage et al., 2015; Collell C. et al., 2012).

Successful application of NIR spectroscopy depends on the correct choice of spectral instrument. The choice of the instrument depends on analyzed products, their chemical composition and structure, required analyte sensitivity and selectivity, reliability, ease-of-use, and implementation needs. Modular-configurable instruments with a range of light sources, fibers, accessories for different measurement mode, allow easy measurement of specific products. Fiber optic probes are very good solution for sampling in-vivo, analyzing large samples, monitoring real-time reactions, and any other application where it is difficult to bring the sample to the spectrometer. The flexibility and user-friendliness has made them one of the most widespread tools in modern spectroscopy. Fiber-optic probes have the widest range of applications in laboratory and online analysis of different food samples such as milk, dairy products, meat, meat products, fish, fish products, fruit, beverages, etc. (Horvath et al., 2008; Tito et al., 2012; Trocino et al., 2012; Niu et al., 2014; Reis and Rosenvold, 2014). Development in optics and electronics lead to miniaturization of NIR instruments. Recently offered small size and low cost portable NIR spectrometers have several advantages for non-destructive, online, or in-situ analysis in agro-food industry (Teixeira dos Santos et al., 2013).

In the last fifteen years NIR spectroscopy has been used in combination with a new tool caled Aquaphotomics. This approach has been developed by prof. Roumiana Tsenkova from Kobe University, Japan and can be used to find water hydrogen bonds in different aqueous systems under various perturbations. The goal changes in water to be utilized to obtain more information for understanding changes in observed biological system. Twelve characteristic wavelengths known as 'WAter MAtrix CoordinateS' (WAMACS) have been identified in the area of the first overtone of the water NIR spectra, where despite the type of perturbation

the observed systems showed predictable spectral variations. Changes of water absorbance pattern can be visualized as a star chart named 'Aquagram' (Tsenkova, 2009). Aquaphotomics has been applied in different areas as water characterization, food quality control, early diagnostics in medicine, etc. (Matija and Tsenkova, 2011; Munćan, 2011; Lu et al., 2016; Veleva-Doneva, 2017).

The use of Aquaphotomics based on spectral information for analytical purposes relies on the multivariate data analysis. Nowadays this is of even more importance because of the increasing power of computers and the development of NIR spectrophotometres that allow thousands of spectral data points to be obtained. Aquaphotomics is the analytical technique which the most applies chemometrics as a tool for extracting relevant information from analytical data (Atanassova et al., 2017; Feng and Sun, 2013; Kumar et al., 2014). NIR spectroscopy has been successfully used by Huang et al., 2016 for intramuscular fat investigation in fresh, frozen and frozen-thawed pork meat. They obtain the best results in first derivative of raw spectra and application of Gabor filtered mean spectra. Wu et al., 2016 have applied Partial least squares regression (PLSR) to design a prediction model for pork meat exposed to freeze-thawed processes with correlation coefficient of prediction 0.81 and root mean square error (RMSE) 0.33. Similar evaluation procedure has been applied by Xiong et al., 2015 with regression coefficients in prediction (Rp) 0.944 and root mean squared errors estimated by prediction (RMSEP) 0.081. Li et al., 2016 have studied meat pork quality to differentiate normal from pale, soft and exudative meat (PSE). Niu et al., 2014 have applied NIR spectra to make a classification and prediction models for identification donkey, beef, pork and mutton meat by SIMCA method. Accuracy of 100% for calibration and 98% for prediction has been achieved. Spectral instrument has been used by Collell et al., 2012 in prediction of water activity and moisture content in fermented dry sausages. Atanasova, 2015 has investigated NIRS in combination with aquaphotomics as a tool for monitoring the changes during ripening of Bulgarian yellow cheese from cow milk. She found significant changes in aquagram patterns depending on changes in titratable acidity and protein fraction in cheese during ripening. Cattaneo et al., 2016 have studied the differences in application of new coatings during the ripening and storage of two types of Italian cheese and winter melon by using near infrared spectroscopy and aquaphotomics. The authors conclude that each coating generated a specific fingerprint for the same product suggesting that aquagrams could be a useful procedure for distinguishing the effects of different coating materials. A lot of publications related to aquaphotomics and monitoring of changes in biological systems under various perturbations can be found (Bázár et al., 2014; Gowen et al., 2015; Kovacs et al., 2016).

The aim of this paper is to demonstrate the feasibility of NIR spectroscopy and Aquaphotomics approach for rapid discriminating of wild and raised in the recirculation system perch, fresh and spoiled meat, freezing and thawing meat and quality defects of meat.

## 2. Materials and methods

### 2.1. Anayzed samples

#### 2.1.1. First experiment

Thirty four perches (*Perca fluviatilis L.*) with a live weight of 120–140 g were investigated. Half of the fish were raised in the recirculating system of the experimental base of Agricultural Faculty of Trakia University, and the other half of the fish were caught with a fishhook at a Zhrebchevo Dam, Bulgaria). All the fish were killed by putting them in ice immediately after the catch, filleted and subjected to chemical and NIRS analysis.

Fish samples were prepared according to AOAC (2000; method 983.18) and subjected to determination of water content using air drying. Crude protein content was calculated by converting the nitrogen content, quantified by Kjeldahl's method, using an automatic Kjeldahl system (Kjeltec 8400, FOSS, Sweden). Lipid content was determined by the method of Soxhlet, using an automatic system (Soxtec 2050, FOSS, Sweden). Ash content was investigated by incineration in a muffle furnace (MLW, Germany) at 550°C for 8 h. Crucibles were equilibrated to the room temperature and weighed.

#### 2.1.2. Second experiment

Chilled pork loin samples (12 different batches) were collected from different retail meat markets. The meat was cut in slices 1–1.5 cm tick, weighing 45–55 g, and placed in sterilized glass Petri dishes, in aseptic laboratory conditions. Samples were placed at a temperature of 6 ± 0,3°C for storage of 3, 7 or 10 days. Total bacterial count was determined according to ISO 4833 standard. Formed colonies in the agar are presented as $\log_{10}$CFU/g product.

#### 2.1.3. Third experiment

Meat samples were collected from 72 cross-breed pigs, each with an approximate live weight of 115 kg. The pH of muscle samples was measured directly at 45 minutes post-mortem. Carcasses were divided into two classes according to pH values: normal meat with $pH_{45}$ values higher than 5.8, and Pale, Soft, Exudative (PSE) meat with $pH_{45}$ values lower than 5.8. Porcine muscle (*Longissimus thoracis et lumborum*) samples were taken 24 h after slaughter and divided into two parts. One part of each sample was scanned immediately, and a second part packed and sealed in a plastic bag to be deep frozen at –32°C for 6 h and kept at –21°C. Samples were thawed after one month and measured again.

### 2.2. NIR measurements and analysis

Diffuse reflection spectra of all tested food samples were obtained with a portable scanning NIRQuest 512 instrument in the range 900–1700 nm, using a reflection fiber-optic probe (Figure 1). For each sample measurements were made in 5 different points on the meat surface and then averaged. The spectral data processing and multiple scatter correction was carried out by Pirouette ver. 4.5 (Infometrix, Inc., Woodinville, WA, USA) software.

A radar chart called aquagram was used to display normalized absorbance values at several water bands on the axis originating from the centre of the graph. Water matrix coordinates at 1344, 1364, 1372, 1382, 1398, 1410, 1438, 1444, 1464, 1474, 1492 and 1518 nm, were used for axes. The values for aquagram $Aq_\lambda$ are calculated using the following equation:

$$Aq_\lambda = \frac{A_\lambda - \mu_\lambda}{\sigma_\lambda},$$

where $A_\lambda$ *is* absorbance after multiplicative scatter correction (MSC), $\mu_\lambda$ is the mean value of all spectra, and $\sigma_\lambda$ is standard deviation of all spectra at wavelength $\lambda$, respectively.

### 2.3. Statistical analysis

Program STATISTICA, StatSoft, Inc., Tulsa, USA was used for statistical analysis of the data.

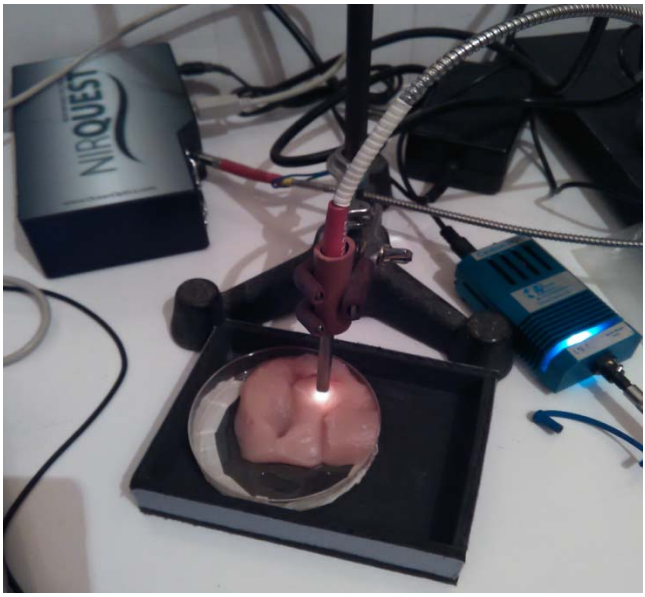



Figure 1. Measuremet of meat samples using a reflection fiber-optic probe and portable scanning NIRQuest 512 instrument

## 3. Results and Discussion

### 3.1. Experiment 1

Chemical composition of meat from wild perch (*Perca fluviatilis L.*) and the one raised in the recirculation system is presented in Table 1. The water content in the meat of wild perch is significantly higher than that in raised perch. The content of dry matter, crude protein and

crude lipids was higher in samples from perch raised in the recirculation system compared to these caught in Zhrebchevo Dam, Bulgaria. The ash content in the meat of wild perch was significantly less than the values in the cultivations in the recirculation system.

Table 1. Chemical composition of meat from wild perch (*Perca fluviatilis L.*) and the one raised in the recirculation system

| Parameter | Raised perch | Wild perch |
|---|---|---|
| Water, % | 77.07±0.03 | 79.70±0.07*** |
| Protein, % | 20.68±0.07 | 18.96±0.00*** |
| Lipids, % | 0.74±0.03 | 0.11±0.01*** |
| Dry matter, % | 22.93±0.03 | 20.30±0.07*** |
| Ash, % | 1.52±0.07 | 1.24±0.07* |

*** $P \leq 0.001$; ** $P \leq 0.01$; * $P \leq 0.05$.

Differences in NIR spectra of meat from wild perch and the one raised in the recirculation system were observed (Figure 2). The most significant differences were observed at 960 nm, 1100 nm, 1160 nm, and in the region from 1254 to 1321 nm, 1400–1424 nm, and at 1582 nm, respectively. The most of absorption maximums, at which significant differences between spectra of two kind of perch occured (at 960, 1400, 1421 nm and 1582 nm), might be assigned to vibration of O-H group of water (Workman and Weyer, 2008).

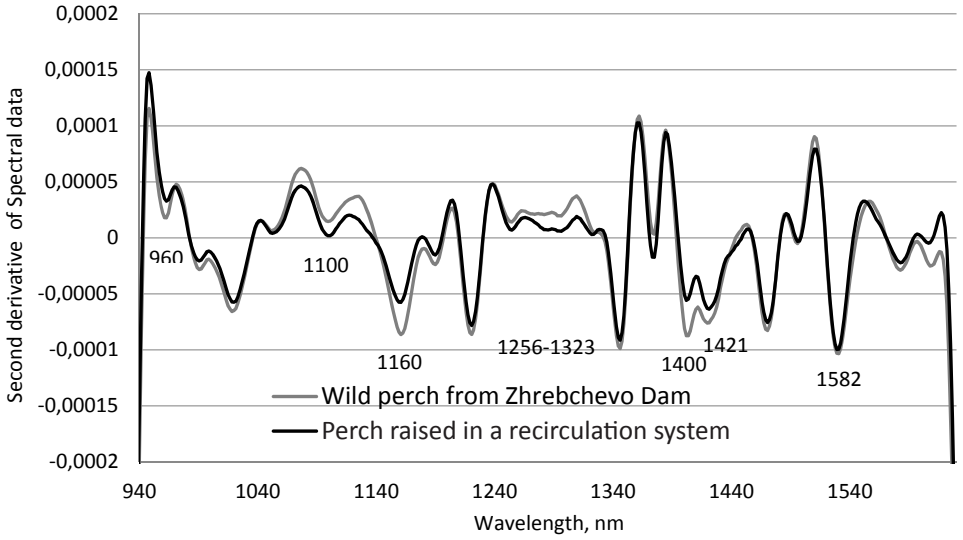



Figure 2. Second derivative absorbance spectra of meat from wild perch (*Perca fluviatilis L.*) and the one raised in the recirculation system

S o u r c e: Authors' own elaboration based on the research.

The aquagram, calculated using WAMACS coordinates, based on the spectral data of tested fish samples, is presented in Figure 3. The aquagram more clearly showed differences in NIR spectra of wild perch and the one raised in the recirculation system, caused by different chemical composition.

### 3.2. Experiment 2

The number of bacteria cells of meat samples during the investigated period varied between 3.146 to 9.505 $\log_{10}$CFU per 1 g product. Meat samples immediately after purchase had bacteria cells from $1.6 \times 10^4$ to $5.7 \times 10^5$ per 1 g. The number of bacterial cells increased to $10^8$–$10^9$ per 1 g after 7 or 10 days storage period. These results indicated that the chilled pork samples have undergone a gradually microbiological spoilage during storage. Meat samples were classified as fresh, semi-fresh or spoiled, according to measured $\log_{10}$CFU/g values: lower than 4—fresh, values between 4 and 6—semi-fresh, values bigger than 6—spoiled.

Bacteria growing is connected with degradation of protein and carbohydrate from substrates and presence of proteins and possibly free amino acids, amines or peptides and their interaction with water. Such changes are recognized as the main indicator for the starting of spoilage in meat and meat products. Differences in absorption spectra of fresh, semi-fresh and spoiled meat were observed, most significant in 1300–1550 nm region. The absorbtion in that region might be assigned to vibration of O-H group of water and N-H stretching of proteins (amines and amides) and their interaction with water.

Spectral data of all samples with bacteria cells count lower than 3 $\log_{10}$CFU per 1 g were averaged. This procedure was repeated for samples with values from 3 to 4 $\log_{10}$CFU per 1 g, from 4 to 5 $\log_{10}$CFU per 1 g, etc. The averaged spectra were used for calculation of aquagram coordinates (Figure 4). Aquagram showed changes in meat during the spoilage process, connected with proportion of free and bounded water and interaction of products of proteolysis in meat with water.

### 3.3. Experiment 3

PSE meat occurs when the pigs suffer acute stress before slaughter. When there are sufficient energy reserves in the muscles, the initial pH can drop very fast post-mortem due to the production of lactic acid. This pH drop causes a denaturation of the myosin and sarcoplasmic proteins and results in pale meat with a low water holding capacity.

Lean muscle contains approximately 75% water. Water in meat existed in form of bound, entrapped and free water. Bound water is the water that exists in the vicinity of non-aqueous constituents (like proteins) and has reduced mobility. Entrapped water is another fraction of water that can be found in muscles. It can be easily converted to ice during freezing. Free water is defined as the water whose flow from the tissue is unimpeded. During freezing and thawing of meat, ice crystal growth causes biochemical and physical changes. The latter result in the disruption of cellular organelles and release of their contents into the meat drip juice. These changes lead to changes in water content and proportion of free and bounded water, change of pH, water-holding capacity, protein denaturation, texture and tenderness of

the meat (Vieira et al., 2009). At the micro-level, changes lead to oxidative processes and oxidation of lipids and proteins in destroyed cells (Xia et al., 2009).

Differences in absorption spectra between both normal and PSE meat and fresh and frozen then thawed meat were observed in the same region between 1350 and 1500 nm as for fresh and spoiled meat. These differences could be explained with changes in water content and proportion of free and bounded water in meat. This statement is confirmed by aquagrams (Figures 5 and 6) showing changes of water structure in normal and PSE meat, as well as between fresh and frozen meat.

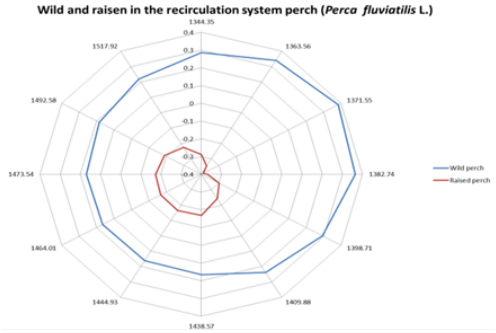



Figure 3. Aquagrams of wild perch (*Perca fluviatilis L.*) and the one raised in the recirculation system

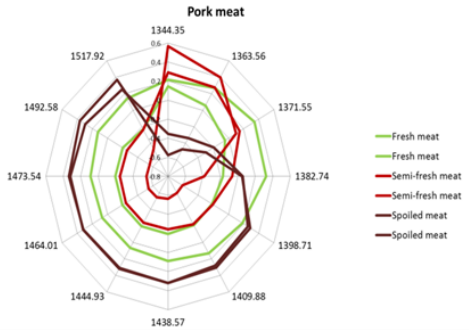



Figure 4. Aquagrams of fresh, semi-fresh and spoiled pork meat

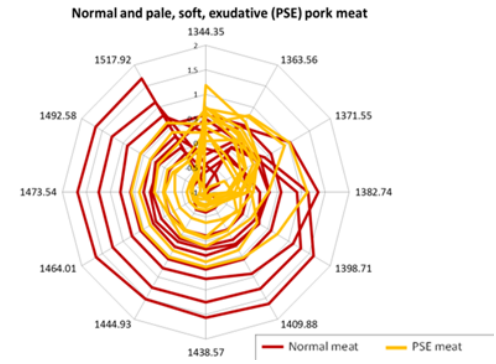



Figure 5. Aquagrams of normal and pale, soft, exudative pork meat

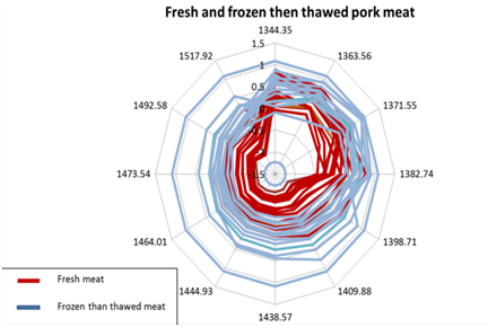



Figure 6. Aquagrams of fresh and frozen then thawed pork meat

Source (Figures 3–6): Authors' own elaboration based on the research.

## 4. Conclusions

In all of examined cases (normal and PSE meat; fresh and frozen then thawed meat, fresh and spoiled meat, meat of wild and caught in dam perch) differences in NIR in 1300–1550

nm region occurred, connected with water absorptions. These differences were clearly illustrated in obtained aquagrams.

Differences in absorption spectra and respective aquagrams of tested samples could be explained with functionally different structures of water in different kind of meat.

Aquagrams for all tested food products could be used for investigating differences, connected with quality of meat, degree of spoilage of meat, and type of fish. These results demonstrate the potential of portable fiber-optics near-infrared spectrometer for monitoring food quality through observation of water absorbance bands.

## References

Atanassova, S. (2015). Near Infrared Spectroscopy and aquaphotomics for monitoring changes during yellow cheese ripening. *Agricultural Science and Technology*, *7* (2), 269–272.

Atanassova, S., Veleva, P., Stoyanchev, T. (2017). Near-infrared spectral informative indicators for meat and dairy products bacterial contamination and freshness evaluation. In: A. M. Holban, A. M. Grumezescu (eds). *Microbial Contamination and Food Degradation* (pp. 315–340). Amsterdam: Elsevier Academic Press. ISBN 9780128112632.

Balage, J. M., da Luz, E., Silva, S., Gomide, C. A., Bonin, M. de N., Figueira, A. C. (2015). Predicting pork quality using Vis/NIR spectroscopy. *Meat Science*, *108*, 37–43.

Bázár, G., Kovács, Z., Tanaka, M., Tsenkova, R. (2014). Aquaphotomics and its extended water mirror concept explain why NIRS can measure low concentration aqueous solutions [online, accessed: 2017-10-20]. In: *Aquaphotomics, 'Understanding Water in Biological World'*. The 5th Kobe University Brussels European Centre Symposium 'Innovation, Environment, and Globalisation', Brussels, Belgium. Retrieved from: http://www.aquaphotomics.com/pdf-posters/nr2.pdf.

Cattaneo, T., Vanoli, M., Grassi, M., Rizzolo, A., Barzaghi, S. (2016). The aquaphotomics approach as a tool for studying the influence of food coating materials on cheese and winter melon samples. *Journal of Near Infrared Spectroscopy*, *24*, 381–390.

Cheng, J. H., Dai, Q., Sun, D. W., Zeng, X. A., Liu, D., Pu, H. B. (2013). Applications of non-destructive spectroscopic techniques for fish quality and safety evaluation and inspection. *Trends in Food Science & Technology*, *34*, 18–31.

Collell, C., Gou, P., Arnau, J., Muñoz, I., Comaposada, J. (2012). NIR technology for on-line determination of superficial a(w) and moisture content during the drying process of fermented sausages. *Food Chemistry*, *135* (3), pp. 1750–1755.

Cozzolino, D., Murray, I. (2012). A review on the application of infrared technologies to determine and monitor composition and other quality characteristics in raw fish, fish products, and seafood. *Applied Spectroscopy Reviews*, *47* (3), 207–218.

Feng, Y. Z., Sun, D. W. (2013). Near-infrared hyperspectral imaging in tandem with partial least squares regression and genetic algorithm for non-destructive determination and visualization of Pseudomonas loads in chicken fillets. *Talanta*, *109*, 74–83.

Gowen, A. A., Marini, F., Tsuchisaka, Y., De Luca, S., Bevilacqua, M., O'Donnell, C., Downey, G., Tsenkova, R. (2015). On the feasibility of near infrared spectroscopy to detect contaminants in water using single salt solutions as model systems. *Talanta*, *131*, 609–618.

Horvat, K., Seregely, Zs., Andrassy, E., Dalmadi, I., Farkas, J. (2008). A preliminary study using near infrared spectroscopy to evaluate freshness and detect spoilage in sliced pork meat. *Acta Alimentaria*, *37*, 93–102.

Huang, L., Zhao, J., Chen, Q., Zhang, Y. (2014). Nondestructive measurement of total volatile basic nitrogen (TVB-N) in pork meat by integrating near infrared spectroscopy, computer vision and electronic nose techniques. *Food Chemistry*, *145*, 228–236.

Huang, H., Liu, L., Ngadi, M. O. (2016). Prediction of pork fat attributes using NIR images of frozen and thawed pork. *Meat Science*, *119*, 51–61.

ISO 4833–1:2013. Microbiology of food and animal feeding stuffs: Horizontal method for the enumeration of microorganisms. Colony-count technique at 30 degrees C.

Jia, B., Yoon, S., Zhuang, H., Wang, W., Li, Ch. (2017). Prediction of pH of fresh chicken breast fillets by VNIR hyperspectral imaging. *Journal of Food Engineering*, *208*, 57–65.

Kitamoto, M., Kito, K., Niimi, Y., Shoda, S., Takamura, A., Hiramatsu, T., Akashi, T., Yokoi, Y., Hirano, H., Hosokawa, M., Yamamoto, A., Agata, N., Hamajima, N. (2009). Food poisoning by Staphylococcus aureus at a university festival. *Japanese Journal of Infectious Diseases*, *62* (3), 242–243.

Kovacs, Z., Bázár, G., Oshima, M., Shigeokad, S., Tanaka, M., Furukawa, A., Nagai, A., Osawa, M., Itakura, Y., Tsenkova, R. (2016). Water spectral pattern as holistic marker for water quality monitoring, *Talanta*, *147*, 598–608.

Kumar, N., Bansal, A., Sarma, G. S., Rawal, R. K. (2014). Chemometrics tools used in analytical chemistry: An overview, *Talanta*, *123*, 186–199.

Li, X., Feng, F., Gao, R., Wang, L., Qian, Y., Li, C., Zhou, G. (2016). Application of near infrared reflectance (NIR) spectroscopy to identify potential PSE meat. *Journal of the Science and Food Agriculture*, *96* (9), 3148–3156.

Lu, W., Sun, D. W., Pu, H., Cheng, J. H. (2016). Quality analysis and classification and authentication of liquid foods by near-infrared spectroscopy: A review of recent research developments. *Critical Reviews in Food Science and Nutrition*, *57* (7) 1524–1538. DOI:10.1080/10408398.2015.1115954.

Matija, L., Tsenkova, R. (2011). Aquaphotomics of hydrogenated fullerenes. In: *Book of abstracts of the Second Scientific International Conference on Water and Nanomedicine* (pp. 30–31). Banja Luka: Academy of Sciences and Arts of Republic of Srpska.

Munćan, J. (2011). A comparative study of structure and properties of water by IR and opto-magnetic spectroscopy. In: *Book of abstracts of the Second Scientific International Conference on Water and Nanomedicine* (pp. 56–57). Banja Luka: Academy of Sciences and Arts of Republic of Srpska.

Niu, X. Y., Shao, L. M., Dong, F., Zhao, Z., Zhu, Y. (2014). Discrimination of donkey meat by NIR and chemometrics (article in Chinese). *Guang Pu Xue Yu Guang Pu Fen Xi*, *34* (10), 2737–2742.

Official Methods of Analysis (2000). 17th ed., AOAC International, Gaithersburg, MD, Method 983.18.

Reis, M. M., Rosenvold, K. (2014). Early on-line classification of beef carcasses based on ultimate pH by near infrared spectroscopy. *Meat Science*, *96*, 862–869.

Rouger, A., Remenant, B., Prévost, H., Zagorec, M. (2017). A method to isolate bacterial communities and characterize ecosystems from food products: Validation and utilization as a reproducible chicken meat model. *International Journal of Food Microbiology*, *247*, 38–47.

Rukchon, C., Nopwinyuwong, A., Trevanich, S., Jinkarn, T., Suppakul P. (2014). Development of a food spoilage indicator for monitoring freshness of skinless chicken breast. *Talanta*, *130*, 547–554.

Sandorfy, C., Buchet, R., Lachenal, G. (2006). Principles in molecular vibrations for near-infrared spectroscopy. In: Y. Ozaki, W. F. McClure, A. A. Christy (eds). *Near infrared spectroscopy in food science and technology* (pp. 11–48). Hoboken, NJ: John Wiley & Sons. ISBN 9780471672012.

Schmid, D., Gschiel, E., Mann, M., Huhulescu, S., Ruppitsch, W., Bohm, G., Pichler, J., Lederer, I., Hoger, G., Heuberger, S., Allerberger, F. (2007). Outbreak of acute gastroenteritis in an Austrian boarding school, *Euro Surveillance*, *12* (3), 224.

Teixeira dos Santos, C. A., Lopo, M., Pascoa, R., Lopes, J. A. (2013). A review on the applications of portable near-infrared spectrometers in the agro-food industry. *Applied Spectroscopy*, *67*, 1215–1233.

Tito, N. B., Rodemann, T., Powell, S. M. (2012). Use of near infrared spectroscopy to predict microbial numbers on Atlantic salmon. *Food Microbiology*, *32* (2), 431–436.

Trocino, A., Xiccato, G., Majolini, D., Tazzoli, M., Bertotto, D., Pascoli, F., Palazzi, R. (2012). Assessing the quality of organic and conventionally-farmed European sea bass (Dicentrarchus labrax). *Food Chemistry*, *131*, 427–433.

Tsenkova, R., 2009. Introduction to Aquaphotomics, dynamic spectroscopy of aqueous and biological systems describes peculiarities of water. *Journal of Near Infrared Spectroscopy*, *17*, 303–314.

Veleva-Doneva, P. (2017). Advanced computer-based approaches for food quality evaluation: updated review. *Trakia Journal of Sciences*, series *Social Sciences*, *15* (1), 413–418.

Veleva-Doneva, P., Draganova, T., Atanassova, S., Tsenkova, R. (2010). Detection of bacterial contamination in milk using NIR spectroscopy and two classification methods—SIMCA and Neuro-Fuzzy classifier. *IFAC Proceedings Volumes*, *43* (26), 225–229.

Veleva-Doneva, P., Stoyanchev, T., Daskalov, H., Draganova, T., Atanassova, S. (2012). Informative indicators used for bacterial presence determination in yellow cheese by near-infrared spectral data. *Workshop on Dynamics and Control in Agriculture and Food Processing*, *IFAC 2012* (pp. 55–59).

Vieira, C., Diaz, M. T., Martínez, B., García-Cachán, M. D. (2009). Effect of frozen storage conditions (temperature and length of storage) on microbiological and sensory quality of rustic crossbred beef at different states of ageing. *Meat Science*, *83* (3), 398–404.

Weeranantanaphan, J., Downey, G., Allen, P., Sun, D. W. (2011). A review of near infrared spectroscopy on muscle food analysis: 2005–2010. *Journal of Near Infrared Spectroscopy*, *19*, 61–104.

Workman, J., Weyer, L. (2008). Practical guide of interpretative near-infrared spectroscopy. Boca Raton, FL: Taylor & Francis. ISBN 1420018310.

Wu X., Song, X., Qiu, Z., He, Y. (2016). Mapping of TBARS distribution in frozen-thawed pork using NIR hyperspectral imaging. *Meat Science*, *113*, 92–96.

Xia, X., Kong, B., Liu, Q., Liu, J. (2009). Physicochemical change and protein oxidation in porcine longissimus dorsi as influenced by different freeze-thaw cycles. *Meat Science*, *83*, 239–245.

Xiong, Z., Sun, D. W., Pu, H., Xie, A., Han, Z., Luo, M. (2015). Non-destructive prediction of thiobarbituric-acid reactive substances (TBARS) value for freshness evaluation of chicken meat using hyperspectral imaging. *Food Chemistry*, *179*, 175–181.

Zhang, Q. Q., Han, Y. Q., Cao, J. X., Xu, X. L., Zhou, G. H., Zhang, W. Y. (2012). The spoilage of air-packaged broiler meat during storage at normal and fluctuating storage temperatures. *Poultry Science*, *91* (1), 208–214.

# Innowacyjne metody inżynieryjne w ocenie jakości i bezpieczeństwa żywności

**Abstrakt:** Wzrost poziomu aktywności i jakości życia człowieka zależy od wielu czynników. Jednym z nich jest bezpieczeństwo i wysoka jakość dostarczanej żywności. Postęp, jaki dokonał się w obszarze technologii, technik pomiarowych i narzędzi przetwarzania danych, umożliwił rozwój innowacyjnych metod inżynieryjnych dających gwarancję wysokiej skuteczności kontroli jakości żywności i zdrowia publicznego. W artykule przedstawiono analizę spektralną bliskiej podczerwieni i akwapotomikę jako nieinwazyjne i szybkie metody oceny jakości żywności przez obserwację pasm absorpcji wody.

**Słowa kluczowe:** spektroskopia bliskiej podczerwieni, akwapotomika, wielowymiarowa analiza danych, bezpieczeństwo i kontrola żywności

# Bancassurance in the opinion of individual customer of Świętokrzyskie Voivodeship


## Jarosław Wenancjusz Przybytniowski

Jan Kochanowski University in Kielce

Faculty of Management and Administration

## Dominik Bucki

Higher Theological Seminary in Sandomierz

## Wioletta Magdalena Pacholarz

AGH University of Science and Technology

Faculty of Management

## Stanisław Borkowski

Kielce University of Technology

Faculty of Management and Computer Modelling

Correspondence to:
Jarosław Wenancjusz Przybytniowski
Uniwersytet Jana Kochanowskiego w Kielcach
Wydział Prawa, Administracji i Zarządzania
Instytut Zarządzania
ul. Świętokrzyska 21
25-406 Kielce, Poland
Tel.: +48 668 102 377
E-mail: j.w.przybytniowski@wp.pl



**Abstract:** The purpose of this study was to analyze the level of knowledge and, consequently, the individual client's perceptions, which influenced the quality of the insurance service offered, in non-life insurance sector through insurance brokerage, with a special focus on bancassurance. It has been hypothesized that the SWOT method is an effective instrument for identifying the level of knowledge and hence the individual customer's awareness through the prism of bancassurance. The methodological concept of the study was based on a functional view of the insurance market and the economic determinants of the market. Research analyses were conducted using the knowledge contained in the literature of the subject. In addition, we analyzed the development strategy of the banking sector in the eyes of customers from the Świętokrzyskie Voivodeship using the SWOT analysis method. The study period covered the years 2013–2016. The main conclusion that is drawn from the analysis is that the current level of cooperation between the insurance company and the bank in the opinion of individual customers does not have a better chance of developing bancassurance without introducing innovations in banking products.



**Key words:** insurance brokerage, insurance company, bank, bancassurance


## 1. Introduction

The issue of insurance mediation and its accompanying changes is not adequately appreciated by both financial market practitioners and the existing scientific studies. At the same time, the perception of insurance mediation, especially the intermediary (agent and broker) as a dependent and independent entity in the financial market structures, including insurance and determinants influencing the effectiveness of these entities, it becomes a necessity for the proper development of this market.

Addressing these issues and the economic importance of the functioning of insurance intermediation on the financial market, including insurance, is due to the conviction of the importance of intermediation, as evidenced by the annual increase in the number of insurance intermediaries and the

gross premiums generated by this insurance channel, provision of insurance services. In this paper, the description of the concept of insurance intermediation is described, mainly focusing on the direct channel of bancassurance—banking and insurance associations. It emphasizes the subjective nature of bancassurance activities because of the conviction that insurance intermediaries are involved in a world of values that often differ in terms of type, function, task, and hierarchy of individual insurance market participants. This article is a follow-up to earlier published studies and is the result of our own research, conducted as part of a research project no. 614535. The aim of this paper is to analyze the level of knowledge and thus the individual customer's perceptions of the quality of insurance services offered in the non-life insurance sector prism of insurance brokerage, with emphasis on bancassurance service. According to this research problem, the design of the article has been subordinated to the following hypothesis: SWOT is an effective instrument for identifying the level of knowledge and hence the individual customer's awareness through the prism of bancassurance. The methodological concept of the study was based on a functional view of the insurance market and the economic determinants of the market. Research analyses were conducted using knowledge contained in literature of the subject. Used literature (both Polish and foreign) includes: closed items, articles in trade journals, Polish legal acts and the strategy of banking and insurance development in the eyes of customers using SWOT analysis. The study period covered the years 2013–2016.

## 2. Definition of bancassurance

Opportunities for the activation of the distribution of insurance products, especially for life, are perceived in the development of joint bank-insurance ventures, bancassurance, opportunities for the development of insurance niches, the use of outsourcing in modern management. This activity is unilateral (the insurer distributes its products in the banking network) or bilateral (mutual provision of the services) (cf. Messyasz-Handschke, 2002, pp. 50–62). Agreements are a strategic alliance, or relationships focused on a specific product group. Regardless of the variant, cooperation between the two institutions is geared towards increasing the efficiency of the resources and the volume of sales and revenues (Szczepankowski, 2000, pp. 53–54).

The first modern example of bancassurance (Orlowski, 2011, pp. 41–44) was the launch of the insurance distribution by the German Sparkasse savings bank in 1778. Further development of this business can only be observed at the turn of the 1980s and 1990s. In Poland, however, the development of bancassurance institutions dates back to the late 1990s, both in the field of non-life insurance and in life assurance. This activity, on the Polish market, consists mainly in the distribution of insurance contracts in banking institutions. Thanks to the active use of common databases, it is possible to create a new bancassurance offer.

The integration of financial market activity has triggered demand synergies, where the demand for one type of financial service has spawned demand for other, often complementary services. Adapting to changing market conditions, banks began to cooperate with insurance companies. The development of insurance banking (which initiates the agreements with banks) and the bank insurance strategy (the originator of agreements are insurance companies), thanks to the phenomenon of additional sales and standardization of services, gives the client unlimited possibilities to choose different financial services in one place and allows to

use integrated innovations banking services. On the other hand, the market for financial services relinquishes hostile elements and destructive components of cross-sectoral competition.

Bancassurance means using of banking facilities and services to provide banking services. According to Marek Śliperski (2002, pp. 20–21), bancassurance is understood as an activity consisting in the use of a bank—its outlets, services and customers to sell insurance, mainly life and retirement, at the initiative of such activities originating from commercial banks of retail nature offers. In turn, Magdalena Swacha-Lech (2008, pp. 7–13) defines bancassurance as a strategy for action taken by banks and insurance companies, which include the subject--matter relationships in which the dominant bank is the one that engages its distribution channels for sale or promotion of insurance products. According to Arleta Messyasz-Handschke (2002, pp. 50–52), this activity is one-sided (the insurer distributes its products in the banking network) or bilateral (reciprocal provision of the aforementioned services). As defined by Investopedia US, A Division of IAC (cf. Bancassurance, 2017), bancassurance means the partnership of banks and insurance companies by selling their products to the customer base. This kind of arrangement can be beneficial for both companies. Banks can earn extra income by selling insurance products, and insurance companies are able to expand their customer base without having to support a sales system or commission to agents or insurance brokers. A different way of defining the concept of bancassurance is presented in the London South East Financial Dictionary (cf.), where bancassurance should be understood as an institutional combination of insurance business with banking activities in a financial environment whose offer includes unique deposit and credit products such as loans, deposit accounts, transfers. This combination is dependent on a number of economic and political factors in terms of regulation, state economic policy, economic situation, market position, capital strength of an enterprise. Likewise this term was defined by Pang-Ru Chang, Jin-Lung Peng and Chiang Ku Fan (2011, pp. 76–93). According to these authors, bancassurance should be understood as a method or a specific way of distributing insurance products by banking institutions. Nevertheless, it is a global movement that gradually breaks down traditional barriers between different companies, which are both suppliers of financial products and services.

Bancassurance can also be defined through innovation, mainly in the area of financial and technological innovation. Liberalization has led to intensified competition in the entry into the markets of new suppliers of financial products and services and thus the creation of sustainable institutions capable of rivalling banks. Innovative solutions are sought for sustainable economic and financial benefits. This is supported by the awareness of the existence of links between insurance services and banking (see broader Mrozowska, 2012, pp. 30–34).

Bearing in mind the concept of bancassurance, it can be seen that there is still no uniform definition of the concept under discussion in literature and its location in ever-changing financial markets. It is relatively new, but already popular in the world and in Poland, the form of providing financial services initially offered to private individuals, and over time also companies in which banks have become actively involved in the distribution of insurance services (see Carow, 2001, pp. 129–150; Gebauer and Schober, 2006, pp. 122–147).

To summarize the above definitions, 'the essence of bancassurance is to improve the quality of services provided by financial markets to increase the efficiency of distribution of goods and services through increased cooperation between banks and insurers.' The effect of

this cooperation is, among others, availability and ease of acquiring insurance coverage related to the purchase of banking products, and credits. Effective cooperation with insurers is beneficial through a variety of channels of access to customers developed by the bank, and by comparing banking facilities, you can offer financial products interconnections by increasing the offer for your customers, which results in additional revenue (Figure 1).

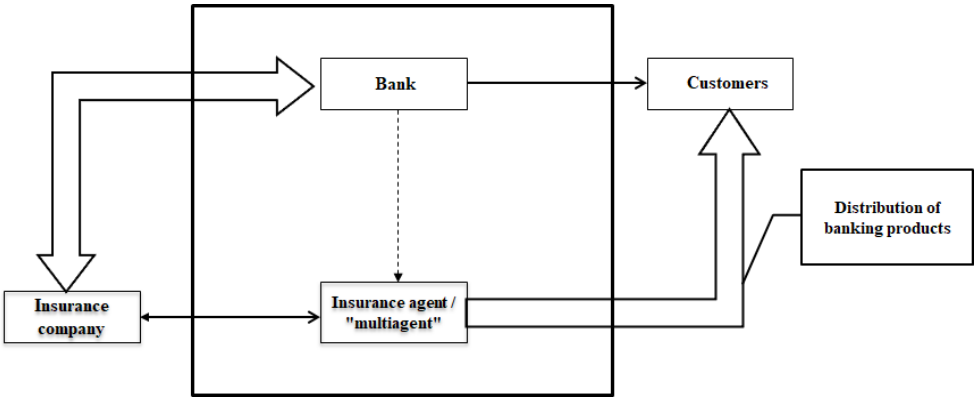



Figure 1. Bancassurance product distribution system

S o u r c e: Authors' own elaboration based on Benoist, 2002, pp. 295–303.

The experiences of Western European countries indicate an improvement in the competitive position of the bank by generating additional revenue for insurance services provided by banking facilities (Bergendahl, 1995, pp. 17–28; Fenn, Vencappa, Diacon, Klumpes and O'Brien, 2008, pp. 86–100). Bancassurance is a response to the phenomenon of so-called productive synergy, i.e. when the demand for one type of financial service raises desire and need to acquire other, often complementary products or services, such as:

a) property insurance related to taking of a mortgage loan,
b) credit card insurance against the consequences of theft when it is issued, lost or destroyed,
c) insurance of the purchased car, with a loan for its purchase.

Basically, we can distinguish two types of cooperation between a bank and an insurance company:

a) capital integration—it leads to the emergence of banking groups in the form of a joint venture, merger or acquisition. The nature of cooperation is reduced to subjective activity,
b) unpaid cooperation (formal and legal)—based on cooperation in the field of banking and insurance activities, between non-affiliated financial institutions, and integrated marketing alliances, e.g. distribution agreements.

The reasons for establishing financial holdings with insurers are broader (see Cummins, Tennyson and Weiss, 1999, pp. 325–357; Cummins and Rubio-Misas, 2007, pp. 323–355):

a) deep structural changes in national economies as a result of the introduction of monopolization and liberalization processes,

b) the start of a period of serious intensification within the sectoral competition in financial markets,
c) changing the preferences and requirements of individual and institutional clients,
d) tightening competition in the financial sector,
e) the possibility of financing larger projects, owing to the fact that the group has more capital,
f) possibility to finance projects without the required own contribution,
g) possibility for small insurers to obtain insurance, the required own contribution for the implementation of projects on the basis of the EU funds,
h) advising on implementation of the EU projects,
i) take over some of the projects being implemented, currently funded by Venture Capital,
j) increasing importance of Poland in the arena of international financial markets, especially in the area of the former Eastern Bloc and the EU,
k) creating the possibility of the flow of own capital and thus causing the actual merging of entities forming the banking group,
l) providing adequate conditions on the liability line and assets, through long-term placement of the first division insurance, notably with the equity fund, as an insurance in the second pillar of social security.

In addition, the causes of the formation of capital-banking groups are the sudden changes in financial markets, which directly affect operating activities and the results of financial institutions. The most important premises for the development of banking and insurance cooperation include:

a) the need to increase equity,
b) creation of banking and insurance structures—the weakness of Polish insurance companies on the financial market (apart from PZU SA), which increases their susceptibility to takeover by a foreign bank,
c) low degree of openness of the Polish economy to foreign competition, which does not sufficiently mobilize banks to improve the quality of their offers.

## 3. SWOT analysis of bancassurance in the eyes of customers

### 3.1. SWOT analysis

The presentation of synthetic SWOT analysis results was used to study the effective strategy of the researched capital groups.[1] It consists of the combination of internal factors (strengths and weaknesses) and the external environment (opportunities and threats), broken down into sectors of its business.

Each SWOT analysis consists of four main stages of action (cf. Obłój and Sosnowski, 2014, p. 416; Jeżerys, 2000, pp. 85–86; Żabiński [ed.], 2000, pp. 6–7):

1) indication of the key areas of the company's business,

[1] SWOT analysis is one of the basic methods of strategic analysis. The name of the method is an acronym for English words: strengths, weaknesses, opportunities, threats.

2) indication of a reference framework for assessing strengths and weaknesses of the organization,
3) determining the profile of the competitive enterprise,
4) gathering conclusions and summarizing the analysis.

These four areas are closely related. Once they have been properly verified, you can get the proper functioning of your business and take further steps to find the right strategy.

In the SWOT analysis, four types of strategies are distinguished:

1. Aggressive strategy (maxi-maxi)—takes place in an organization within which the own strengths and strengths of the environment prevail. It is based on strong growth and expansion, using maximum strengths and opportunities. According to Krzysztof Obłój (2007, pp. 337–338), 'aggressive strategy (maxi-maxi) is based on maximizing the synergy effects that occur between the organization's strengths and opportunities and those generated by the environment. This is a strategy of strong expansion and diversified development.' By contrast, according to Andrzej Klasik (1993, p. 112), aggressive strategy includes: strengthening market position, seizing opportunities, concentrating resources on competing products, taking over organizations with the same profile. This is a strategy that uses synergy of strengths of the organization and opportunities that are emerging in the environment.
2. Conservative (maxi-mini) strategy—occurs in the organization when with great internal potential it is subjected to unfavourable conditions of external conditions. In this strategy, the essence is using the strengths to overcome the threats (Gierszewska and Romanowska, 2009, p. 194).
3. Competitive strategy (mini-maxi)—takes place in an organization where weaknesses over strengths predominate, but there are opportunities in the environment. The essence is to take advantage of emerging opportunities, while reducing weaknesses (Obłój 2007, p. 338).
4. Defensive strategy (mini-mini)—it allows it to survive when a given organization is in unfavourable surroundings and devoid of key strengths. This strategy may in fact lead to the maximum benefit of the company before its liquidation or merger with another organization (Klasik, 1993, p. 111).

## 3.2. Methodology of research

Taking into account selected aspects of the organization of activities of insurance associations, it should be noted that irrespective of the legal environment or the nature of the market, the proper division of tasks or roles between the insurance company and the bank is essential. In analyzing individual tasks of insurers and banks, it is not possible to skip a closer look at the issues involved. Only a few years ago, insurance companies could not count on bank products in which there would be an offer from insurance companies. Nowadays, the situation is different, because banks and insurance companies have used marketing methods that convinced customers to use a common offer of these financial market institutions. Customers of bancassurance offer come mainly from existing clients of banks. At a time when competition is increasing (for example: change in customer attitude, quality of service, price reduction, or

multi-channel distribution), this situation can be beneficial for both institutions (insurers and banks), because of mutual acquiring clients for these institutions. At this point, it should be borne in mind that in bancassurance activities there are certain factors involved in personality issues that arise when clients are using the services of a bank and insurance company. Mutual penetration of various spheres of insurance and banking creates specific behaviour for employees and customers (gradual increase in knowledge, and consequently awareness), on systematic changes (market globalization) accompanying the development of bancassurance.

To investigate this phenomenon, a survey was conducted based on which the assessment of knowledge level in awareness raising on bancassurance of inhabitants of Świętokrzyskie Voivodeship was conducted. The study was conducted in a five-level Likert scale, combining five responses ranging from complete rejection—1, to total acceptance—5. The researcher was asked to indicate to what extent he agreed with the presented question, where: 5 means 'very big', 4 means 'big', 3 means 'medium', 2 means 'small', 1 means 'definitely small'. Sample selection met the conditions for representativeness of the results for the population in the number n = 330 between the ages of 18 and 65, in terms of: having a bancassurance contract, sex and place of residence. For direct examinations, n = 312 (95%) of correctly completed questionnaires were included to allow for more detailed studies. The research was conducted among the residents of the Świętokrzyskie Voivodeship, in direct contact, using questionnaires at the banks' offices as well as insurance companies located in the studied area in the years 2013–2016. As a result of the reliability studies of the α-Cronbach coefficient questionnaire, in all studied years, αc = 0.921 was obtained. Of the total number of subjects, men were 160 (51.3%), while women were 152 (48.7%). Considering the place of residence, 178 (57.1%) were surveyed in the city and 134 (42.9%) in the countryside. Most respondents were aged 36–45 and 56–65, respectively (23.4% and 23.1%). They represent 46.5% of the total number of people surveyed. The lowest were aged 18–25 years (25.4%).

Because of the research, trends were found in the subject matter investigated, namely the banking and insurance relationships, which are intertwined between the various insurance and banking spheres caused by the specific behaviour of employees and customers, through successive increases in knowledge and consequent awareness (Figure 2).

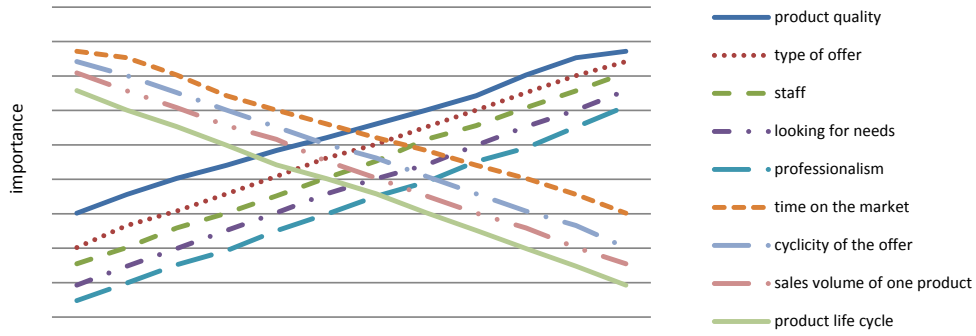



Figure 2. Trends in the bancassurance environment associated with a gradual increase in knowledge and, as a consequence, awareness

S o u r c e: Authors' own elaboration based on the research.

As it can be seen in Figure 2, the knowledge, and thus the awareness of individual customers about the phenomenon under investigation, has grown to the significant importance of the company's resources. Causes of this phenomenon can be mainly seen in the surrounding environment, which makes bancassurance customers play an important role: product quality, type of offer, service, adapting the offer to the needs of respondents using this service, as well as the professionalism of employee's insurance companies and banks. By contrast, they lose over time the importance of such factors as the time of a given product on the market. Knowledge is not needed for the cycles of a given offer, sales volume, or cyclicality of product life. Confirmation of these results is the study carried out by B. Gladstone (2000, p. 95), published in the book *From know-how to knowledge: The essential guide to understanding and implementing knowledge management*, London: Industrial Society. The processes taking place in an insurance or banking environment are important contributors to the knowledge--raising process for individual clients, and thus to increased awareness of the functioning of the market. Further studies have been conducted among customers using bancassurance, highlighting the following factors that determine the increase in the importance of knowledge (Table 1).

Table 1. Factors determining the increase of knowledge and awareness according to individual customer of Świętokrzyskie Voivodeship in the years 2013–2016 (in %; n = 312)

| Year / The content of the question | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|
| Market globalization | 93.2 | 89.3 | 91.2 | 96.3 |
| Professionalism of the service workers | 89.3 | 92.1 | 93.1 | 92.1 |
| Quick response of employees of insurance companies to reported damage | 94.3 | 92.9 | 91.4 | 89.6 |
| Correction of bancassurance offer to customer needs | 88.4 | 89.2 | 83.1 | 82.4 |
| Time competition, which requires shortening the life cycle of the offer | 78.4 | 77.2 | 77.9 | 77.2 |
| Time competition related to the speed of reaction of enterprises to changes in the environment | 74.3 | 76.2 | 73.1 | 72.5 |
| Processes of integrating the design of marketing offers into the success of the market | 70.3 | 67.3 | 62.1 | 66.9 |
| Successive technology development | 73.2 | 71.2 | 67.3 | 64.2 |
| Mergers of insurance companies and banks have resulted in a skilful combination of knowledge and experience of employees | 63.2 | 66.3 | 63.2 | 61.3 |
| Changes in marketing have resulted in a different customer treatment, with a focus on customer relationship integration, and as a result, its loyalty | 58.1 | 59.1 | 57.2 | 59.3 |
| The creation of insurance banking associations has given the opportunity to share knowledge and experience | 56.3 | 57.1 | 52.1 | 55.7 |

S o u r c e: Authors' own elaboration based on the research.

As it can be seen from the above studies, the most important factors influencing the level of knowledge in the analyzed period in clients are globalization of the average level of 92.5%.

Subsequently, the rapid reaction of insurance companies' employees to reported damage (92.1%) and professionalism of service providers (91.7%). In the opinion of respondents, the slightest influence on the increase of knowledge of the respondents was: the creation of bank insurance associations gave the opportunity to exchange knowledge and experience, and changes in marketing caused different treatment of the client with a focus on integration of customer relations, as a result, its loyalty: successively—55.3% and 58.4%. Similar studies have been published by Alina Kozarkiewicz-Chlebowska (2001, pp. 3–5), who also distinguishes the factor of globalization of the market, being the basic determinant of the increase in the importance of knowledge in the organization. In conclusion, the first stage of research is knowledge that is an important factor in creating the market. The core purpose of any organization should be to create knowledge that is then placed in their services, increasing their value, which significantly contributes to the increased competitiveness of banking unions, and this results in customer loyalty, which in turn improves their economic situation (higher profits).

The next stage of the study was the survey conducted by SWOT, the operation of the bancassurance service, analogous to the years 2013–2015, highlighting in the survey those factors whose task significantly influences the quality of the surveyed service offered by the insurance companies. The research procedure that was carried out in 2016 did not change in comparison with 2013, and the selection of advantages, disadvantages and opportunities and threats was the same in all studies conducted. Due to the volume of results (studies conducted as previously mentioned in 2013–2016), in this study, only the results of the 2013 study will be presented and compared to 2016. In all studies, the respondents were asked to select and group in the table (advantages, disadvantages and opportunities and threats) the factors proposed in the survey that determine their task, the quality of the bancassurance service, while at the same time influence their level of knowledge and awareness. These factors have been selected, which have reached a point scale from 1 to 5 points—a minimum of 3 points (Tables 1–2) and a tabulation of strengths and weaknesses as well as opportunities and threats. For this purpose, the standardization of the weight ($Sw$) is calculated by dividing the weight of the parameter ($w$) by the sum of weights ($\Sigma w$) by the following formula:

$$Sw = \frac{w}{\Sigma w} \tag{1}$$

Subsequently, a weighted assessment ($Ow$) of each parameter, by the product of the parameter estimation ($O$) and standardization of the parameter weight ($Sw$), by the formula:

$$Ow = O \times Sw \tag{2}$$

After weighing each parameter, the author calculated the sum of weighted scores ($R$) using the formula (the sum of weighted scores cannot exceed 10 points):

$$R = \Sigma\, Ow \tag{3}$$

The impact of the internal and external factors of the surveyed companies was assessed according to a scale of points ranging from 1 to 5 points (where the highest number corresponds to the maximum impact of the factor on the organization) and the weighted value was calcu-

lated. At the same time, a summary of strengths and weaknesses has been made and a counterbalance or balance has been established (Tables 2–3).

Table 2. SWOT analysis of bancassurance services in the 'eyes' of individual clients in Świętokrzyskie Voivodeship in 2013 (n = 312)

| Strengths (S) | Weight | Rating | Weighted value | Weaknesses (W) | Weight | Rating | Weighted value |
|---|---|---|---|---|---|---|---|
| Fast customer service | 0.10 | 3 | 0.30 | In a shorter period costs increase | 0.75 | 5 | 2.25 |
| Reaction to customer needs | 0.10 | 4 | 0.45 | No investment offers | 0.25 | 4 | 1.65 |
| Professionalism of employees | 0.25 | 5 | 0.90 | | | | |
| Timeliness and punctuality | 0.25 | 5 | 1.00 | | | | |
| Honestly solving the damage | 0.15 | 4 | 0.55 | | | | |
| Lower insurance premium | 0.15 | 3 | 0.40 | | | | |
| **Together** | **1.00** | **X** | **3.60** | **Together** | **1.00** | **X** | **3.90** |
| Opportunities (O) | Weight | Rating | Weighted value | Threats (T) | Weight | Rating | Weighted value |
| Gaining credibility of banking institutions in the 'eyes' of the client | 0.15 | 4 | 0.65 | Increased insurance risk | 0.20 | 4 | 0.80 |
| Restrict organizational structure | 0.15 | 3 | 0.50 | The appearance of the requirement to enter into an insurance contract with a specific bank | 0.15 | 4 | 0.60 |
| Discounts on offer | 0.20 | 5 | 1.00 | Restrictions on the business of the insurance company in the investment process | 0.35 | 4 | 1.00 |
| Opportunities to increase the range of bancassurance offers for investment offers | 0.15 | 4 | 0.65 | The appearance of the requirement to enter into an insurance contract | 0.10 | 5 | 1.00 |
| Increased security by perceiving bancassurance as a customer-friendly | 0.20 | 5 | 1.00 | Link the fate of the insurance company to the fate of the bank | 0.15 | 3 | 0.50 |
| Satisfaction of the customer with comprehensive service | 0.15 | 4 | 0.65 | There is a growing scope for bancassurance exclusions | 0.05 | 3 | 0.20 |
| **Together** | **1.00** | **X** | **4.45** | **Together** | **1.00** | **X** | **4.20** |

S o u r c e: Authors' own elaboration based on the research.

Table 3. SWOT analysis of bancassurance services in the 'eyes' of individual clients in Świętokrzyskie Voivodeship in 2016 (n = 312)

| Strengths (S) | Weight | Rating | Weighted value | Weaknesses (W) | Weight | Rating | Weighted value |
|---|---|---|---|---|---|---|---|
| Fast customer service | 0.15 | 4 | 0.60 | In a shorter period costs increase | 0.50 | 5 | 2.35 |
| Reaction to customer needs | 0.15 | 4 | 0.60 | No investment offers | 0.50 | 5 | 2.25 |
| Professionalism of employees | 0.20 | 5 | 1.25 | | | | |
| Timeliness and punctuality | 0.40 | 5 | 1.25 | | | | |
| Honestly solving the damage | 0.05 | 3 | 0.30 | | | | |
| Lower insurance premium | 0.05 | 3 | 0.25 | | | | |
| **Together** | **1.00** | **X** | **4.50** | **Together** | **1.00** | **X** | **4.60** |
| Opportunities (O) | Weight | Rating | Weighted value | Threats (T) | Weight | Rating | Weighted value |
| Gaining credibility of banking institutions in the 'eyes' of the client | 0.20 | 5 | 1.15 | Increased insurance risk | 0.30 | 5 | 1.50 |
| Restrict organizational structure | 0.05 | 3 | 0.35 | The appearance of the requirement to enter into an insurance contract with a specific bank | 0.10 | 4 | 0.40 |
| Discounts on offer | 0.25 | 5 | 1.25 | Restrictions on the business of the insurance company in the investment process | 0.20 | 5 | 1.00 |
| Opportunities to increase the range of bancassurance offers for investment offers | 0.15 | 4 | 0.60 | The appearance of the requirement to enter into an insurance contract | 0.15 | 4 | 0.60 |
| Increased security by perceiving bancassurance as a customer-friendly | 0.15 | 4 | 0.60 | Link the fate of the insurance company to the fate of the bank | 0.15 | 4 | 0.60 |
| Satisfaction of the customer with comprehensive service | 0.20 | 5 | 1.00 | There is a growing scope for bancassurance exclusions | 0.10 | 3 | 0.30 |
| **Together** | **1.00** | **X** | **4.95** | **Together** | **1.00** | **X** | **4.40** |

S o u r c e: Authors' own elaboration based on the research.

The above analysis shows that the proper cooperation between banks and insurance companies enables primarily the implementation of innovative services, which makes bancassurance service offerings more attractive in the increasingly competitive financial services market. In addition, we can already say that the research conducted at this stage indicates

about the increasing knowledge and awareness of surveyed respondents of Świętokrzyskie Voivodeship—about the researched phenomenon, which may have a significant influence on the development of this insurance service channel.

Then, based on the obtained data, the strategic position of the surveyed companies was assigned, with one of the four strategies: maxi-maxi, mini-maxi, maxi-mini, mini-mini. At this point, the calculation was made using the following indicators:

1. *The market attractiveness* of the enterprise (*AR*), which is a function of the external factors of the business environment (opportunities (*O*) and threats (*T*)), defined by the formula:

$$AR = \frac{O}{O + T} \tag{4}$$

2. *Market position of the surveyed enterprise* (*PR*). This indicator determines the location of the enterprise on the national or global market. This item is measured by the market share of the surveyed company and the ability to maintain or increase this share. It is a function of internal factors (strong (*S*) and weak (*W*)). Calculations are made by the formula:

$$PR = \frac{S}{S + W} \tag{5}$$

After determining the attractiveness and market position of the company, a strategy was defined. Basing on the above indicators (*AR* i *PR*), the author calculated *the Probability of Success* (*PSS*) from the following formula:

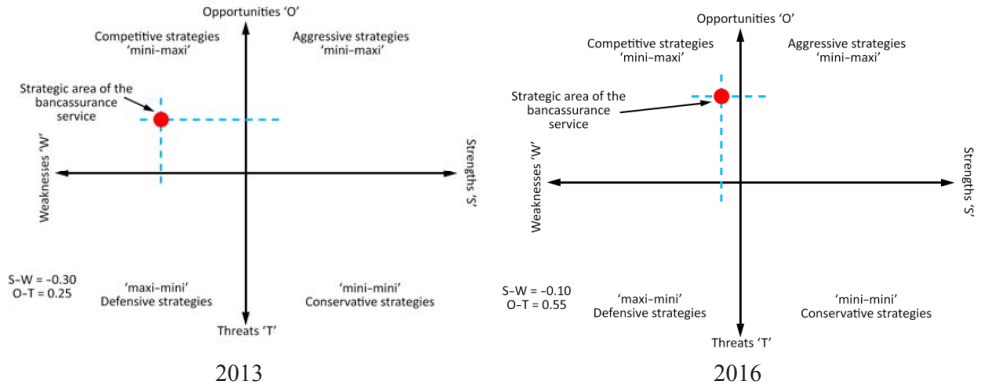
$$PSS = \frac{AR + PR}{2} \tag{6}$$

From the combination of internal and external factors, broken down into banking groups, it can be stated that the proper cooperation of banks with insurance companies (bancassurance) allows primarily the possibility of implementing innovative services, which significantly contributes to the enrichment of the service offering of banks and insurance companies in an increasingly competitive financial services market. Tables 3–4 show the synthetic results of the research conducted using the SWOT analysis to select the effective bancassurance market strategy from the perspective of individual client. When assessing the impact of internal and external factors on the surveyed areas, a point scale was adopted in the range (0.05; 0.50), with a ratio of 0.50—the greatest impact of a given factor on the functioning of the bancassurance market. Based on the figures obtained, the weighted average was calculated. In addition, a collective assessment of strengths and weaknesses, as well as opportunities and threats for the area under investigation was made. Based on the presented indicators, a strategic position was established for the surveyed banking groups. Given the strengths and weaknesses in banking and insurance structures, the value of PR in 2013 was 0.49, unlike in 2016, where the value of this indicator reached 0.53, which is 0.04 higher. On the other hand, the value of AR for 2013 was 0.51, as opposed to 2016, where the value of this index reached 0.49, which is lower by 0.02. The results show that the bancassurance service has lost its attractiveness but significantly improved its market position compared to 2013.

Based on the above calculations, a summary of the data was made using the PSS index for this purpose. The value of this indicator in 2013 was 0.50 and in 2016—0.51. This means that

bancassurance service in 2016 reduced the likelihood of strategic success compared to 2013 by 0.01, which in turn reduced the risk of the service under investigation. It can be stated that the current level of cooperation between the insurance company and the bank in the opinion of individual clients, at the level of their knowledge and awareness—has no greater chance of developing the bancassurance market without innovating in banking products. The weakness of Polish insurance companies on the financial market increases their vulnerability to mergers and the lack of innovation contributes to the lack of openness of the Polish economy to foreign competition.

The final stage of the research, based on the results obtained, will allow us to determine the strategic position for the bancassurance service in 2016, while reviewing how much this position relative to 2013 has changed (Figures 3–4).




Figures 3–4. Strategic position of the service bancassurance in 2013 and 2016 (n = 312)

S o u r c e: Authors' own elaboration.

The result of the SWOT analysis is the area of the competitive strategy (mini-maxi) for the audited financial entities on the bancassurance market. This means that the development of the bancassurance service market is in the form of: the advantage of the weaknesses within the organization and the opportunities that accrue from the environment (competitive strategy). This is the case when building a bancassurance service is conducive to the arrangement of external conditions. The aim of the above strategy is to eliminate the vulnerabilities of the banking and insurance associations to build competitive strength in the structure of the financial services industry. This can be achieved by maximizing the use of opportunities from the outside. Actions to maintain and at the same time build a competitive position allow you to take advantage of the opportunities offered by insurance banking and to gain the credibility of the bancassurance service in the eyes of your individual client while reducing or correcting internal inconsistencies by increasing your knowledge and awareness. Bearing in mind bancassurance market activity in the eyes of private banking clients, the most promising opportunities for their growth are primarily customer service and professionalism. They allow for limiting the greatest weaknesses within the institution, i.e.: a short period of increased costs.

## 4. Conclusions

Based on the presented study, it can be stated:

1. The existence of a capital union largely facilitates the initiation of banking and insurance cooperation in the sphere of distribution of banking and insurance products and in current operational processes, where there is common: marketing, consulting, money market operations and capital.
2. The essence of banking-insurance relationships is to improve the quality of services rendered for bancassurance services to increase the efficiency of the distribution of goods and services through increased cooperation between banks and insurers. Creating such types of insurance service channels leads to increased profitability and acquiring new loyal customers for those relationships which are an integral part of both institutions of the financial sector.
3. The client encounters bancassurance products most often when he opens a personal bank account. Increasing the level of knowledge about these insurance products significantly increases the level of knowledge and awareness of the individual customer.
4. The value of PSS in 2013 amounted to 0.50 and in 2016—0.51. This means that bancassurance service in 2016 has reduced the likelihood of strategic success compared to 2013 by 0.01, which causes a significantly lower risk of the service being tested.
5. The current level of cooperation between the insurance company and the bank in the opinion of individual clients, at the level of their knowledge and awareness—has no greater chance of developing bancassurance without introducing innovations in banking products. The weakness of Polish insurance companies on the financial market increases their vulnerability to mergers and the lack of innovation contributes to the lack of openness of the Polish economy to foreign competition.

## References

Bancassurance [2017]. In: *Investopedia: Dictionary* [online, accessed: 2017-09-05]. Retrieved from: https://www.investopedia.com/terms/b/bancassurance.asp.

Benoist, G. (2002). Bancassurance: The new challenges. *The Geneva Papers on Risk and Insurance*, *27* (3), 295–303.

Bergendahl, G. (1995). The profitability of bancassurance for European banks. *International Journal of Bank Marketing*, *13* (1), 17–28.

Carow, K. A. (2001). The wealth effects of allowing bank entry into the insurance industry. *The Journal of Risk and Insurance*, *68* (1), 129–150.

Chang, P., Peng, J., Ku Fan, Ch. (2011). A comparison of bancassurance and traditional insurer sales channels. *The Geneva Papers on Risk and Insurance*, *36* (1), 76–93.

Cummins, J. D., Rubio-Misas, M. (2007). Deregulation, consolidation, and efficiency: evidence from the Spanish insurance industry. *Journal of Money, Credit, and Banking*, *38* (2), 323–355.

Cummins, J. D., Tennyson, S., Weiss, M. A. (1999). Consolidation and efficiency in the US life insurance industry. *Journal of Banking and Finance*, *23* (2–4), 325–357.

Directive (EU) 2016/97 of the European Parliament and of the Council of 20 January 2016 on insurance distribution (recast). *Official Journal of the European Union*, L 26/19.

Fenn, P., Vencappa, D., Diacon, S., Klumpes, P., O'Brien, C. (2008). Market structure and the efficiency of European insurance companies: A stochastic frontier analysis. *Journal of Banking and Finance*, *32* (1), 86–100.

Gebauer, J., Schober, F. (2006). Information system flexibility and the cost efficiency of business process. *Journal of the Association for Information Systems*, *7* (3), 122–147.

Gierszewska, G., Romanowska, M. (2009). *Analiza strategiczna przedsiębiorstwa*. Warszawa: PWE. ISBN 9788320818246.

Gladstone, B. (2000). *From know-how to knowledge: The essential guide to understanding and implementing knowledge management*. London: Industrial Society. ISBN 1858358809.
Jeżerys, B. M. (2000). Metoda SWOT. In: U. Gołaszewska-Kaczan (ed.). *Analiza strategiczna* (pp. 85–86). Białystok: Wydawnictwo Uniwersytetu w Białymstoku. ISBN 8387884421.
Klasik, A. (1993). Studia prospektywne i analiza strategiczna. In: A. Klasik (ed.). Planowanie strategiczne. Warszawa: PWE. ISBN 8320809086.
Kozarkiewicz-Chlebowska, A. (2001). *Koncepcja zarządzania wiedzą, jej geneza, zastosowanie i perspektywy*. In: L. Pasieczny (ed.). *Polska w Europie – Polskie nauki o zarządzaniu wobec wyzwań XXI wieku. Dorobek Szkoły Letniej „Warszawa 2000"*, Warszawa: Wyższa Szkoła Przedsiębiorczości i Zarządzania im. Leona Koźmińskiego w Warszawie. ISBN 838684664X.
Messyasz-Handschke, A. (2002). Bancassurance – współpraca czy konkurencja? *Bank i Kredyt*, *4*, 50–62.
Mrozowska, B. (2012). Bancassurance – regulacje prawne i samoregulacja rynku. *Prawo Asekuracyjne*, *72* (3), 30–47.
Obłój, K. (2007). *Strategia organizacji*. Warszawa: PWE. ISBN 8320816335.
Obłój, K., Sosnowski, M. (2014). Analiza sił i słabości firmy: budowanie profilu konkurencyjnego. In: K. Obłój (ed.). *Strategia organizacji*. Warszawa: PWE. ISBN 9788320821659.
Orłowski, C. (2011). Konsumenci bancassurance. *Gazeta Bankowa*, *12*, 41–44.
Przybytniowski, J. W. (2009). *Rozwój ubezpieczeń gospodarczych w procesie integracji europejskiej*. Kielce: Uniwersytet Humanistyczno-Przyrodniczy Jana Kochanowskiego. ISBN 9788371334009.
Swacha-Lech, M. (2008). *Bancassurance. Sprzedaż produktów bankowo-ubezpieczeniowych*. Warszawa: CeDeWu. ISBN 9788375560305.
Szczepankowski, P. J. (2000). *Fuzje i przejęcia*. Warszawa: Wydawnictwo Naukowe PWN. ISBN 8301131314.
Śliperski, M. (2002). *Bancassurance. Związki bankowo-ubezpieczeniowe*. Warszawa: Difin. ISBN 8372512787.
www.lse.co.uk/financeglossary
Żabiński, L. (ed.). (2000). *Analiza strategiczna przedsiębiorstwa na potrzeby wyboru strategii rozwoju (za pomocą metody SWOT)*. Katowice: Akademia Ekonomiczna im. Karola Adamieckiego. ISBN 8387265918.

# Bancassurance w opinii klienta indywidualnego województwa świętokrzyskiego

**Abstrakt:** Celem niniejszego opracowania była analiza poziomu wiedzy, a co za tym idzie – świadomości klienta indywidualnego, mających wpływ na jakość usługi ubezpieczeniowej oferowanej w sektorze ubezpieczeń majątkowych przez pryzmat pośrednictwa ubezpieczeniowego, ze szczególnym uwzględnieniem usługi *bancassurance.* Za hipotezę przyjęto, iż metoda SWOT jest skutecznym instrumentem identyfikacji poziomu wiedzy, a co za tym idzie – świadomości klienta indywidualnego, przez pryzmat usługi *bancassurance.* Koncepcję metodologiczną opracowania oparto na funkcjonalnym ujęciu rynku ubezpieczeniowego i ekonomicznych uwarunkowań działalności tego rynku. Analizy badań były prowadzone z wykorzystaniem wiedzy zawartej w literaturze przedmiotu. Ponadto przeanalizowano strategię rozwoju sektora bankowo-ubezpieczeniowego w oczach klientów z województwa świętokrzyskiego z wykorzystaniem metody analizy SWOT. Przedział czasowy badania obejmował lata 2013–2016. Główna konkluzja, jaka nasuwa się z przeprowadzonej analizy, to iż na obecnym poziomie współpraca zakładu ubezpieczeń i banku w opinii klientów indywidualnych nie ma większych szans rozwoju usługi *bancassurance* bez wprowadzenia innowacji w produktach bankowo-ubezpieczeniowych.

**Słowa kluczowe:** pośrednictwo ubezpieczeniowe, związki bankowo-ubezpieczeniowe, zakład ubezpieczeń, bank, bancassurance

# MANAGEMENT

# The concept of dichotomy of the innovation process in an enterprise


## Leszek Kozioł

Małopolska School of Economics in Tarnów

Faculty of Management and Tourism



**Abstract:** The article presents selected, more important definitions of innovation in an enterprise, paying attention to those of them which emphasize its immaterial character. It describes models of the innovation process, concepts of the innovativeness system and models of the innovative activity of a firm. It was found out that the elements of these objects are a coherent entirety. The principle of the presented research approach is the paradigm assigned to Schumpeter of merging various activities within the innovation process. It turned out, however, that an attempt to implement such a broad programme, namely the invention and the application of innovation, often ends in failure. The reason is that we cannot recognize the tools of analysis and define the determinants of the innovation process in the comprehensive Schumpeterian approach, however, we can resolve these issues by studying each of the processes separately. The aim of the article is to present the concept of the dichotomy of the innovation process in an enterprise and indicate the way of using it in practice. Two autonomous processes, crucial for the development of innovativeness, are distinguished in this concept, namely the process of innovation invention and the process of innovation implementation.

In the strategy of an organization it is necessary to define the object and the scope of analysis, at the same time considering the level of innovation ability of an enterprise; in a creative industry they may specialize in creating ideas, designing novelties and offering innovative projects to an appropriately selected target group. Traditional firms should develop and implement these projects in practice to the benefit of customers. It should be emphasized that the choice of the subject of innovative activity determines the innovation ability of the organization, the ability to manage innovative projects and the use of modern (agile) management methods, as well as management pragmatics.

The article is of theoretical and analytical character. To achieve the aim and verify the theses, following research methods were used: literature analysis, impact factor analysis, professional conversations with experts.



**Key words:** innovation, models of the innovation process, innovative project management, concept of the dichotomy of the innovation process



Correspondence to:
Leszek Kozioł
Małopolska Wyższa Szkoła Ekonomiczna
Wydział Zarządzania i Turystyki
Katedra Zarządzania
ul. Waryńskiego 14
33-100 Tarnów, Poland
Tel.: +48 14 65 65 535
E-mail: koziol l@interia.pl


## 1. Introduction

High pace of introduction of new technologies, digitalization of business activity, use of the Internet and social net-

working sites in the relationship with customers and other stakeholders, shortening of product lifecycle, deregulation of labour markets and, what is the most important, increasing market competition may be imminent to enterprises and even whole industries.

The survival and development of enterprises in unstable environment requires unique competences of management staff and personnel, first of all in strategic effectiveness, operating effectiveness, project management and innovativeness skills. Innovativeness understood as the ability to create and implement innovations is a contemporary method of manufacturing new products in a better or changed way, method of improving processes and relationships, method of achieving the strategic goals of an organization (Figure 1).

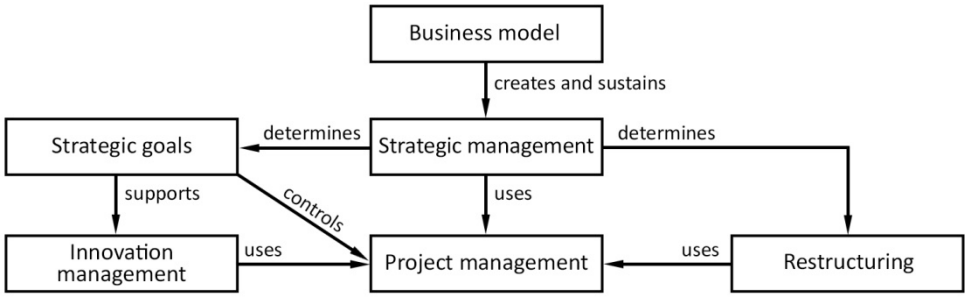



Figure 1. The structure of project and innovation management in an organization

S o u r c e: Author's own elaboration.

An innovative business model defines the catalogue of projects and goals constituting the overall strategy of an enterprise. The strategy implementation justifies undertaking restructuring and innovative activities, uses the project management method, as well as supervision and control instruments. The creation of innovation model can be used in the organization's business activities for the development of knowledge and innovation as well as raising its competitiveness.

The aim of the article is to present the concept of the dichotomy of the innovation process in an enterprise and show the ways of using it in practice. The study has been created as an attempt to show the author's concept of creating and implementing innovations.

The following theses were adopted in the presented concept: innovation process, regardless of the type of innovation, can be approached twofold, namely as the process of invention of innovation and the process of implementation of innovation. The determinants of both processes and research instruments are totally different, nevertheless, in numerous innovation models it constituted a coherent whole: from invention to innovation and to imitation of innovation, which remarkably complicates practical implementation of this pattern.

In its strategy an enterprise can define the scope of innovative activity according to the possessed innovation ability, as well as project abilities to dynamize and steer innovation activity.

As a thesis it was also assumed that the method of evaluating innovation ability of an enterprise is an effective instrument of identification of competences and the level of knowledge of the management staff and employees with regard to innovativeness. The analysis of the level of knowledge, therefore the awareness and motivation of employees within the mentioned scope, influences the effectiveness of innovation process.

The article is of theoretical and analytical character. To achieve the aim and verify the theses, the following research methods were used: literature analysis, impact factor analysis, professional conversations with experts, conversations with managers regarding pragmatics of innovation management in an enterprise.

## Around the term of innovation in an organization

Innovation, in its essence, is variously understood and defined. In already numerous and broad literature there are a lot of different definitions and interpretations of the term 'innovation'. In majority of them the balance point of analyzing this issue is basically put on the identification of various types of innovations, determinants of this phenomenon, both material and immaterial ones, its designates and dimensions, positive and negative effects calculated in a long and short term. The term is associated with modernization, improvement, novelty or an original solution, an idea, a new conception, an invention, a design.

Numerous authors draw attention to the problem with defining the phenomenon of innovativeness. They emphasize that the precise definition of terms related to innovation, such as type of innovation, innovation process, innovation system, innovative activity, innovation management, influences the substantive and methodological aspects of investigating this phenomenon, including the subject and the scope of the study, the way of conducting the analysis, interpretation of the results, and finally the innovativeness and effectiveness of enterprises.

In the literature we can find various approaches to investigating the innovation process in an enterprise. Referring to a well-known concept of the innovation process attributed to Joseph Schumpeter, expressing three elements of this process as 'Invention—Innovation—Imitation', some authors who deal with this issue indicate the key meaning of a selected element of the system, others emphasize the unity of the process thus divided. Some researchers treat invention as the whole innovation process, whereas others refer innovation to the practical application of a new idea, its market diffusion, they expose the process of the imitation of innovation (Howells, 2005, p. 1).

Practitioners having a lot of knowledge about innovation management in an enterprise highlight the meaning of the context of innovation commercialization. Many of them understand and treat innovation as a process of offering new products, processes and experiences to customers on the one hand, and measurable benefits to the firm on the other hand.[1]

[1] For example, Jeffrey Baumgartner believes that innovation is the 'implementation of creative ideas in order to generate value, usually through increased revenues, reduced costs or both'. On the other hand, Mike Shipulski claims that it is a 'work that delivers new goodness to new customers in new markets, and does it in a way that radically improves the profitability equation'. Kevin McFarthing defines innovation as the 'introduction of new products and services that add value to the organization'. Gijs van Wulfen defines innovation as a 'feasible relevant offering such as product, service, process

The most numerous group is made of authors who understand innovation as activities related to the creation of an idea and its commercialization, in other words—they include in their research both the process of invention, innovation and the process of implementation of invention, they indicate its material and immaterial character. In this stream there are definitions of innovation developed by well-known authors, such as: Joseph Schumpeter, Peter F. Drucker, Michael E. Porter, Philip Kotler, Ricky W. Griffin or *Oslo Manual*.[2]

A considerably smaller number of researchers emphasize that innovation in its essence is immaterial, it constitutes its new element, object, project based on knowledge and creativity. Such a point of view is represented by, among others: Simon Kuznets, Percy Whitfield, Robert E. Lucas, Everett M. Rogers.[3]

In the content of the definitions given we can distinguish at least three approaches to the description of the essence of innovation. The article adopts two approaches: the narrow and the broad one.

In the narrow approach innovation is a cognitive process of creating and developing ideas, concepts, projects—basing on knowledge and creativity—which are called novelty, a new element by the creator or recipient, the target group. Innovation (creativity) in this approach can be identified through the evaluation of the expected results, or the evaluation of the quality of innovative projects. Creativity is understood here as the quality of an object (concept, project) and not the trait of the man, the creator. In this sense, innovation refers to every object which takes the immaterial form, e.g. an idea, a new method, an innovative design (Bartol and Martin, 1991).

In the broad, so-called Schumpeter's approach, innovation is any, in principle beneficial, creative and original change in various areas of an organization's activity, bringing novelty and progress in comparison with the existing state assessed positively in the light of the effectiveness criteria of a given organization (Kozioł, Wojtowicz and Karaś, 2017).

---

or experience with a viable business model that is perceived as new and is adopted by customers' (all definitions see: Skillicorn, 2016).

[2] According to J. Schumpeter, innovation is the establishment of new products, new methods or semi-finished goods (Schumpeter, 1939, p. 84). P. F. Drucker regards innovation a special tool in entrepreneurs' hands, which is interpreted as an ability to launch new business activity or to offer a different package of services to customers (Drucker, 1992, pp. 40–45). In M. E. Porter's view, innovation is a technological improvement related to more effective and efficient fulfilment of goals (with the use of marketing and management knowledge) (Porter, 1990, p. 45). On the other hand, R. W. Griffin claims that it is every organizational effort whose aim is to launch new goods to the market (Griffin, 2004, p. 424). In *Oslo Manual* it is assumed that innovation means the invention and then the implementation of a new method, process, product, instrument, or other business activity of a market character, organization of work or a relation with external environment (*Oslo Manual*, 2008). In P. Kotler's opinion, an innovative project—whether it will be new products, services, processes or business models—upon implementation will give specific, both positive and negative results (Kotler, 2013, p. XVI).

[3] S. Kuznets believes that innovation is the application of new knowledge towards an invention (Kuznets, 1959, p. 30). According to P. Whitfield, innovation is knowledge and creativity building a new element (Whitfield, 1979, pp. 14–15). R. Lucas ascertains that innovation is the accumulation of human capital translated into economic growth (Lucas, 1988, pp. 5–7). In E. M. Rogers's view, innovation includes all areas which through subjective feelings are recorded and assessed as a novelty, regardless of a real level of novelty of the said object or thought (Rogers, 2003, p. 12).

## 2. The unity of the divided process

The presented definitions have been developed and expanded in numerous models of the innovation process, concepts of innovativeness system presented in literature or in developed models of the innovative activity of enterprises. Examples of selected solutions concerning innovativeness of enterprises are presented in subsequent Figures 2–5.

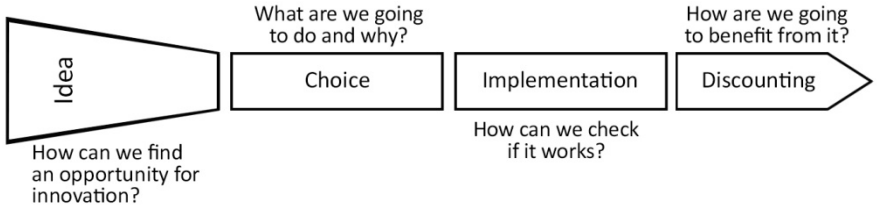



Figure 2. The progression of innovation process

S o u r c e: Author's own elaboration based on: Tidd and Bessant, 2013, p. 89.

The model of progression of innovation process is the development and expansion of Schumpeter's innovation process system, particularly in the diffusion (dissemination) part of innovation. The components of this part (stages of the process) as a result of mutual influences are a coherent wholeness. However, a complex, difficult stage of the process of invention of innovation which was called 'an idea' was presented very briefly, without an attempt of its operationalization. What is more, the stage (sub-stage) of the evaluation of the innovative project in the pre-diffusion stage is also missing.

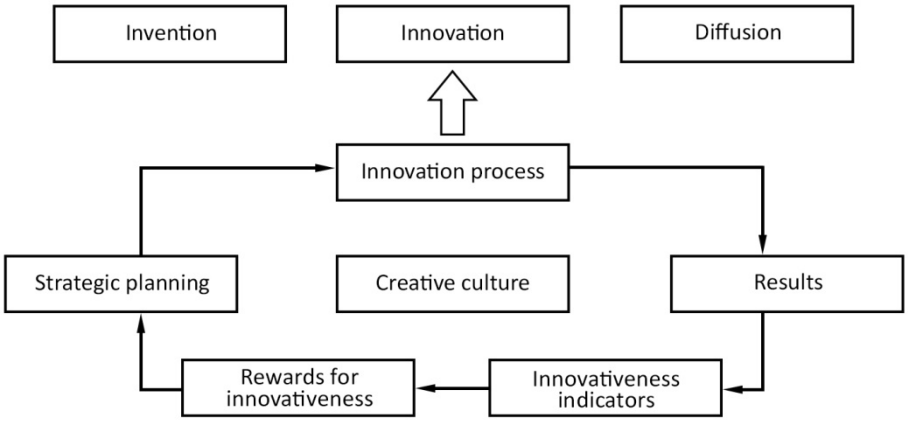



Figure 3. Complete innovativeness process

S o u r c e: Author's own elaboration based on: Trías de Bes and Kotler, 2013, pp. XV–XVII.

Presented above innovativeness system includes two subsystems: innovation process in the traditional, classical approach and the innovation management process. It emphasizes the significance of strategy and strategic planning, monitoring and operating control, motivation for innovative activities and organizational culture constituting the context of the system (Figure 3). Inclusion of innovative activity in the implementation of strategic goals of an organization is really justified, however, innovativeness with regard to operating effectiveness, important from the point of view of productivity and competitiveness of an organization, should not be limited.

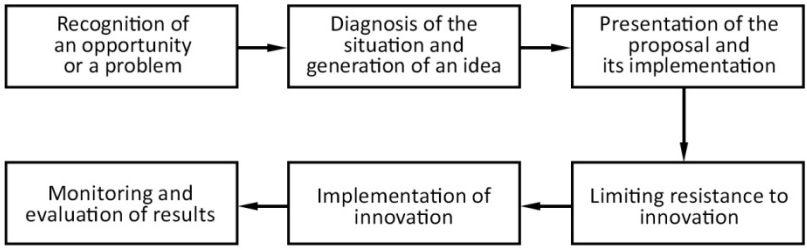



Figure 4. Innovation process—the six-step model

S o u r c e: Bartol and Martin, 1991, pp. 235–236.

According to the authors of the innovation process model comprising six types of integrated activities (steps), the reason for limiting innovativeness, already at the beginning of the process, is the type of managers' activities. They mainly concentrate on solving current problems, they attach less importance to finding opportunities for its development, especially ideas, innovative projects increasing competitiveness. Presentation of the proposals of an innovative solution with the provision of the plan of its implementation decreases the resistance of various groups of interest to innovation and improves its completion. Detailed proposals included in the model aim at improving the innovation process as a whole (Figure 4).

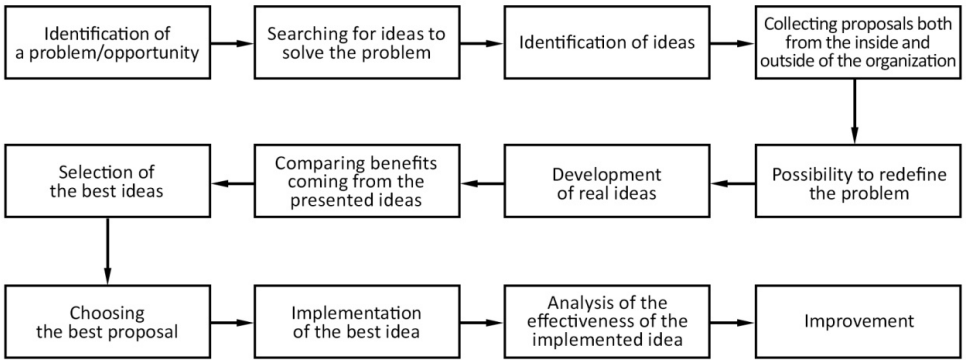



Figure 5. Innovation process according to Pauric McGowan

S o u r c e: Based on McGowan, 1997, p. 583.

The extension of the innovation process which goes further is presented by Pauric McGowan. Twelve stages of this process create the algorithm of the procedure similar to the decision making process model, more broadly to solving problems in an organization. The proposed procedure may also turn out to be useful in the innovation management process in an organization (Figure 5).

The quoted definitions of innovation and other notions and terms with respect to the innovativeness of an organization according to their authors are understood as systems, objects, whose components, as a result of mutual influences, constitute a coherent wholeness. A general principle for the presented research attitude is the paradigm of uniting various activities (stages) within the innovation process and establishing the evaluation of an innovative project at the stage of its choice and commercialization.

## 3. Dichotomy of the innovation process—an outline of the concept

The innovation process, regardless of the character and type of innovation and the way of its emergence, includes two stages, two autonomous processes:

1. The process of innovation invention, consisting of the stage of creating the first concept, a draft concept (an innovative project concept emerges)[4], the stage of materializing the idea (parametrization of the innovativeness process), and of the stage of idea evaluation (the evaluation of innovative project in pre-diffusion stage). The ex-ante evaluation of innovative project is performed, among others, in the context of the project feasibility, and then its functionality and effectiveness.
2. The process of innovation implementation, comprising the stage of the concept selection, namely the innovative project and implementation method, that is the control over the implementation of the innovative project function and the stage of discounting value from the implemented idea, namely the interception of value from the innovative project (see Figure 6).

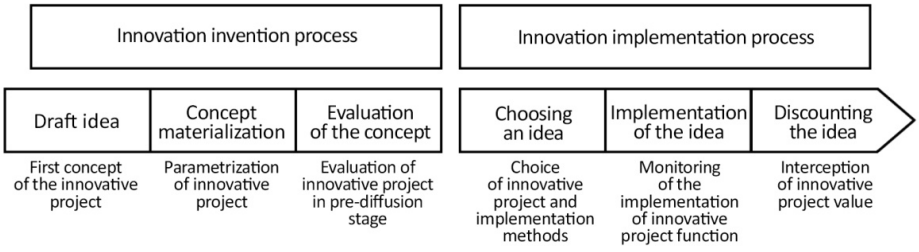



Figure 6. Two-dimensional progression of innovation process

S o u r c e: Author's own elaboration.

[4] A significant element of the analysis is the use of project management idea in innovative activity—constituting a value for an enterprise. The notion differs from traditional ventures in terms of the dynamics of progression and the rate of the benefits achieved. According to some researchers, an innovative project is not precisely defined in literature, it can be defined as invention of innovation, an idea, a draft of something. A project is also an intended plan of action, a concept, an initial schedule, a programme. Its uniqueness concerns not only the way of implementation, but also products or benefits which may arise in its effect (Duncan, 1995, p. 4).

An innovative project in the stage of the process of innovation implementation differs significantly from the project emerged in the stage of innovation imitation. In particular, they differ in identification of problems and defining goals, the approach to creating and using ideas (innovation), the level of use of the possessed resources and designing technologies, competences of designers, the level of risk, time and budget for implementation, or the project business value.

Innovation invention projects have vaguely defined goals and the ways of their implementation. It sometimes happens that they are implemented according to the principle that the solution is known but the goal and the application of the project are not defined precisely. The budget is not specified and the time of the project is not defined, and the predicted benefits are uncertain. This type of projects occur unexpectedly and they are an opportunity for an enterprise (Kelley and Littman, 2009, p. 3), they are an innovation that takes on an intangible form (see the definition of innovation in a narrow sense).

On the other hand, the goals of innovation implementation projects most often arise from the strategy of an enterprise. Their financial budget, the time of implementation and, which is the most important, the business value are defined relatively precisely. In their essence, projects of implementation (commercialization) of innovation are similar to the class of agile projects (Agile Project Management), which are in the range between standard, and extreme projects are implemented according to the plan (Wysocki, 2013, p. 390; Kozioł and Ćwiertniak, 2018, p. 186). They usually take on a material form, less often intangible (see the definition of innovations in a broad sense). In short, in the innovation inventiveness process unique skills of the creators and motivation of the researcher's learning and achievements are indispensable, while in the process of innovation implementation these requirements relate to managerial abilities and skills, material motivation and promotion.

The differentiation between both types of projects also concerns the competences of designers. In an innovation invention project creativity and talent as well as divergent thinking are of key significance, whereas in an implementation of innovation project these are entrepreneurship and competences with regard to innovative project management or convergent thinking.

The basic components of creativity include, according to Teresa Amabile (1983, pp. 67–77, after: Bartol and Martin, 1991, p. 282):

- The knowledge of the area being the field of analysis, e.g. technical skills, artistic abilities, talent in a given area, as well as specialist knowledge, expertness.
- Creative thinking skills. They concern (the ability of) cognitive style and methods of thinking focused on the explorations of new directions, scientific approaches which may be applied to generate new ones and the style of working which leads to the development of creative ideas. Creative style of working includes the ability to concentrate effort and attention in the long term, an ability to resign from ineffective ways of acting, stamina and high level of engagement.
- Motivation of achievements. A significant premise of creativity, invention is the internal motivation of achievements, learning (internal motives).

A person followed by a strong motivation of achievements or learning (*internal motives*) is distinguished by greater creativity, invention that an individual is interested in external

stimuli, for example a financial reward (*external motives*). Observations indicate that external rewards may contribute to the suppression of creativity process. For example, a scientist who participates in research into a new medicine to obtain a reward in the form of a monetary gratification is not as creative as a scientist for whom learning, scientific achievements are more important.

The creativity process includes several stages. Most often four stages are distinguished: preparation, incubation, illumination, verification (Haefele, 1962, after: Bartol and Martin, 1991, p. 285).

The preparation stage boils down mainly to the identification of a problem or a task whose solving requires creative thinking, unconventional approach to formulating proposals (variants) of solving the problem. It requires the concentration of attention and in-depth research, thinking over aspects of the problem, e.g. social issues. Solving the mentioned issues depends on the creativity of the individual and the time—months, or even years.

The incubation stage is mainly based on the use of subconsciousness and divergent thinking in the search for and exploration of unusual solutions (ideas). It is the impact of subconsciousness which enables to find new solutions. Where a high level of creativity is required, understood as a qualitative feature of product, subconsciousness and intuition may turn out to be the instrument more effective that an aware logical action.

The illumination stage is a new level of a researcher's mind, which allows to cross the barrier, reach a new, innovative solution, the state of mind called 'eureka'.

In the verification stage there is testing an idea determined by the researcher's assessment. In this process, convergent, logical thinking is indispensable for the proper assessment of a solution (idea). If it turns out that the solution is not feasible, it is necessary to return to the earlier stage or initiate the process of creating thinking anew.

On the other hand, the process of imitation of innovation is the manifestation of entrepreneurship and it is related to the necessity to develop and implement a new innovative business model, therefore, to undertake business activity anew, take increased responsibility for the related risk. In such an approach entrepreneurship is understood as recognition, evaluation, refining and use of an innovative project.

As it was mentioned, in this stage it is necessary to perform the evaluation of the innovative project with particular consideration to the limitation of the project feasibility, the situation of the organization, the level of its functionality and effectiveness in the short and long term.[5]

The commercialization of an innovative project requires competences in project management, the use of modern (agile) management methods so that one could implement subsequent stages of this process described more broadly and presented in Figures 4 and 5.

Among numerous attributes of a creative idea (innovative project) preferred by managers and entrepreneurs the following are mentioned: the achievement of competitive advantage, the inception of value from innovation, the adjustment to the existing business model, as well as originality and flexibility, namely the possibility to refine and develop the idea (Gruber,

[5] A helpful tool for evaluating an innovative project is the NASA (National Aeronautics and Space Administration) preparedness method. With this method, you can define and evaluate an idea from the conceptualization phase of a solution to the stage of its maturity, in which the idea takes the form of a solution that can be applied in practice (Mankins, 1995, p. 5).

Kim and Brinckmann, 2015, pp. 205–225). M. Holmes, T. R. Holcomb, P. G. Klein, R. D. Ireland presented the sequential model of judgments made by entrepreneurs, which considers four criteria (Holmes, Holcomb, Klein and Ireland, 2013): ideation, profitability, desirability and activity. The model explains how an entrepreneur evaluates the project, starting with evaluation of a creative idea and ending in evaluation of the venture implementation.

As it can be observed, the determinants of both the processes and research instruments are considerably different. Also the competences of the designers and the products of their work are dissimilar. In the process of invention of innovation it is a unique idea communicated to the firm in which it emerged or the environment of the organization. Implemented in the process of the implementation of innovation, it creates value for the project buyer, it becomes his intellectual property. In fact, at least two innovative projects are being created (two innovations) that can be implemented in a different place and time.

Scientific and research institutes, universities, authors of software, planning and design companies, advertizing agencies, or R&D units functioning in corporations, and even single positions of authors constitute the creative industry with high dynamics of creating (producing) innovative projects. Offered within the industry or outside it they bring benefits to project authors. Innovation ability of enterprises of the creative base refers to the creation and application of the act of creativity of new ideas, inventions, innovative projects. Innovation ability is determined by a lot of factors of immaterial character at the same time. This ability is relatively coherent, homogeneous, universal, particularly in the sector of creative, innovative enterprises (Kozioł, Wojtowicz and Karaś, 2017).

In its innovation strategy an enterprise can choose a broad range of innovative activity, including both the process of invention of innovation and the process of the imitation of innovation. However, it requires the extension of innovation potential and ability[6], necessary for implementation of both processes. High costs and high risk of the venture are the reason for which only few organizations can afford it due to financial reasons, material resources, competences and others.

The majority of enterprises, especially those which belong to small and medium-sized enterprises, assume in their strategy the development of innovation ability in the area of implementation of innovation. An innovative organization of this type has the capability of identifying and taking over innovative projects, ideas from its environment, adjusting and developing a project, commercializing and incepting value from innovation. It has resources and capabilities to discover and make use of opportunities to develop new products and processes in order to meet market needs (Hogan, Soutar, McColl-Kenned and Sweeney, 2011).

Some enterprises implementing innovation also attempt to get involved in the process of creating innovation, especially those which function in the innovative environment. They

[6] The effectiveness of an enterprise with regard to creating innovation is determined by resources developed in the past (innovative potential), as well as appropriate skills and capabilities of their current use. Innovation, which should be emphasized, must be coherent with the strategy of the organization and originate from it. In this way the organization expresses its readiness to introduce innovation and defines the methods of implementing innovation. In other words, innovation ability is the ability to apply the act of creativity of new ideas, inventions, which results in innovation whose diffusion brings benefits to the enterprise (Kozioł, Wojtowicz and Karaś, 2017).

create alliances of knowledge, networks of inventions (Tödtling, Lehner and Kaufman, 2009), bases of knowledge, various forms of knowledge exchange, for example 'Edu-Time', undertake cooperation in innovation creation (co-innovation) (Boney, 2012). The last of the mentioned activities, co-innovation, consists in joined creation of innovation to build common values and increase the level of competitiveness. The basis, the creative determinant of co-innovation is the use of IT instruments, particularly e-learning. They can take on other organizational forms, for example they can be a set of independent, in the legal sense, business units, implementing various projects and projects coordinated by a company—an integrator which has distinctive, unique competences.

In this process, the so-called management pragmatics is particularly useful. According to interviewees—i.e. managers—Polish enterprises are developing innovative activities, introducing beneficial changes within the stage (stages) of the innovation process, using for this purpose external sources of knowledge, experience of international enterprises in particular.

## 4. Conclusions

The main conclusion that can be drawn from the conducted analysis is that from the perspective of time some of J. A. Schumpeter's views have become obsolete. The presented theory of innovation and the so-called innovation triad as the description of the process from invention through innovation to imitation—the process presented at a high level of generality, homogeneity, low disjunctiveness, treated as a field of analysis, the subject of the research of numerous authors. It appeared, however, that an attempt to invent and apply innovation often ends in failure since we still cannot explain what premises, cultural and economic stimuli, the way of implementation of innovative projects, reactions of the markets generate changes conditioning the diffusion of a new product or service.

We cannot recognize the tools of analysis and define the determinants of innovation process in the comprehensive Schumpeterian approach, but we can resolve it by studying each of these processes separately. Management pragmatics is a factor supporting innovation process. Organizations lacking sufficient resources did not invest in the sphere of research and development (basic, applied development works), but instead they tried to use external sources of knowledge, where the costs of innovative projects and the risk of failure are much smaller than in the case of conducting own research.

It is in the strategy of an organization that the object and the scope of the analysis must be defined, considering the level of innovation ability of an enterprise, in the creative industry they can specialize in creating ideas, designing novelties and offering innovative projects to properly selected target group. Traditional firms should develop these projects and implement them in practice with benefits for their customers.

As we can observe, the choice of the object and the scope of innovative activity determine innovation ability of an organization, the ability to manage innovative projects and the use of modern (agile) management methods, as well as innovation policy supported by management pragmatics.

## References


Amabile, T. (1983). *The social psychology of creativity*. New York: Springer Verlag. ISBN 3540908307.

Bartol, K. M., Martin, D. C. (1991). *Management*. New York: McGraw-Hill. ISBN 0070039267.

Bonney, L. B. (2012). *Insights into 'mysterious processes': Incentivising co-innovation in agrifood value chains*. PhD thesis. University of Tasmania.

Drucker, P. F (1992). *Innowacja i przedsiębiorczość. Praktyka i zasady*. Transl. by A. Ehrlich. Warszawa: Państwowe Wydawnictwo Ekonomiczne. ISBN 8320808707.

Duncan, W. R. (1995). *A Guide to the project management body of knowledge*. Upper Darby, PA: Project Management Institute. ISBN 1880410133.

Griffin, R. (2004). *Podstawy zarządzania organizacjami*. Transl. by M. Rusiński. Warszawa: Wydawnictwo Naukowe PWN. ISBN 8301140186.

Gruber, M., Kim, S. M., Brinckmann, J. (2015). What is an attractive business opportunity? An empirical study of opportunity evaluation decisions by technologists, managers, and entrepreneurs. *Strategic Entrepreneurship Journal*, *9* (3), 205–225.

Haefele, J. W. (1962). *Creativity and innovation*. New York: Reinhold Publishing Corporation.

Hogan, S. J., Soutar, G. N., McColl-Kennedy, J. R., Sweeney, J. C. (2011). Reconceptualizing professional service firm innovation capability. Scale Development. *Industrial Marketing Management*, *40* (8), 1264–1273.

Holmes, M., Holcomb, T. R., Klein, P. G., Ireland, R. D. (2013). *The role of judgment and decisions in new--venture formation: Toward a behavioral model.* Paper presented at the Strategic Management Society Conference, Atlanta.

Howells, J. (2005). *The management of technological innovation: The shaping of technology and institutions of the market economy*. London: Sage. ISBN 9781446229842.

Kelley, T., Littman, J. (2009). *Sztuka innowacji*. Transl. by G. Łuczkiewicz. Warszawa: MT Biznes. ISBN 9788361040859.

Kozioł, L., Ćwiertniak, R. (2018). Kształtowanie portfela projektów w zarządzaniu innowacjami. In: P. Cabała (ed.). *Zarządzanie portfelem projektów w organizacji. Koncepcje i kierunki badań* (pp. 183–203). Kraków: Mfiles.pl. ISBN 9788394140847.

Kozioł, L., Wojtowicz, A., Karaś, A. (2017). The concept of the innovative tourism enterprises evaluation capability. In: V. Katsoni, A. Upadhya, A. Stratigea (eds.). *Tourism culture and heritage in a smart economy* (pp. 159–172). Springer Proceedings in Business and Economics. Cham: Springer. ISBN 9783319477312.

Kuznets, S. (1959). *Six lectures on economic growth*. Glencoe, Il: Free Press of Glencoe.

Lucas, R. E. Jr. (1988). On the mechanism of economics development. *Journal of Monetary Economics*, *22* (1), 3–42.

Mankins, J. C. (1995). *Technology readiness levels*. A White Paper. Washington: NASA. Advance Concepts Office, Office of Space Access and Technology.

McGowan, P. (1997). Innowacja i przedsiębiorczość wewnętrzna. In: D. M. Steward (ed.). *Praktyka kierowania* (pp. 579–600). Transl. by A. Ehrlich. Warszawa: Polskie Wydawnictwo Ekonomiczne. ISBN 8320810256

Podręcznik Oslo. (2008). *Zasady gromadzenia i interpretacji danych dotyczących innowacji*. Warszawa: European Commission, OECD, Ministry of Science and Higher Education. ISBN 9788361100133.

Porter, M. E. (1990). *The Competitive Advantage of Nations*. New York: Free Press. ISBN 0029253616.

Rogers, E. M. (2003). *Diffusion of innovation*. New York: Free Press. ISBN 0743222091.

Schumpeter, J. A. (1939). *Business cycles. A theoretical, historical and statistical analysis of the capitalist process*. New York: McGrow-Hill Book Company.

Skillicorn, N. (2016). What is innovation? 15 experts share their innovation definition. In: *Idea to value* [online, accessed: 2017-11-15]. Retrieved from: https://www.ideatovalue.com/inno/nickskillicorn/2016/03/innovation-15-experts-share-innovation-definition/.

Tidd, J., Bessant, J. (2013). *Zarządzanie innowacjami. Integracja zmian technologicznych, rynkowych i organizacyjnych*. Transl. by J. Szostak. Warszawa: Oficyna a Wolters Kluwer business. ISBN 9788326431500.

Tödtling, F., Lehner, P., Kaufman, A. (2009). Do different types of innovation rely on specific kinds of knowledge interactions? *Technovation*, *29* (1), 59–71.

Trías de Bes, F., Kotler, P. (2013). *Innowacyjność przepis na sukces. Model „od A do F”*. Transl. by M. Zawiślak and J. Środa. Poznań: Wydawnictwo Rebis. ISBN 9788375108132.
Whitfield, P. (1979). *Innowacje w przemyśle*. Transl. by T. Mroczkowski. Warszawa: Państwowe Wydawnictwo Ekonomiczne.
Wysocki, R. (2013). *Efektywne zarządzanie projektami: tradycyjne, zwinne, ekstremalne*. Gliwice: Helion. ISBN 9788324639069.

# Koncepcja dychotomii procesu innowacji w przedsiębiorstwie

**Abstrakt:** W artykule przedstawiono wybrane, ważniejsze definicje innowacji w przedsiębiorstwie, ze zwróceniem uwagi na te z nich, które podkreślają jej niematerialny charakter. Opisano modele procesu innowacji, koncepcje systemu innowacyjności oraz modele działalności innowacyjnej przedsiębiorstwa. Stwierdzono, że elementy tych obiektów stanowią spójną całość. Zasadą prezentowanego podejścia badawczego jest przypisywany Schumpeterowi paradygmat zespolenia różnych działań w ramach procesu innowacji. Okazało się jednak, że próba realizacji tak szerokiego programu, tj. inwencji i aplikacji innowacji często kończy się niepowodzeniem. Nie potrafimy bowiem rozpoznać narzędzi analizy i określić determinanty procesu innowacji w całościowym Schumpeterowskim ujęciu, możemy natomiast kwestie te rozstrzygnąć, badając każdy z tych procesów z osobna.

Celem artykułu jest przedstawienie koncepcji dychotomii procesu innowacji w przedsiębiorstwie oraz wskazanie sposobu jej wykorzystania w praktyce. W koncepcji tej wyróżniono dwa kluczowe dla rozwoju innowacyjności autonomiczne procesy, tj. proces inwencji innowacji oraz proces wdrażania innowacji.

W strategii organizacji należy określić przedmiot i zakres analizy, uwzględniając przy tym poziom zdolności innowacyjnej przedsiębiorstwa, w branży kreatywnej mogą one specjalizować się w kreowaniu pomysłów, projektowaniu nowości oraz oferowaniu projektów innowacyjnych odpowiednio dobranej grupie docelowej. Firmy tradycyjne powinny projekty te rozwijać i realizować w praktyce z korzyścią dla klientów. Należy podkreślić, że wybór przedmiotu działalności innowacyjnej determinuje zdolność innowacyjną organizacji, umiejętność zarządzania projektami innowacyjnymi oraz wykorzystanie nowoczesnych (zwinnych) metod zarządzania, jak również pragmatykę zarządzania.

Artykuł ma charakter teoretyczno-analityczny. Dla osiągnięcia celu i weryfikacji tez zastosowano metody badawcze takie jak: analiza literatury, analiza czynników wpływu, rozmowy z ekspertami.

**Słowa kluczowe:** innowacja, modele procesu innowacji, zarządzanie projektami innowacyjnymi, koncepcja dychotomii procesu innowacji

# Intellectual capital: The strategic resource of organizations


## Sandra Isabel Rodrigues Bailoa

Polytechnic Institute of Beja
School of Technology and Management



**Abstract:** The increasing investment in intangibles and the growth of markets of goods and services based on knowledge shows that these assets that comprise the intellectual capital are the key to strategic management of organizations in the knowledge economy. In increasingly competitive markets, where it is mandatory to innovate constantly, the value of products and services seems to depend more and more on the percentage of technology, knowledge and intelligence embedded in them. Given this reality, intellectual capital should be considered a strategic resource and the ability to manage it, a key factor for success.

This study intends to address this issue reflectively, showing the importance of intellectual capital and its strategic management as a way of developing sustainable competitive advantage for organizations.



**Key words:** intellectual capital, knowledge management, intellectual capital management, strategic management, competitive advantage


## 1. Introduction

The transition from an economy based on tangible goods to an economy based on intangible assets, the so-called knowledge economy, has resulted in research areas such as intellectual capital. Intellectual capital is often defined as a set of intangible assets that create value for organizations and seems to be the determining raw material in the creation of sustained competitive advantages. In increasingly competitive and dynamic markets, where innovation is the watchword, it is important that organizations improve and sustain the ability to strategically manage and maximize the value that derives from their intellectual capital.

Thus, the objective of this paper is to be a reflection on the theme of intellectual capital and mainly about the importance of its strategic management as a mean for organizations to obtain sustained competitive advantages. Since the topic has been the subject of multiple articles and books in the last decades, this work intends to be a review of the state of art. Despite this subject is addressed to several areas, such as ac-


Correspondence to:
Sandra Isabel Rodrigues Bailoa
Edifício da Escola Superior
de Tecnologia e Gestão
Campus do Instituto Politécnico
de Beja
Rua Pedro Soares
7800-295 Beja, Portugal
Tel.: +351 284 314 400
E-mail: sandra.bailoa@ipbeja.pt

counting, human resources and finance, this article intends to provide a framework for strategic management.

This paper is organized as follows. The next section introduces literature review and describes theoretical background of intellectual capital. The third section discusses issues related to strategic management of intellectual capital. The fourth section presents main conclusions.

## 2. Intellectual capital: The state of art

### 2.1. Conceptual roots

In recent decades, the emergence of new forms of economic activities based on information and knowledge has been demonstrated by high volumes of business investments related to intangible aspects ranging from business support services, financial institutions, computer industry, biotechnology, aerospace, culture, tourism, telecommunications, social and community services, accounting, juridical services, marketing, among others. So, increasing investment in intangibles and the growth of markets for production of knowledge-based services show the importance of knowledge as a factor of production and led to call it the knowledge economy (Drucker, 1993, p. 34). The knowledge-based economy brought a transition from an economy based on tangible goods (raw material, labour and capital intensive) to an economy based on intangible assets intensive in technology and knowledge, based on information, human capacities, know-how, customer-supplier relationship, brand loyalty, quality of products and services, marketing, among others. Intangible assets as knowledge and intellectual capital (IC) now represent a highly significant share of corporate sustainability, and in many cases have more value than physical and material assets and that is because increased business competitiveness requires greater needs for innovation in products and processes, and higher quality, which are increasingly dependent on knowledge and IC. Therefore, IC is an area of research that comes with the transition to the so-called knowledge economy.

According to Roos et al. (1997, p. 15), theoretical roots of IC come from two different streams of research or currents of thought: the strategic and the measurement (Figure 1). The first focuses on the creation and use of knowledge and the relationship between knowledge and value creation. The second is related to the need to develop a new information system by measuring non-financial variables together with traditional financial variables.

According to Pablos (2003, p. 68), 'The root of the intellectual capital report tradition is in Sweden. Back in 1994, the Swedish insurance company Skandia published the first intellectual capital report in the world.' This report is also referred by Sveiby (2010, p. 4), Martins (2007, p. 827), Ramos (2003, p. 142), Viedma (2000, p. 9) and Rađenović and Krstić (2017, p. 128). Fernández (2007, p. 15) also states that in the early 1990s in Sweden and USA new concepts and tools associated with knowledge and IC management appeared, at the level of business management literature. In fact, modern development of IC research was made mainly by Brooking (1996), Sveiby (1997a; 1997b), Edvinsson and Malone (1997), and Stewart (1997) producing scientific texts and studies with practical application, especially in business area, and whose books published popularized the concept of IC. Despite

this intense research on the 1990s, according to Serrano and Fialho (2003, p. 112) and Khalique et al. (2011, p. 343), the concept of IC was first introduced in 1969 by the economist John Kenneth Galbraith.

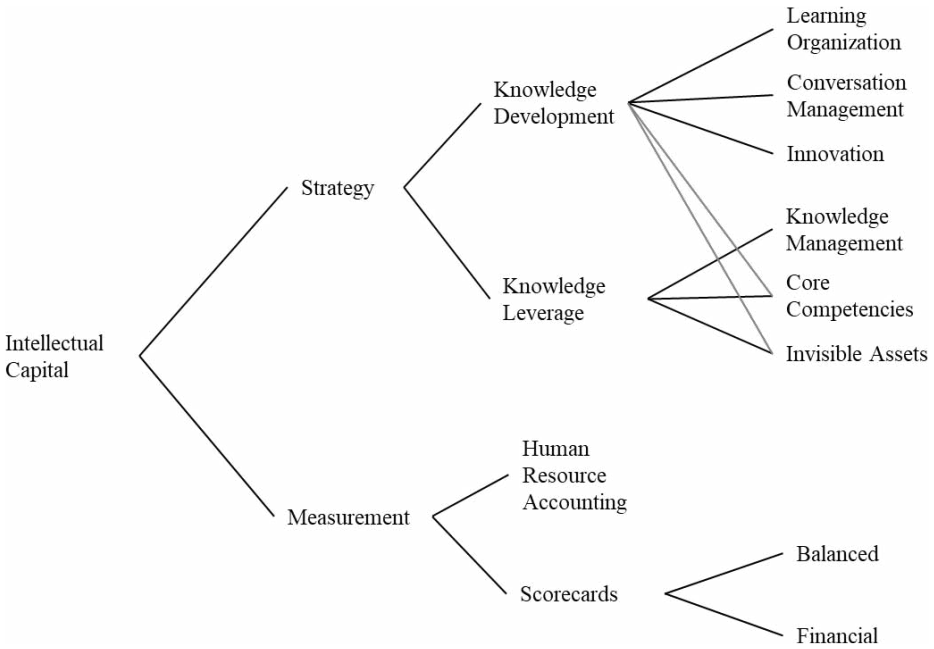



Figure 1. Conceptual roots of IC

S o u r c e: Roos et al., 1997, p. 15.

For Choo and Bontis (2002, p. 15) research on IC has taken different approaches by different areas such as accounting, strategic management, human resources, finance. The different approaches have led to various designations, for example the terms 'intellectual capital' and 'intangible capital' are used interchangeably, 'Economists call them knowledge capital, management experts refer to them as intellectual capital, and accountants call them intangible capital or intellectual capital' (Kavida and Sivakoumar, 2009, p. 56).

There seems to be no single IC definition that can be generally accepted. 'It is difficult to define IC due to its invisible and dynamic nature' (Zhou and Fink, 2003, p. 37). Despite this, many definitions depart from the idea that the IC is based on a set of intangible assets related to the existing knowledge in organizations. Kavida and Sivakoumar (2009, p. 56) corroborate this idea by pointing out that in knowledge-based industries intellectual property is the most valuable capital, so IC is the manifestation of collective knowledge, ideas, innovation and wisdom of a company's employees. They refer that 'Intangible capital is a generic term used in describing the invisible capital of a firm that generates value for it. Intangible capital, in its evolving forms, is commonly referred to as intellectual capital or knowledge capital or intellectual assets' (Kavida and Sivakoumar, 2009, p. 56). Also for Viedma (2000, p. 7) intan-

gible assets have their origin in the knowledge, skills, values and attitudes of people who are a part of a stable core of the company. 'These intangible assets are called intellectual capital and comprise all those tacit or explicit knowledge that generate economic value for the company' (Viedma, 2000, p. 7). Also for Martins (2007, p. 825) 'Intellectual capital is then seen as intellectual material—knowledge, information, intellectual property, experience—that can be used to create wealth.'

Another line of investigation assumes IC as the difference between the company's market value and its book value based on the fact that the reports provided by financial accounting do not fully reflect the reality of companies, since their accounting value is often below their market value because IC is not registered in the financial accounts (Pablos, 2003, p. 63; Zhou and Fink, 2003, p. 37; Fernández, 2007, p. 16; Martins, 2007, p. 823; Joia, 2009, p. 1382).

Thus, the IC concept has numerous definitions and interpretations. However, these have in common the fact that IC is a source of sustained competitive advantage, and that the value of organizations and the creation of value are associated with the use of IC.

## 2.2. Classification and components of intellectual capital

In the specialized literature there are several classifications of IC and each proposes a specific typology of intangibles, however the most common is a tripartite classification. IC is usually classified in three categories: human capital, relational capital and structural or organizational capital (Ramos, 2003, p. 139). Human capital includes knowledge, qualifications, collective competences, skills, experiences, creativity, capacity for innovation, motivation and professional training of workers in the organization. Relational capital includes value contained in the company's relationship with customers, suppliers, investors and distribution channels. Structural or organizational capital includes organizational processes and procedures, technologies, hardware, software and databases, organizational structure, brands, patents and intellectual property rights.

Ramos (2003, p. 139) also mentions that people (human capital) create the knowledge they share, use and diffuse (relational capital), which is finally institutionalized and codified by companies (structural capital). Among these categories, human and relational capital are transitory in organizations, since they do not have the permanence of structural or organizational capital, namely because they can move easily to other companies, so an important challenge in the management of IC is the transformation of human and relational capital in something more permanent as the structural capital.

Roos et al. (1997, pp. 30–31) divide IC into human capital and structural capital, differentiating them respectively between the 'thinking' and the 'non-thinking' IC, since we cannot use the same management methods for people and structural capital. They also point out that human capital is the part of the IC that is not owned by the company, while with structural capital it is (Roos et al., 1997, pp. 30, 42).

Table 1. Some classifications of IC components

| Author | Classification of IC components | Model |
|---|---|---|
| Kaplan, Norton (1992) | Customer perspective; Internal business process perspective; Learning and growth perspective | Balanced Score Card |
| Brooking (1996) | Market assets; Human-centred assets; Intellectual property assets; Infrastructure assets | The Technology Broker |
| Edvinsson, Malone (1997) | Human capital; Structural capital; Customer capital; Organizational capital; Innovation capital, Process capital | Skandia Navigator |
| Roos et al. (1997) | Human capital; Competence; Attitude, Intellectual property Structural capital; Relationships, Organization; Renewal and development | The IC distinction tree IC-Index |
| Stewart (1997) | Human capital; Structural capital; Customer capital | The elements of IC |
| Sveiby (1997) | Internal structure; External structure; Employee competence | The Intangible Assets Monitor |

S o u r c e: Author's own elaboration.

Despite generalization in the tripartite classification, various authors present some differences regarding the classification of IC components, since a generally accepted methodology to classify IC has not yet been reached. However, it is more a matter of terminology or a way of aggregating the elements than proper differences between concepts (Ramos, 2003, p. 140). So despite the different terminologies presented, some parallels can be established. Table 1 presents a comparison of classifications suggested by some of the first and most well-known investigations.

## 2.3. Models for measuring and managing intellectual capital

Most models that were developed to measure IC and knowledge assets appeared in the business scope, in areas such as accounting, economics, human resources, intellectual property (Malhotra, 2003, p. 6). They assume that financial indicators are necessary but insufficient in analyzing the performance of an organization, so the IC indicators should complement the financial ones, allowing looking for explanations for the present and future results of the organizations. Despite this common assumption, models present differences in the priority given to evaluation and measurement of IC components. Sveiby (2010, p. 3) presents the following four categories of measurement approaches for the classification of the main models:

– D i r e c t I n t e l l e c t u a l C a p i t a l M e t h o d s (DIC)—estimate the monetary value of intangible assets by identifying its various components and, once these components are identified, they can be directly evaluated, either individually or as an aggregated coefficient;
– M a r k e t C a p i t a l i z a t i o n M e t h o d s (MCM)—calculate the difference between the company's market capitalization and its stockholders' equity as the value of its IC or intangible assets;

– Return on Assets Methods (ROA)—average pre-tax earnings of a company for a period of time are divided by the average tangible assets of the company, the result is a company ROA that is then compared with its industry average; then the difference is multiplied by the company's average tangible assets to calculate average annual earnings from the intangibles; then dividing the above-average earnings by the company's average cost of capital or an interest rate, one can obtain an estimate of the value of its intangible assets or IC;
– Scorecard Methods (SC)—the various components of intangible assets or IC are identified and indicators and indices are generated and reported in scorecards or as graphs; these methods are similar to DIC but expecting that no estimate is made of the monetary value of the intangible assets; and a composite index may or may not be produced.

Sveiby (2010, p. 3) also refers that methods offer different advantages, as for example ROA and MCM methods are useful in merger and acquisition situations and for stock market valuations, because they are methods that offer monetary valuations. They can be used in comparisons between companies within the same industry and are good for illustrating the financial value of intangible assets because they are constructed basing on long established accounting rules. Its disadvantages are in the translation of everything in monetary terms, which can make the analysis superficial and insufficient, and in addition some of these methods are of no use for non-profit organizations, internal departments and public sector organizations—such is the case of MCM.

On the other hand, it is also mentioned that the DIC and SC methods can easily be applied at any level in an organization, they can allow a better diagnosis of an organization because of the fact that they do not need to measure in financial terms, makes them useful in non-profit organizations, internal departments and public sector organizations and for environmental and social purposes. Their disadvantages are that the indicators are contextual and have to be customized for each organization and each purpose, which makes comparisons difficult, on the other hand—they are not easily accepted by managers and companies who are used to see everything from a financial perspective (Sveiby, 2010, p. 3).

To Sveiby (2010, p. 4), no method can fulfil all purposes and one must select the method depending on the purpose, situation and audience. In Figure 2 Sveiby (2010, p. 4) presents the main models for measuring intangible assets and IC.

Numerous studies have been conducted in search for methodologies to improve intellectual capital management. The diversity of models developed is due to the very intangible nature of these assets and, especially in each specific business, have its particular combination of key knowledge of success in function of the objectives to be achieved and the market situation (Viedma, 2000, p. 8).

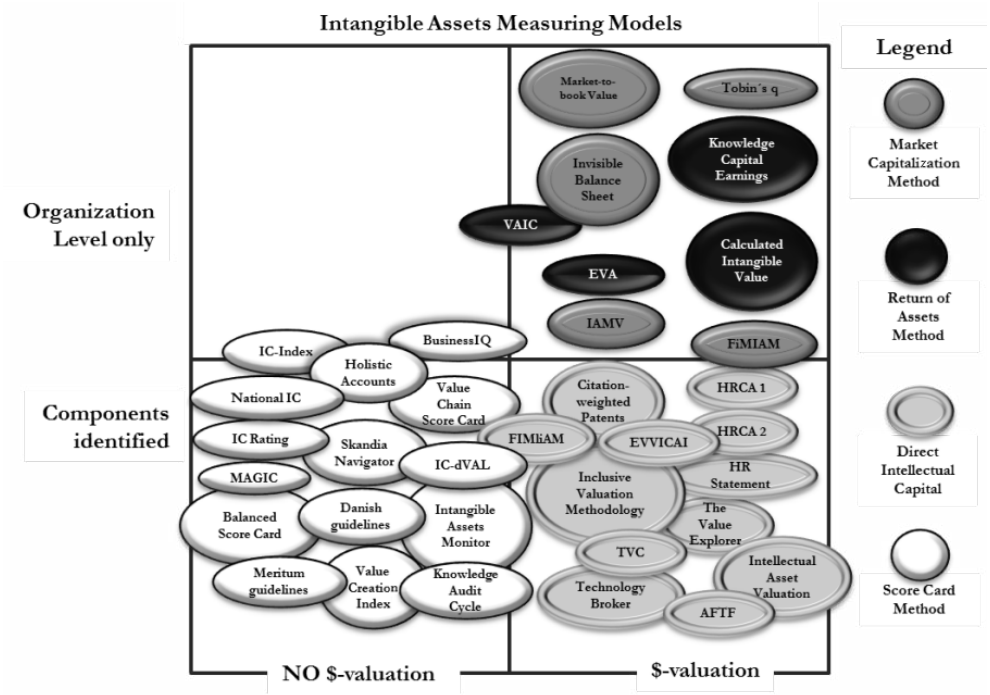



Figure 2. Intangible assets measuring models

S o u r c e: Adapted from Sveiby, 2010, p. 4.

It is possible to find a multiplicity of intellectual capital management methodologies especially coming from the business area where the first models were produced. Some popular models of intellectual capital management are the following examples: Balanced Scorecard (Kaplan and Norton, 1992), Skandia Navigator (Edvinsson and Malone, 1997), The Intangible Assets Monitor (Sveiby, 1997a), among others. However, it is also possible to observe some other research paths with the application of the concept to the public sector management (Cinca et al., 2001; Queiroz, 2003; Queiroz et al., 2005; Hyrkäs et al., 2009; Joia, 2009), to the territories management (Viedma, 2003; Andriessen and Stam, 2004; Bontis, 2004; Sánchez Medina et al., 2007; Rybinski, 2009), and to digital networks management (Tapscott et al., 2000; Terra and Gordon, 2002; Ruta, 2009; Liu, 2009; Liu and Chen, 2009; Chen, 2011; Bailoa, 2015; 2016).

## 3. The strategic management of intellectual capital

### 3.1. Intellectual capital and competitive advantage

If we take into account that the current context of more competitive markets requires that businesses have to innovate permanently, then the source of sustained competitive advantage of companies operating in knowledge economy is to achieve a proper management of their

IC. Several authors defend and recognize it as a strategic and decisive resource in the creation of value, as a way to face dynamic environments, and as a source of sustained competitive advantages that allows to differentiate the organization from the rest, among them: Viedma, 2000, p. 8; Pablos, 2003, p. 63; Serrano and Fialho, 2003, p. 113; Zhou and Fink, 2003, p. 38; Kraemer, 2004, p. 1; Nadai and Calado, 2005, p. 1; Souza et al., 2008, p. 6; Matos and Lopes, 2008, p. 234; Kavida and Sivakoumar, 2009, p. 55; Ruta, 2009, p. 562; Liu and Chen, 2009, p. 9416; Chen, 2011, p. 3592; Matos, 2013, p. 339; Gogan, 2014, p. 194; Nuryaman, 2015, p. 297; Todericiu and Şerban, 2015, p. 713; Gogan et al., 2016, p. 194; Rađenović and Krstić, 2017, p. 128, 131.

According to Serrano and Fialho (2003, p. 114), competitive advantage requires respect for the following criteria: add value, scarcity or rarity, difficult or imperfectly imitable and difficult to replace. IC seems to fit perfectly in these criteria. To reinforce this idea, Rađenović and Krstić (2017, p. 131) indicate that the characteristics of IC, as a valuable knowledge-based resource, are: IC is valuable, rare, imperfectly imitable and non-substitutable; IC is communicable to others; and components of IC are both distinctive and comprehensive. These authors consider that because of these characteristics, IC can be transformed in the competitive advantage of the firm (Rađenović and Krstić, 2017, p. 131).

Nonaka and Takeuchi (1995, p. 6) also point out that continuous innovation leads companies to competitive advantage and that focus must be given to knowledge as a competitive resource. IC and knowledge generate economic value when the flow of new ideas is marketed in the form of innovative products, processes, services and forms of organization, and in the ability to maintain this innovation, the sustained competitive advantage. To Rađenović and Krstić (2017, p. 128) a firm to achieve competitive advantage must create superior value for its customers in comparison with its competitors, and the capacity to do that depends on its resources, and the authors also refer that the 'Utilization of knowledge-based resources creates value that can be manifested as human capital, innovations, patents etc.' (Rađenović and Krstić, 2017, p. 129). Edvinsson et al. (2004, p. 42) argue that from a commercial point of view, for shareholders the value is in the company capacity for continuous innovation and the development of new products and services. These authors summarize the innovation formula as the sum of the re-use of existing ideas and knowledge combined with new knowledge as inventions and then market and capitalize those (Edvinsson et al., 2004, p. 42). For Fernández (2007, p. 19) the impact that knowledge has on tangible results is indirect, it is revealed from cause-and-effect relationships, that is, its value only becomes real when it becomes a tangible value. In fact, the utility in managing knowledge and IC is demonstrated when these intangibles become new products, services and processes. 'This means that in all organizational processes it will be necessary to incorporate IC and throughout the organization to make each individual an innovator, and therefore the core of the innovation process, the management of intellectual capital' (Matos and Lopes, 2008, p. 234).

### 3.2. Knowledge management versus intellectual capital management

In literature the terms: IC, knowledge, intangible assets, among others, are used interchangeably. It is difficult to establish limits for how they are used and defined by the authors

since the distinction between these concepts is not always easy to be done because they have common fields. For Roos et al. (1997, p. 24) while knowledge is a part of IC, this one is much more than just knowledge, for example it should consider brands, patents and external relations that companies hold with distributors, suppliers and customers, dimensions that allow to create value to the organization. In a similar way, in this work, IC can be assumed as a more comprehensive concept where knowledge is included, among other elements.

At the same time, knowledge management (KM) and intellectual capital management (ICM) are concepts that sometimes are confused and whose contents overlap in some way. To Serrano and Fialho (2003, p. 127) and Kraemer (2004, p. 3) KM is a strategy to transform and accumulate intellectual assets that will allow greater productivity, competitiveness and better results. According to Viedma (2000, p. 11), there are essential differences of approach between ICM and KM. ICM focuses on creating, obtaining and effectively managing all the intellectual assets necessary to achieve corporate objectives and successfully developing its strategies; it is intellectual asset management of a strategic point of view. KM refers to the tactical and operational aspects, it is more detailed and focuses on facilitating and managing knowledge-related activities such as their creation, capture, transformation and use, consists of planning, setting in motion, operating and controlling all activities and programmes related to knowledge (Viedma, 2000, p. 11). To Souza et al. (2008, p. 7) KM is not only at the operational level, but at the strategic level, it is a broad function that encompasses a multitude of activities, processes and approaches, in an effort that must begin in the company's strategic managers and must understand the entire structure, culture and practices of the organization.

Also to Zhou and Fink (2003, p. 39), KM and ICM serve different purposes, but have similarities and also complement each other by having important overlaps. KM and ICM present in common the scope of broad action and that covers the whole set of intellectual activities within the organization. They present different objectives because ICM is considered at the top management and strategic management level, focuses on extraction and creation of value, its objective is to create and develop intellectual assets and increase the value of the company by building capacities from a strategic perspective. KM is considered at the tactical and operational level, focusing on activities that facilitate creation, capture, transformation and use of knowledge. It plays an important role in development and exploitation of IC and its elements, creating an environment conducive to its growth and maximization, promoting a smarter organization (Zhou and Fink, 2003, p. 39). According to Zhou and Fink (2003, p. 39), the relationship between IC and KM is of vital importance to an organization (Figure 3). ICM and KM should be linked to achieve added value and must be made to work together by aligning KM processes with individual IC elements because this linkage allows a proper use of IC, becoming the central resource for sustainable competitiveness. Therefore, KM plays an important role in the process of IC development and exploitation, focusing on facilitating and managing knowledge-related activities, and strives to create a knowledge friendly environment in which IC will grow.

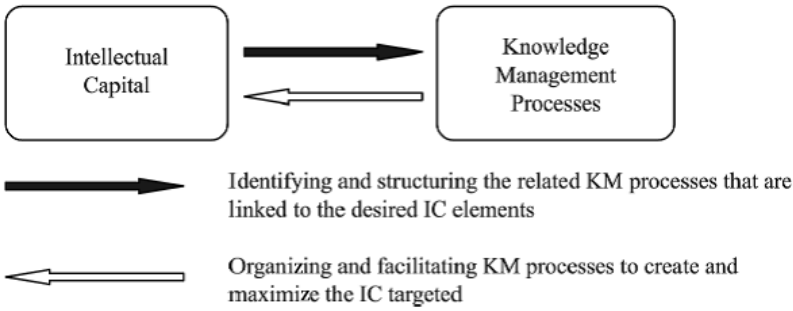



Figure 3. The relationship between IC and KM

S o u r c e: Zhou and Fink, 2003, p. 40.

KM and ICM activities should be defined according to the strategic needs of the company, dependent on their priorities, and should involve the entire organization, thus, linking IC with the strategic organizational objectives ensures that the company derives competitive advantages from IC and KM (Zhou and Fink, 2003, p. 42). Thus, and beyond the conceptual differences, what is retained is that both activities are considered essential tools for strategic management.

### 3.3. Challenges and directions for strategic intellectual capital management

The context of the knowledge economy has brought new strategic implications and challenges to organizations. Fernández (2007, p. 15) explains that there were times when competitive advantage of organizations came from strategies such as: cost leadership (produce at lower costs than competitors raising sales volume), differentiation (positioning itself in the market with different products from the competition) or segmentation (focusing on a certain market, a certain profile of consumers, etc.). However, today the sustained competitive advantage indicated by most researchers stems from the proper management of IC, assuming a change in the way management and strategies are conceived.

Each author in each temporal context has contributed to a better conception of the strategy. Fernández (2007, p. 22) synthesizes three contemporary paradigms of the strategy referring the passage of the economic paradigm, inspired by the industrial economy, where we find well known authors of the strategic management like Ansoff or Porter, to the information paradigm, where we find for example Nonaka, Drucker and Mintzberg, and later to the systemic or learning paradigm, where stands out Senge and the concept of the Learning Organization. Mintzberg et al. (1998) even come to categorize the different views of strategy in ten schools of strategic thinking. Fernández (2007, p. 22) argues that the most recent research demonstrates the need to use new approaches and tools of strategic direction, then strategies to create value these days must move from managing tangible assets to strategies based on KM, managers must understand the importance of knowledge as the primary source of sustained competitive advantage and must change the way they conceive organizational strategy, incorporating key intangible assets such as skills, organizational learning, customer relationships, and innovation, among others.

Indeed, there are several researches that emphasize the need to adopt a more strategic stance in ICM. According to Viedma (2000, p. 5), the starting point for the formulation of the strategy is to identify and value the capacities and resources that are decisive for the company, classifying the resources in tangible and intangible, corresponding the intangible ones to IC (Figure 4).

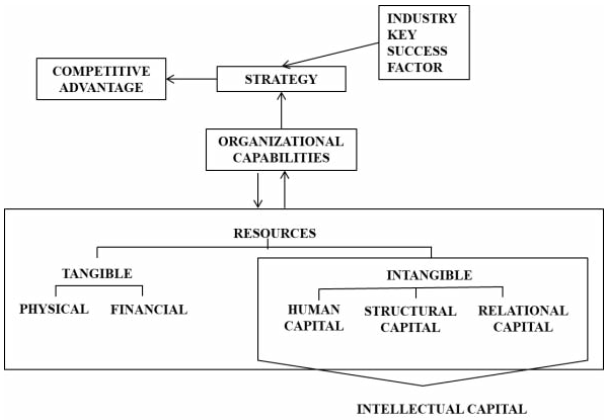



Figure 4. Fundamental relations between resources, capabilities and competitive advantage

S o u r c e: Viedma, 2000, p. 6.

For Roos et al. (1997, p. 62), '… an IC system is good only if it is based on the strategic identity of the company.' Roos et al. (1997, p. 62) developed a measurement and management model of IC (Figure 5) whose basic essence begins in the company's strategy and follows some important phases: understand what the company is and what it wants to be, which means rethinking its mission and translating it into more quantifiable terms; once the identity and long-term objectives are clarified, they should be used as guidelines to identify critical success factors; critical success factors should give rise to indicators; the information flowing from individual measures should then be collected in different IC categories.

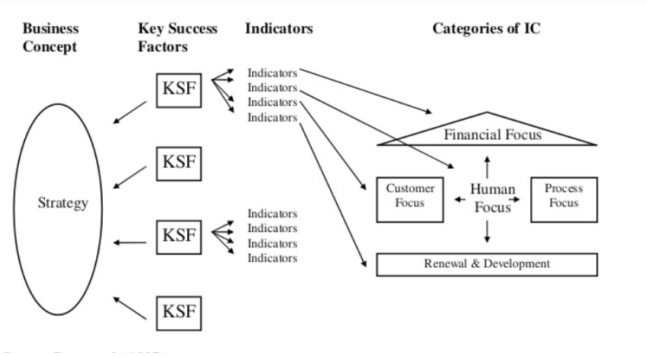



Figure 5. The process model

S o u r c e: Roos et al., 1997, p. 63.

Some authors emphasize the importance of measuring IC to improve its management. Kavida and Sivakoumar (2009, p. 58) state that the key issue for using IC as a strategic tool lies in its measurement because what can be measured can be managed and, therefore, IC measurement is a prerequisite for its management, presenting some reasons that justify its measurement, both externally and internally. At the external level, an IC analysis could provide stakeholders with more realistic information about the company's current situation and its future potential where IC reports should supplement traditional financial reports but for this the indicators should be held somewhat stable and are comparable among different companies (Kavida and Sivakoumar, 2009, p. 58). At the internal level, IC is an important management tool to improve the performance of a company, allowing to add value in assisting in strategic choices, analyzing changes both internally and externally, resource allocation, and motivation of employees. It is something that must be properly incorporated into the philosophy, culture, and vision of the firm, however, it must be realized that not all information can be disclosed (Kavida and Sivakoumar, 2009, p. 59).

Souza et al. (2008, p. 11) point out that measuring knowledge requires clear techniques to identify a set of appropriate indicators that can interconnect people, strategy and performance, providing objective bases for decision making. For Fernández (2007, p. 20) the measurement of intangible assets is a challenge that involves the concentration of efforts in several phases: to determine the variables that must be measured; define correct indicators capable of reflecting the value of the selected variables; determine how they will be presented both internally and externally. Also Kraemer (2004, p. 5) argues that the information that results from the evaluation of IC is useful for managers, since they enable them: systematization of information; identification and measurement of financial and non-financial indicators; get details about the competencies of the professionals, know the revenue generators of the organization; provide help in making decisions about staff, investments, and customers.

For Kaplan and Norton (2001, p. 12) the problem goes beyond measurement, that is, strategies as a sustained way of creating value for organizations are changing, but the tools for managing strategies have lagged behind this evolution. Companies face problems in trying to implement knowledge-based strategies that exploit intangible assets due to the lack of adequate tools. According to Kaplan and Norton (2001, p. 12), an economy where intangible assets have become the main source of competitive advantage requires tools that describe knowledge-based assets and value-creating strategies built from those assets. To these authors, the methodology created by them, the Balanced Scorecard, as an important tool in the definition and implementation of the organizational strategy, is a management system designed to manage the strategy presenting three different dimensions (Kaplan and Norton, 2001, pp. 17–18): 1. Strategy—main item of the organizational agenda; 2. Focus—all the resources and activities of the organization align with the strategy; 3. Organization—mobilization and participation of all elements of the organization.

For Fleury and Oliveira (2001, p. 141) the strategic implications of managing knowledge lie in three main points about the intrinsic nature of knowledge that are relevant to strategic action: 1. The definition of what knowledge is really worth developing by the company; 2. How companies can share the knowledge that will sustain their advantage; 3. The ways in which the knowledge that constitutes the company's advantage can be protected.

Some authors have expressed concern about developing methodologies and frameworks for strategic ICM. Zhou and Fink (2003, p. 42) presented a theoretical model, the *ICW—Intellectual Capital Web*—a systematic way of managing and measuring knowledge processes for the purpose of creating and maximizing IC (Figure 6).

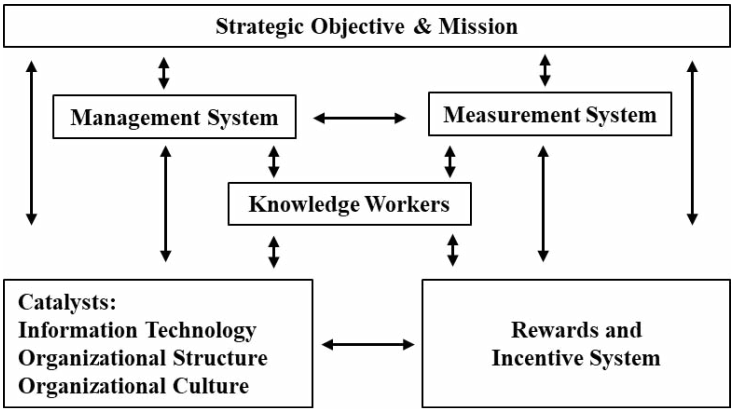



Figure 6. Intellectual capital Web

S o u r c e: Zhou and Fink, 2003, p. 41.

The ICW comprises of six elements: organizational strategic objective, management system, measurement system, knowledge workers, catalysts, and rewards and incentive system. The strategic objective guides the direction of the organization and indicates what kinds of IC are important to develop and maximize for the firm's growth and success. The purpose to link IC with organizational strategic objective is to ensure that the firm gets competitive advantages from its IC. After the IC elements that are crucial to the business have been identified and classified, organizations can then align KM activities with IC elements, that is, the guidelines for the formulation of the KM strategy (Zhou and Fink, 2003, p. 42). At the centre of the model there are the knowledge workers whose management implies stimulating and promoting behaviours of knowledge creation and sharing; KM systems include formal and informal activities and processes for acquiring, encoding, storing and distributing knowledge organized in a network so that they can reach the whole organization; and measurement systems are essential because they provide metrics to measure the effectiveness of management processes, provide feedback for management (Zhou and Fink, 2003, p. 44). The catalysts include information technology, organizational structure and culture, which are tools that facilitate the storage, transfer and sharing of knowledge, they are also the support in the creation of an environment conducive to generation and sharing that allows learning and open communication; and finally, rewards and incentive systems are a key element in motivating behaviours conducive to the creation of a knowledge-sharing culture (Zhou and Fink, 2003, pp. 44–45).

Choo and Bontis (2002, p. 16) also present a framework for strategic management of knowledge and IC consisting of the following elements: 1. Organizational processes of knowledge; 2. Locus of knowing/ learning; 3. Types of IC; 4. Strategic levers. This model can be seen in Figure 7.

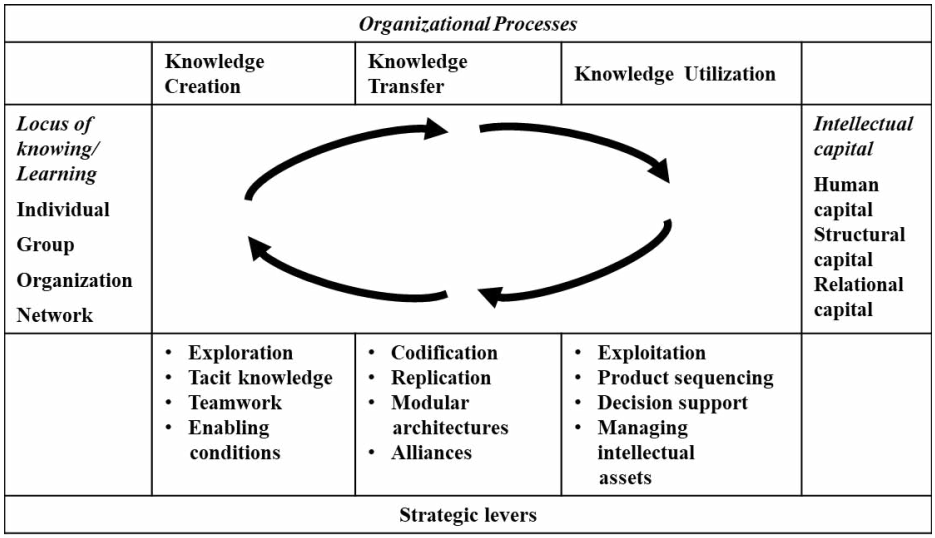



Figure 7. A framework for strategic knowledge management

S o u r c e: Choo and Bontis, 2002, p. 16.

According to Choo and Bontis (2002, p. 16), a company generates value from knowledge through organizational processes that include its creation, transfer and use in the production of goods and services, and also in the production of new knowledge. Over time the company accumulates a stock of knowledge and skills that are unique given their learning and experience which consists of its IC. This includes human, structural, and relational capital that resides in its workers, routines, intellectual property, and relationships with customers, suppliers, distributors, and partners. This stock is continually renewed through new learning at various levels: individual, group work, organization, and network of organizations of which the company is a part.

Choo and Bontis (2002, pp. 17–18) also argue that there is no universal recipe for a company to define a knowledge-based strategy, each organization must design its responsibilities and initiatives based on their aspirations, learning and abilities, conditions molded either by the conditions of the industry, the surrounding general environment, as well as the whole path or the trajectory that the organization has fulfilled. The authors acknowledge that companies to have success need different types of knowledge, sometimes knowledge to develop products, knowledge about customers and competitors to identify markets, knowledge to coordinate and integrate the flow of resources that they use, and knowledge about how to renew their IC and their essential capabilities. They also recognize that a knowledge-based strategy is a responsibility that links the specific characteristics of a company to the contingencies of the environment in which it operates and that in an increasingly dynamic and complex world, companies will need agility and the ability to embrace what would traditionally be seen as opportunities, for example sharing and protecting knowledge, managing stocks and flows of IC (Choo and Bontis, 2002, pp. 17–18).

## 4. Conclusions

The topic addressed in this article was intended to be a reflection about the importance of strategic management of intangible assets of an organization as a source to obtain sustained competitive advantages. In increasingly competitive environments associated with the current scenario of globalization, where the cycle of life of products and services decreases, and where its demand is increasingly informed, the survival of organizations is associated with continuous innovation. IC creates value and wealth for the organizations when it is transformed and allows new productions including the one of the own knowledge. Thus, the strategic management of IC can allow creating new knowledge, to disseminate it and to quickly incorporate it into new processes and products. For these reasons, in the knowledge economy, IC has become the strategic resource for organizations that compete in dynamic environments.

Despite the fact that the concept of IC has been object of many definitions and interpretations, it is generally associated to a set of unique intangible assets (knowledge, information, creativity, competences and skills of workers, trademarks, customer satisfaction, marketing, and quality, among others) that create value and competitive advantages to organizations. And it is usually classified in three main categories, such as human capital, structural capital and relational capital. On the other hand, the different perspectives and methodologies to manage IC reveal some tension in the approaches and some lack of consensus on how the various components of IC are defined and measured. It is necessary to recognize that indeed there have been efforts coming from several areas of research that aim to contribute to better understand the usefulness of using, measuring and managing knowledge and IC, however, it is verified that there are not yet universally accepted definitions or methodologies.

The fact that IC is not recorded in the financial and accounting reports shows that traditional measurement systems are not designed to deal with the complexity of IC, whose value is difficult to determine and is strongly influenced by the context in which it exists in an organization. Thus, IC often ends up being defined as the difference between the market value of a company and its book value. This difficulty in determining this value, or its importance in an organization, has multiplied the measurement models of this asset, appearing models almost for all tastes, some that transform it even into monetary values, and others that are based on the construction of a set of indicators for its better strategic management, among other perspectives.

Where there seems to be consensus among multiple authors, that is on recognizing that IC is the strategic resource of organizations, the one capable of allowing bringing the desired sustained competitive advantages. It is from this recognition that KM and ICM concepts have emerged. Both concepts seem to complement each other. Some authors associate KM more with tactical and operational management aspects related to the creation, diffusion and sharing of knowledge, and ICM is more associated with strategic management aspects, linked to effectively managing all the intellectual assets essential to achieve the objectives of organizations. ICM seems to be about the ability to extract the maximum value of an organization's IC, that is, in an appropriate and profitable way, stimulating behaviours and environments that foster innovation and the transformation of new ideas into products, services or pro-

cesses in a continued manner that will allow that the competitive advantage can be sustained, that is, lasting. The different perspectives on ICM also reveal that there is no generally accepted recipe. However, there are aspects that most authors argue as to rethink the organization's mission and to clarify long-term goals that allow identifying critical success factors; to identify IC elements that are crucial to the organization's growth and success; to align ICM and KM activities and processes with the key IC elements (activities to maximize the value of IC) and also with strategic needs and strategic objectives; to use ICM tools/ methodologies and appropriate indicators to provide information on the different IC categories; to align the organization with the strategy and make it a participatory process, among other aspects mentioned.

Thus, if, on the one hand, managing IC in an adequately way does not seem to be able to do with traditional models, requiring rethinking and renewing of a whole set of concepts and principles, on the other hand, the multiplicity of methodologies and the fact that there is no generally accepted tool create some difficulties in choosing the procedures to be followed in the definition of an ICM strategy. Anyway, the most important is to realize that priority must be given to the level of IC strategic management and to do that, the formulation, execution and evaluation of the strategy must be based on new tools that allow maximizing the value of IC. Therefore, in the knowledge economy, the strategic management of IC seems to be a very significant challenge for organizations.

As a final note, it is considered that in general the objective of the present work were achieved, the elements that were initially foreseen were developed, and the main aspects in relation to the strategic management of IC were analyzed and discussed. The developed analysis allowed deepening the knowledge and better understanding of the thematics—nevertheless, it must be emphasized that the extension of the theme allows to realize that it has not been exhausted in this reflection.

## References

Andriessen, D., Stam, C. (2004). *The intellectual capital of the European Union: Measuring the Lisbon agenda Version 2004* [online, accessed: 2017-10-23]. Centre for Research in Intellectual Capital; Inholland University of professional education; de Baak—Management Centre VNO-NCW. Retrieved from: https://www.bvekennis.nl/Bibliotheek/05-0048_Measuring_Lisbon_agenda.pdf.

Bailoa, S. (2015). Analyzing digital capital of Portuguese local governments websites. *The Małopolska School of Economics in Tarnów Research Papers Collection*, *28* (4), 27–45.

Bailoa, S. (2016). Merging digital capital and digital governance: A framework for local government websites. *The Małopolska School of Economics in Tarnów Research Papers Collection*, *32* (4), 25–43.

Bontis, N. (2004). National intellectual capital index: A United Nations initiative for the Arab region. *Journal of Intellectual Capital*, *5* (1), 13–39.

Brooking, A. (1996). *Intellectual capital: Core assets for the third millennium enterprise*. London: International Thomson Business Press. ISBN 1861524080.

Chen, S. (2011). Exploring digital capital of automated cargo clearance business websites. *Expert Systems with Applications*, *38*, 3590–3599.

Choo, C., Bontis, N. (2002). *The strategic management of intellectual capital and organizational knowledge*. Oxford: Oxford University Press. ISBN 019513866X.

Drucker, P. (1993). *Post-capitalist society*. New York: HarperCollins. ISBN 0887306209.

Edvinsson, L., Malone, M. (1997). *Intellectual capital. Realizing your company's true value by finding its hidden brainpower*. New York: Harper Business. ISBN 0887308414.

Edvinsson, L., Dvir, R., Roth, N., Pasher, E. (2004). Innovations: The new unit of analysis in the knowledge era. The quest and context for innovation efficiency and management of IC. *Journal of Intellectual Capital*, *5* (1), 40–58.

Fernández, R. (2007). La dirección estratégica en la sociedad del conocimiento. Parte I. El cuadro de mando integral como herramienta para la gestión. *ACIMED*, *15* (6). Ciudad de La Habana.

Fleury, M., Oliveira, M. (2001). *Gestão estratégica do conhecimento: integrando aprendizagem, conhecimento e competências*. São Paulo: Editora Atlas. ISBN 9788522429097.

Gogan, M. (2014). An innovative model for measuring intellectual capital. *Procedia. Social and Behavioral Sciences*, *124*, 194–199.

Gogan, M., Artene, A., Sarca, I., Draghici, A. (2016). The impact of intellectual capital on organizational performance. *Procedia. Social and Behavioral Sciences*, *221*, 194–202.

Hyrkäs, E., Kianto, A., Rings M. (2009). IC as a developmental tool for municipalities. *Proceedings of the European Conference on Intellectual Capital*, Inholland University of Applied Sciences, Haarlem, The Netherlands, 28–29 April 2009, pp. 263–270.

Joia, L. (2009). Governo eletrônico e capital intelectual nas organizações públicas. *Revista de Administração Pública*, Rio de Janeiro, *43* (6), 1379–1405.

Khalique, M., Shaari, J., Isa, A. (2011). Intellectual capital and its major components. *International Journal of Current Research*, *33* (6), 343–347.

Kaplan, R., Norton, D. (1992). The balanced scorecard measures that drive performance. *Harvard Business Review*. January–February, 71–79.

Kaplan, R., Norton, D. (2001). *Organização orientada para a estratégia: como as empresas que adoptam o Balanced Scorecard prosperam no novo ambiente de negócios*. Rio de Janeiro: Editora Campus. ISBN 9788535207095.

Kavida, V., Sivakoumar, N. (2009). Intellectual capital: A strategic management perspective. *The IUP Journal of Knowledge Management*, *7* (5–6), 55–69.

Kraemer, M. (2004). *Capital intelectual: A nova vantagem competitiva* [online, accessed: 2017-09-10]. Retrieved from: http://www.gestiopolis.com/recursos3/docs/ger/capintel.htm#mas-autor.

Liu, C. (2009). Developing measures and prioritizing digital capital of real estate websites. *Proceeding of: 2009 WRI World Congress on Computer Science and Information Engineering*, *1*, 508–511.

Liu, C., Chen, S. (2009). Prioritization of digital capital measures in recruiting website for the National Armed Forces. *Expert Systems with Applications*, *36* (5), 9415–9421.

Malhotra, Y. (2003). *Measuring knowledge assets of a nation: Knowledge systems for development* [online, accessed: 2017-10-23]. Research Paper prepared for the Invited Keynote Presentation to be delivered at the United Nations Advisory Meeting of the Department of Economic and Social Affairs Division for Public Administration and Development Management. Retrieved from: http://unpan1.un.org/intradoc/groups/public/documents/un/unpan011601.pdf.

Martins, J. (2007). Capital intelectual, Uma análise exploratória: A realidade Portuguesa. *Ayala Calvo, J. C. y grupo de investigación FEDRA*, pp. 822–837.

Matos, F. (2013). A theoretical model for the report of intellectual capital. *The Electronic Journal of Knowledge Management*, *11* (4), 339–360.

Matos, F., Lopes, A. (2008). Gestão do capital intelectual: A nova vantagem competitiva das organizações. *Comportamento Organizacional E Gestão*, *14* (2), 233–245.

Mintzberg, H., Ahlstrand, B., Lampel, J. (1998). *Strategy Safari: A guided tour through the wilds of strategic management*. London: Prentice Hall. ISBN 0136956777.

Nadai, F., Calado, L. (2005). O conhecimento como recurso estratégico: Caracterizando uma organização intensiva em conhecimento (OIC). *VIII SEMEAD, seminários em Administração FEA_USP*, 11 e 12 Agosto, 2005.

Nonaka, I., Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. New York and Oxford: Oxford University Press. ISBN 0195092694.

Nuryaman (2015). The influence of intellectual capital on the firm's value with the financial performance as intervening variable. *Procedia. Social and Behavioral Sciences*, *211*, 292–298.

Oliveira, L. (2000). A medida e gestão do capital intelectual: o desafio da era do conhecimento [online, accessed 2017-10-23]. *Comunicación presentada en el I Encuentro Iberoamericano de Contabilidad de Gestión*, Valencia, Noviembre 2000. Retrieved from: http://www.observatorio-iberoamericano.org/pai-

ses/Spain/Art%C3%ADculos%20diversos%20sobre%20Contabilidad%20de%20Gesti%C3%B3n/I%20Encuentro%20Iberoamericano%20Cont.%20Gesti%C3%B3n/Gesti%C3%B3n%20del%20Conocimiento/LidiaCAlves.pdf.

Pablos, P. (2003). Intellectual capital reporting in Spain: A comparative view. *Journal of Intellectual Capital*, *4* (1), 61–81.

Pike, S., Fernström, L., Roos, G. (2005). Intellectual capital: Management approach in ICS Ltd. *Journal of Intellectual Capital*, *6* (4), 489–509.

Queiroz, A. (2003). *La medición del capital intelectual en el sector público*. Zaragoza, 373 p. Tese doutorado, Universidad de Zaragoza, Faculdade de Ciencias Económicas y Empresariales. Orientadora: Lourdes Torres Pradas.

Queiroz, A., Callén, Y., Cinca, C. (2005). Reflexiones en torno a la aplicación del capital intelectual en el sector público. *Revista Española de Financiación y Contabilidad*, *34* (124), 211–245.

Rađenović, T., Krstić, B. (2017). Intellectual capital as the source of competitive advantage: The resource--based view. *Economics and Organization*, *14* (2), 127–137.

Ramos, M. (2003). De la contabilidad de los recursos humanos al capital intelectual y la gestión del conocimiento: una ampliación necesaria. *Revista de dirección, organización y administración de empresas*, *29*, 134–144.

Roos, J., Roos, G., Dragonetti, N., Edvinsson, L. (1997). *Intellectual capital: Navigating in the new business landscape*. Basingstoke: Macmillan Business. ISBN 0333694791.

Ruta, C. (2009). HR portal alignment for the creation and development of intellectual capital. *The International Journal of Human Resource Management*, *20* (3), 562–577.

Rybinski, K. (2009). From quantity to sustainable quality: Increasing intellectual capital. Can this objective guide policy development and can it be measured? *Paper prepared for the conference 'New methods for cohesion policy evaluation: promoting accountability and learning'*. Warsaw.

Sánchez Medina, A., González A., Falcón, J. (2007). Intellectual capital and sustainable development on islands: An application to the case of Gran Canaria. *Regional Studies*, *41* (4), 473–487.

Serrano, A., Fialho, C. (2003). *Gestão do Conhecimento – o novo paradigma das organizações*. Lisboa: FCA--Editora de Informática. ISBN 972-722-353-2.

Souza, E., Lima, E., Costa, S. (2008). A gestão estratégica do conhecimento: Uma abordagem fundamentada no desenvolvimento de medidas de desempenho. *IV congresso nacional de excelência em gestão Responsabilidade Socioambiental das Organizações Brasileiras Niteroi*, RJ, Brasil, 31 de julho, 01 e 02 de agosto de 2008. Retrieved from: http://www.inovarse.org/filebrowser/download/8942.

Stewart, T. (1997). *Intellectual Capital: The new wealth of organizations*. New York: Doubleday/Currency.

Sveiby, K. (1997a). The Intangible Assets Monitor. *Journal of Human Resource Costing and Accounting*, *2* (1), 73–97.

Sveiby, K. (1997b). *The new organizational wealth: Managing and measuring knowledge based assets*. San Francisco: Berrett-Koehler Publishers. ISBN 1576750140.

Sveiby, K. (2010). *Methods for measuring the intangible assets*. [online, accessed: 2017-09-13]. Retreived from: http://www.sveiby.com/files/pdf/intangiblemethods.pdf.

Tapscott, D., Ticoll, D., Lowy, A. (2000). *Digital Capital: Harnessing the power of business webs*. Boston: Harvard Business School Press.

Terra, J., Gordon, C. (2002). *Portais corporativos: A revolução na gestão do conhecimento*. 2ªedição. São Paulo: Negócio Editora. ISBN 8586014842.

Todericiu, R., Şerban, A. (2015). Intellectual Capital and its relationship with universities. *Procedia Economics and Finance*, *27*, 713–717.

Viedma, J. (2000). *La gestión del conocimiento y del capital intelectual* [online, accessed: 2013-09-26]. Fundación Iberoamericana del conocimiento. Retrieved from: http://www.gestiondelconocimiento.com/pdf-art-gc/00162viedma.pdf.

Viedma, J. (2003). CICBS: Cities' intellectual capital benchmarking system. *6th World Congress on the Management of Intellectual Capital and Innovation*, Hamilton, Ontario, Canada, January, 15–17, 2003.

Zhou, A., Fink, D. (2003). The intellectual capital web: A systematic linking of intellectual capital and knowledge management. *Journal of Intellectual Capital*, *4* (1), 34–48.

# Kapitał intelektualny – strategiczne zasoby organizacji

**Abstrakt:** Wzrost inwestycji w zasoby niematerialne oraz rozwój rynku towarów i usług opartych na wiedzy dowodzą, że aktywa, które składają się na kapitał intelektualny, są kluczem do strategicznego zarządzania organizacjami w gospodarce opartej na wiedzy. Na coraz bardziej konkurencyjnych rynkach, gdzie koniecznością staje się ciągłe wprowadzanie innowacji, wartość produktów i usług w coraz większym stopniu zależy od ich zaawansowania technologicznego, wiedzy i inteligencji wykorzystanych do ich tworzenia. Należy zatem uznać kapitał intelektualny za zasób strategiczny organizacji, a zdolność do zarządzania nim – za kluczowy czynnik sukcesu przedsiębiorstwa. W artykule zaprezentowano znaczenie kapitału intelektualnego i zarządzania strategicznego tym kapitałem jako czynnika budującego zrównoważoną przewagę konkurencyjną organizacji.

**Słowa kluczowe:** kapitał intelektualny, zarządzanie wiedzą, zarządzanie kapitałem intelektualnym, zarządzanie strategiczne, przewaga konkurencyjna

# Perception and understanding of quality in Deming's management theory and quality process improvement in education


## Wioletta Magdalena Pacholarz

AGH University of Science and Technology in Krakow
Faculty of Management

## Dominik Bucki

Higher Theological Seminary in Sandomierz



**Abstract:** H. Grabowski (2000) defined the teacher as a specialist in human behaviour, whose work consists in intentionally motivating him to change socially desirable behaviour. The assumptions of the reform of the education system in Poland clearly define the tasks of the general school, in which it is stated that teachers should strive for a comprehensive (multidirectional) development of the pupil as the overriding goal of educational work. School education consists in the harmonious implementation of teaching, skills and education by teachers. These tasks are mutually complementary and equivalent dimensions of each teacher's work. The implementation of these tasks must be based on the basic idea of the functioning of a modern school that the student is the subject of all teachers' activities (school). The article is preliminary and it is material for future research. The 'new look' research method chosen by the authors is to give an alternative view of the described issue, which is a presentation of the broadly understood issues related to a new view of the quality of education at the level of primary and secondary schools, using the Deming method.



**Key words:** education system, quality, knowledge, Deming, management


*It's not about being better*
*but to be better than yourself.*
William Faulkner

## 1. Admission

Recent economic developments have made quality of products and services a key criterion for success. Equally important is the knowledge of the managerial staff about the potential for enhancing the results of the work, which is the result of knowledge of the theoretical and practical basis for improving the company's business. Sustainable and continuous quality improvement can only be achieved by directing organization's efforts to plan and prevent problems that arise at the source. This quality management concept is called quality assurance, where greater emphasis is placed on advanced


Correspondence to:
Wioletta Magdalena Pacholarz
Akademia Górniczo-Hutnicza im. Stanisława Staszica
Wydział Zarządzania
Katedra Ekonomii, Finansów i Zarządzania Środowiskiem
ul. Gramatyka 10
30-067 Kraków, Poland
Tel.: +48 882 801 822
E-mail: w.m.pacholarz@wp.pl

quality planning. Improving quality also requires knowledge of customer expectations. Improving the quality of school work is more than just collecting data from processes and from the customer. The study is based on the perception and understanding of quality in management theory, including the theory of W.E. Deming, trying to apply 14 principles in education. In order to be able to measure the quality of school work, a proper measuring tool should be developed to answer the hypothesis 'what is really our school.' The literature on the subject was used to present this issue, taking into account the method of a new look at the presented subject. The authors of this paper will attempt to investigate the dependence of pupils, teachers and parents on specific competences in the education process at school.

## 2. Introduction to quality issues

The origin of the issue of quality dates to the beginning of the world. In the Bible (in the Book of Genesis) in the description of the creation of the world one can find certain elements of it (*God knew that everything he did was very good*), i.e. distinguishing things better (good) and worse (bad ones). Other records on this issue can be found in the Hammurabi Code (*If a builder built a house and his work was not done permanently and the house he built collapsed and killed the owner, the builder will be punished with death*), Chinese Chronicles of Ethics (*Tools below standards cannot be marketed, cotton and silk whose quality and size do not have the required parameters, cannot be marketed*) or Phoenician legislation (*In case of re-identification of poor quality handicraft products, its makers must cut their hands*) (Ostasiewicz [ed.], 2004, p. 110). Thus, the sources of quality of goods and services should be seen in times of great civilizations such as Egyptians, Mesopotamians, Israelites, Romans, Greeks, Chinese, or even Hindus.

Literature of the subject indicates that in the era of classical Greek philosophy (5th–4th c. BC), i.e. in the second decade of the development of ancient philosophy (Plato's work), the term 'quality' first appeared. In his work *Symposium* Plato recognized that the real world was an imperfect reflection of realistically perfect ideas. According to this conviction, the author has defined 'quality' as a certain degree of perfection (objective idealism), stating that quality as beauty is a judgment expressed by the user. If there is no user, then there is no such court (Skrzypek, 2000, p. 15). Therefore, understanding quality can only be through experience, since it is the judgment, subjectively dependent on experience (Wasilewski, 1998, p. 20).

In the literature of the subject, there are many different concepts and definitions of quality. This diversity results from the view of the category and the level in which the issue of quality is considered, and thus their ordering, according to a single, precisely-accepted criterion, seems impossible. The classification of this concept according to the most common criterion, which is the domain of knowledge, is presented in Table 1 below.

Table 1. Selected quality assortments found in literature

| Type of quality improvement | Essence of quality |
|---|---|
| Philosophical | Separation of things or phenomena of certain elements that can be considered qualitatively homogeneous |
| Legal | Quality standards, contained in relevant legislation |
| Sociological | Attitude of consumers to the specific characteristics of the products |
| Humanistic | Shaping of living conditions and work conducive to the rise of culture and morality in society |

| Type of quality improvement | Essence of quality |
|---|---|
| Technical | Preferences of certain qualities of objects, in order to demonstrate optimum social and utility suitability meeting the expectations of users |
| Economic | Level of conformity of the product or service with the requirements of the customer, and these in turn result primarily from his needs, income and prices |

S o u r c e: Authors' own elaboration based on: Horbaczewski, 2006, p. 10; Oyrzanowski, 1969, p. 586; Prussak, 2006, p. 1.

When considering quality definitions, it should also be noted that the term is generally accepted where quality is (Kolman, 2009, p. 15) technical progress, machine reliability, modernity of products, and an important competitive advantage and a fundamental requirement in acquiring new markets. In view of the above, we note that quality is a concept that is not clearly defined. One of the reasons for this situation is undoubtedly that quality often depends on the context in which it is used. It seems correct to say that it is the quality of 'we are dealing with everyone and every day' (Kolman, 2009, p. 14), because it can affect, among others, the use of products, services offered, teacher qualifications, student skills. Thus, this concept is applied in various scientific fields, including the science of management.

The definitions of the concept of quality found in the literature are presented in Table 2.

Table 2. Selected quality definitions found in literature

| Source | Definition |
|---|---|
| Platon | Quality is a judgmental court that marks the degree of perfection in relation to ideas. |
| E. W. Deming | Quality is the predicted degree of homogeneity and reliability achieved at low cost and according to market requirements. |
| J. Juran | Quality is suitability for use. |
| R. Kolman | Quality is the degree to which the requirements are met. |
| W. Shewhart | Quality is a product goodness that can be applied to all products and services. |
| J. Bank | Quality is the full satisfaction of specific customer needs at minimal cost. |
| E. Skrzypek | Quality is the fulfilment of the requirements and expectations of each customer, it is the way leading to its satisfaction, and satisfaction is a very good and reliable measure of quality. |
| ISO 9000:2000 | Quality refers to the degree to which a set of inherent properties meets requirements, where „inherent" is to be understood as „inherent in itself. |
| *Little Dictionary of Polish Language* | Quality is a set of characteristics that make an object a subject, not something else. |
| T. Ansell | Quality is giving customers what they want when they want it, at the right price without making mistakes. |
| A. Piątek | Quality means higher or lower grade in the scale of the value that can be determined by comparing with the standards recommended or considered the best. |
| P. Crosby | Quality is the fulfilment of the requirements. |
| E. Kindlarski | Quality is the degree to which the product can meet the requirements of the recipient. |

S o u r c e: Authors' own elaboration based on: Hamrol, 2005, p. 19; Friday, 1994, p. 2; Gudanowska, 2010, p. 162; Skrzypek, 2002, p. 9, 15; Bank, 1997, p. 17, 94; Juran, 1982, p. 72; *Little Dictionary of Polish Language*, 1983, p. 276; Crosby, 1986, p. 99; Kolman, 2009, p. 14; Ansell, 1997, p. 2; Deming, 1982, pp. 1–2.

The above table indicates that the quality is subjective, volatile, subject to constant modifications, and interpretations of this concept are different because (Bugdol, 2008, p. 18):

a) the quality assessment depends on knowledge, experience, product demand,
b) customer requirements determine the level of product quality,
c) the concept of quality is transformed by human development and qualitative change,
d) quality is a multidimensional and interdisciplinary concept.

However, different definitions of quality, in spite of appearances, complement one another and form a coherent whole. M. Bugdol (2008, p. 18) distinguished eight fundamental definitional approaches to the notion of quality:

1) 'transcendental'—quality is something we strive for, but it is beyond our reach,
2) 'product'—quality is a set of characteristics that determine durability and functionality,
3) 'user'—quality determines the degree of ability to meet needs and expectations,
4) 'manufacturer'—quality is the degree of compliance with the specialized values defined by the projects and processes,
5) 'value'—is the difference between the benefits we derive from the purchase and use of a product and its price,
6) 'social losses'—quality occurs when the products do not contribute to social losses,
7) 'multidimensional'—quality has many characteristics, it is based on quality of service and self-evaluation models,
8) 'strategic'—quality is something that distinguishes one product from other products that are marketed by other organizations: quality is part of a strategy in which to make a profit from product's high quality.

Today science has justified problems with the systematization of the notion of quality, because 'it does not exist in itself and therefore it can only be considered in conjunction with the purpose it serves' (Olejnik and Wieczorek, 1982, p. 124). Subordination and unification of terms and naming related to quality is the subject of analysis and research of qualitative science, i.e. whose name is made up of a combination of the Latin word *qualitas* (quality) and the Greek word *lógos* (science)[1] (Bagiński, 2004, p. 11).

## 3. Development of quality activities

The first activities related to shaping, analyzing, researching or observing quality emerged in Antiquity. The ancient Egyptians, through the development of engineering, geometry and arithmetic, have initiated work on quality control. Concrete evidence of this fact survived to this day and these are precise pyramidal structures. In turn, on the one hand, an important contribution to the development of quality control is visible, especially in the sphere of mathematics, architecture, art and literature of the ancient Greeks (Ostasiewicz [ed.], 2004, p. 110). On the other hand, the greatest achievement of the Romans was probably the invention of concrete. Moreover, the Romans, through their architecture and engineering sciences, contributed quite a lot to the quality and progress of the construction of roads and bridges. Consequently, the achievements of these ancient cultures have been the foundation of the current, formalized approach to quality.

[1] This is an interdisciplinary field of knowledge dealing with all kinds of quality, whose name is made up of a combination of Latin *qualitas* (quality) and Greek *lógos* (science) (Duda, 1994, p. 80).

In the Middle Ages, when all goods were produced by small groups, even the individual developed a paradigm of controllers of the results of their work. What, in practice, meant that the performers themselves were using individualized quality standards.

In Europe, in the modern era, craft characteristics began to be grouped in order to protect the economic and social interests of craftsmanship masters, resulting in the creation of a list of quality standards for manufactured goods, or even the training and promotion of craftsmen. Craftsmanship undoubtedly influenced quality, as there was no room for any, even the smallest defects of products or services.

With the onset of industrial revolution, at the end of the nineteenth century there was a breakthrough, where the rapid development of technology and technology (analogous increase in the complexity of manufacturing processes) required the implementation of far-reaching specialization of work. Mass production has raised the demand for quality control. At that time, the era of managers overseeing the groups entrusted to them was growing (Haffer, 2003, pp. 296–297). At this point, literature of the subject distinguishes four consecutive stages of the concept of quality development, such as (Dahlgaard, Kristensen and Kanji, 2004, p. 15): quality inspection, quality control, quality assurance and quality management.

The first stage, quality inspection, dates back to 1910, when the first Ford Motor Company models came off the production line—mass production, as well as specialization and division of labour. At this stage the company began to employ trained specialists who tested finished products and compared them with the prototype, as a result of which they were rejected or not (Hamrol and Mantura, 2002, p. 92). The second stage, quality control, was initiated by the use of control charts developed by W. A. Shewhart in 1924. According to this view, it should be random (not systematically) detect and remove technology interfering factors, which will allow the production of such products that will meet the requirements set (Latzko and Saunders, 1998, p. 149). This has led to a reduction in inspection costs, as well as the development of statistical methods for controlling the process and the design of experiments. Quality control workers were also included in the quality control process and feedback was generated between the inspection results and the production line. In turn, in the early fifties came the third stage, quality assurance. Unlike the previous ones, he focused on preventing low quality rather than detecting it. This period gave an opportunity for gradual reorientation to the quality expected by consumers of a product of narrowly understood quality, referring only to the production function (Szczepańska, 2010, pp. 15–16). As a result, improved control methods have been developed by extending them to include planning, regulation and quality simulation. Quality management (Konarzewska-Gubała [ed.], 2006, pp. 19–24) is the last from the above-mentioned stages of perception of quality. This is a philosophy of organization management in which all components influence the quality of the product and the process of its manufacture. This means that it is based on work skills teamwork and commitment, self-control and continuous improvement of employees' qualifications to achieve long-term success, i.e. full customer satisfaction and, at the same time, benefits for the organization, its members and society (Konarzewska-Gubała, 2006, p. 19).

The above stages of quality perception have a different domain and at the same time they correspond to the way in which they perceive and change the perception of quality. Thus, all the implications in the various stages of this development bring down the conclusion that the

quality understood comprehensively relates to the product or service, as well as to all organizational processes that contribute to it. In addition, it is very difficult to accurately date the stages of quality development, as the countries, industries, and businesses have been different. In addition, in each subsequent stage applied solutions from earlier stages. Therefore, the above dates, which make it possible to clearly illustrate changes in the approach to quality, should be treated in a contractual manner. However, always 'the interest in quality issues on a universal scale has been dictated by the needs of the practice, mainly in the areas of manufacturing, trade and product exploitation' (Hamrol and Mantura, 2011, p. 9).

In conclusion, it should be emphasized that the further development of the quality issue from the perspective of the field of social sciences is inseparably connected with many outstanding researchers[2], especially in the disciplines of management sciences. Therefore, on the one hand, their findings, which are the result of observations and analyses, still define and prioritize research in the field of quality management. The current pro-quality trends are a reaction to the nature of the economy. On the other hand, the need to integrate the quality aspect of the company's activity, regardless of its nature (manufacturing, commercial, service or various types of business), is primarily due to its growing significance, especially in the last decade. Quality is widely recognized as the most effective weapon in the competitive fight on the domestic market, as well as the international (Ładoński and Szołtysek, 2005, p. 17), which from year to year seems to be increasingly difficult to achieve. Quality, as opposed to some of the best practices of the time, to be used in marginal ways or to fall into oblivion—is a category that permanently associates people and their activity almost in every field of life. This means that regardless of the circumstances or the specific nature of the activity, each organization in its strategy must take into account the quality that is indispensable in the process of setting objectives, plans or tasks, particularly in the organizational, economic, financial or legal sense (Ładoński and Szołtysek, 2005, p. 17). Therefore, all activities should be geared towards adapting to the current realities, which will enable us to recognize and shape the market in the future. Furthermore, given that the customer is the final verifier of the business, it is important to keep an eye on it and respond to dynamically changing needs and requirements. Hence, 'the inclusion of quality in an organization's business results from the fact that: quality is not an end in itself but a means of establishing a system that will provide value to the customer in a comprehensive way. Companies treat quality as a new parameter in the priceless strategies of competition, and that so far is applied. In enterprises, product orientation or marketing is replaced by market orientation' (Szczepańska, 2010, p. 19). Moreover, the quality improvement process is characterized by continuity, and its abandonment can cause it to slip out of control. Consequently, it is necessary to postulate that quality is not left to itself, to the weave of internal and external determinants, or to the case, but to deal with it in a systemic (comprehensive) manner, covering all levels of its functioning. Consequently, we must continually strive to better identify and interpret the quality, management, and performance correlation within our market strategy.

[2] W. E. Deming, whose merits for quality management will be discussed in the next section of this publication.

## 4. Contribution of W. E. Deming in the development of quality philosophy

In the early fifties, the twentieth century began to realize the importance of quality in building competitive products in the USA. W. E. Deming (1900–1993), American lecturer, engineer, statistics, management consultant has become an important part in building quality, not only in the field of industry and economy, but as shown below also in the field of education (Przybytniowski, 2007, pp. 112–117).

W. E. Deming is known for his work in Japan after the Second World War, especially with the work of the leaders of the Japanese industry. At the end of the war, in 1947, at the invitation of General MacArthur, he left for Japan, where American professionals were to assist in the organization of the census. He was the first American specialist who methodically passed on to Japanese engineers and managers the knowledge of statistical process control (Bugdol and Jedynak, 2012, p. 164; Przybytniowski, 2014, pp. 195–204).

It is believed that W. E. Deming was one of the main inspirers of Japan's development after the Second World War and the post-war economic miracle of 1950–1963. During his lecture in 1950, he taught (http://hclectures.blogspot.com/1970/08/demings-1950-lecture-to--japanese.html, accessed: 2017-09-19): 'if modern producers want to make their company successful in the long run, they must keep the following':

1) better product design to improve service,
2) a higher level of uniform product quality,
3) improving product testing at the workplace and in research centres,
4) increase sales through global markets.

In his paper, 'New Economy of Industry, Government and Education', W. E. Deming used the experience of W. Shewhart to introduce his theory: statistical process control, operational definitions, and what W. E. Deming called the 'Shewhart Cycle' (Deming, 2012, p. 114), which evolved into the PDCA (Plan-Do-Check-Act). The PDCA spirit was derived from a scientific approach from the seventeenth century. The author's achievements do not end with the PDCA cycle alone. He has developed 14 principles that help him to understand his philosophy of continuous improvement (Deming, 1982). Implementing these principles has contributed in many organizations to the extraordinary improvement of the quality of manufactured products or services. In addition, it is assumed that together with J. M. Juran, P. B. Crosby or W. Stewart he had the greatest impact on the current perception of issues that we could put under the heading 'quality' or 'quality management'.

The PDCA principle consists in (Hamrol, 2005, p. 156):

1. Plan—set goals and processes necessary to deliver results that meet customer expectations and organizational policies.
2. Follow—process the process.
3. Check—monitor and measure processes and results in terms of results, test results and results.
4. Act—action is taken on the continuous improvement of the functioning of the process.

Continuous quality improvement based on the 'Deming Wheel' principle has been a success for the US and Japanese companies as well as for the European companies, and has been

the basis for improving the quality of the implementation of the new approach to quality management systems in PN-EN ISO 9001:2001 process approach.

## 5. Attempting to apply 14 principles of W. E. Deming in education

The thought of a qualitative approach to education was taken in the late 1980. Since then, many publications appeared in the world and in Poland justifying the need to improve the quality of education in schools at various levels of education (Sztejnberg, 2008, p. 40). Education has become an extremely friendly area for the adoption of modern quality philosophy. The Organization for Economic Co-operation and Development (OECD) report published in 1989 identifies key factors affecting the quality of the school (Dzierzgowska and Wlazło, 2000, p. 104):

a) programme,
b) evaluation, evaluation and monitoring, the role of teachers,
c) organization of the school,
d) resources.

Schools that would implement the W. E. Deming can be called 'quality schools' because they show the prospective goal of creating a friendly school full of satisfied pupils geared to fully satisfy their specific needs. 'Quality schools' are good schools 'that provide a place for students and teachers to work and develop.' 'Thinking about a good school is tantamount to thinking about a safe and friendly school, an institution capable of transforming and changing, responsive to needs. The new philosophy of the school is based on the cooperation of all concerned: teachers, pupils and parents, local communities' (Goźlińska, 2000, pp. 14–15).

Students can see here a school with a rich inner and outer life: circles of interest, interesting events, school trips, and partnerships with teachers.

Parents can understand 'good school' as one that can boast of the highest number of pupils entering the next level of education or gaining an attractive job. The school in which these activities take place is not only a school friendly to the student but also a school that paves the way for scientific and professional success.

The most important, though not the only 'customer' for the school, is the student. We can talk about external clients (students, parents, society) as well as internal ones (teacher, janitor) (Stróżyński, 2003, pp. 28–29). The theory of W. E. Deming assumes the satisfaction of external and internal customers as well as enhancing the quality of internal processes of companies. The first scientist to attempt to apply the theory of W. E. Deming in the education process was J. J. Bonstingl, which lists the four pillars of 'quality schools', using Deming theory (Bonstingl, 2002, p. 39):

a) understanding the relationship between 'suppliers' and 'customers',
b) constant personal commitment to continuous improvement,
c) focus on systems and processes,
d) strong and consistent, focused on total quality, leadership from the management and authorities.

Based on the above considerations, school quality is a kind of comprehensive, collaborative, competent work of all stakeholders (e.g. pupils, teachers, directors, parents, members of the

local community, state authorities, business people, churches, etc.), dedicated to continuous improvement of the school in all established areas of functioning to pass on the correct values.

Of the above-mentioned entities involved in the process of building the so-called quality schools, the authors paid attention to the relationship between: the pupil, the teacher and the parent, without neglecting in these considerations other subjects of quality development in education. These relationships (relations), using the principles of W. E. Deming, are shown below. These dependencies will be analyzed on the basis of surveys conducted among children and youth in schools—catholic schools located in the Diocese of Sandomierz and presented in the next paper.

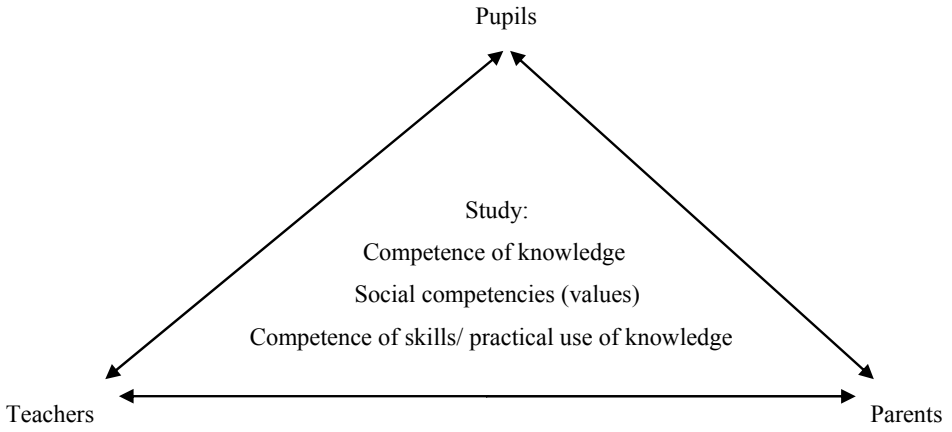



Figure 1. Student, teacher, parent relationship

S o u r c e: Authors' own elaboration.

Bearing in mind the above figure, the dependence is due to the fact that pupils, teachers and parents bring specific competences into the education process at school. We need to know about these specific competences so that the process of education and training takes place in the highest quality standards. This dialogue (exchange of views) should not lead to teaching the parties of the study, but to improving the quality of education.[3] The European Parliament defined competencies as 'a combination of knowledge, skills and attitudes appropriate to the situation' (2006/962 EC). This means that competencies are primarily based on the skilful use of knowledge, using skills and abilities. Skills are defined as the ability to apply knowledge and use by 'know-how' in terms to perform tasks and resolve any problems. There are cognitive skills (related to the cognitive process focused on learning about anything includ-

[3] The school is an educational institution. Education is—from Latin—educate, educate, educate and educate. The most important function of the school is the educational function. Education is the foundation of education, or teaching. Caring is a part of the responsibilities of a teacher. Education is the most important thing because it provides a proper attitude towards learning, working and utilizing their precepts for universal and individual good, never against man. The idea of the school should be to fulfil its educational function, i.e. to educate—shaping the minds, abilities, characters, attitudes and hearts of young people—the future intellectual and ethical elite of Polish society. The mission of the school, as seen, requires a specific vision of what it does, that is, the concept of the functioning and development of the school in order to accomplish the mission.

ing logical, intuitive and creative thinking and practical skills, as well as the efficiency and use of methods, materials, tools and any instruments (2008/C 111/01). The acquired knowledge of competencies will demonstrate the involvement of the parties in terms of the creation of the 'quality school'. The study of the area of competence and knowledge will allow to compare the state of knowledge of the respondents on school events, school procedures and predispositions to the position held. The study of social competencies allows us to know the knowledge of the principles, values and beliefs that affect the choices made—it will identify the motives of the action. Although the examination of the area of competence of skills, that is the practical use of knowledge, will show us how to obtain information on the factors necessary for success in a specific task. Communication, mental, interpersonal, organizational, leadership, self-management, etc. competences will be tested here.

The educational process should, in principle, lead to respect for the dignity of the pupil, the teacher and the parent. In addition, to point out that all parties of the study have voice, and their voice in the quality of education (on a balanced basis) counts. All parties are also supporters of the assumed strategy of cooperation in the learning process as well as the education of the pupils. At the same time this should not lead to undue dominance between the parties at school.

By analyzing the current literature, the authors of this paper have noted that in the qualitative development of education, the basic definition is of a defined standard. 'One of the first definitions of quality standards in Polish education defines standards as the criteria for assessing the effectiveness of a school, characterizing the postulated state, according to which we will determine the degree to which a school performs educational tasks or its values from the point of view of its social mission' (Bogaj, 1993, for: Toruński, 2009, p. 25). The quality of the school education process is based on acceptance and full acceptance by pupils, teachers and parents of expectations regarding the various aspects of the school's functioning. They must be elementary in view of the correct (intellectual) development of the student, the teacher, and the parent, as they are consistent with the principle of 'learning the whole of life'.

The correct setting of the quality of education at the school should allow us to determine the essence of the existence of a school, what is important in it, what is its identity, and what is the essence of the concept of the established learning process. 'The number of standards in education is not strictly defined. There are several classifications of standards developed for education that are related to different approaches to the term "educational standards"' (Toruński, 2009, p. 26; Przybytniowski, 2014, pp. 195–204). By creating the right standards for the proper functioning of the school, you should be aware of:

1. Knowledge requirements (assessment, examination).
2. Programme fundamentals.
3. Policy of the school (school board, ministry department).
4. Mission, school vision—related to the school's development strategy.
5. Expectations of school authorities—subjects taking part in the study.
6. Organizational structure of the school.
7. School resources (infrastructure).
8. Competence of teachers.

9. Religious values.

Standardization must meet the following criteria:

a) contain description of the expected and desirable condition for the development of an educational facility,
b) make a coherent whole,
c) be lawful,
d) be socially accepted,
e) be characterized by rationality and universality (Przybytniowski, 2007, pp. 112–117).

The formulation of standards is concerned with determining the indicators of their achievement. A pointer is a feature, an event, or a phenomenon on the basis of which we conclude with certainty, or with a certain probability that there is a phenomenon that interests us. It is important to formulate indicators that answer the question: 'What if we find that we have reached the standard?', because they are the ones that decide to acknowledge whether the standard was fulfilled or not (Pilch and Bauman, 2010, p. 53). The indicator in the operating form causes the focus to be shifted to the target, i.e. it becomes a proof of the school's achievement of the given standard. The indicators indicated above should indicate that the assumed and expected achievements (appropriate intellectual level) of the students are in accordance with the agreed learning strategy, compatible with the requirements of legal regulations. In order to be able to measure the quality of school work, a proper measuring tool should be developed to answer the hypothesis 'what is really our school?'. Acceptance of the appropriate measuring tool depends on the area under investigation: e.g. (U. 2004, No. 89, item. 845)[4]:

1. Workplace or school work concept, including areas:
   Area 1.1. Intra-school quality assurance system
   Area 1.2. Promotion
2. Management and organization, including areas:
   Area 2.1. Professional development of teachers
   Area 2.2. School conditions
3. Education, including areas:
   Area 3.1. Education programmes
   Area 3.2. Organization of the training process
   Area 3.3. Course of education
   Area 3.4. Educational outcomes
4. Education and care, including areas:
   Area 4.1. Equality of opportunity
   Area 4.2. Educational and preventive work for schools
   Area 4.3. Care work for the school
   Area 4.4. Effects of the educational, preventive and protective work of the school.

[4] The appendix to the regulation of Minister of Education and Science of the Republic of Poland should be used to develop the areas of school quality. It includes standards for assessing the quality of schools and institutions, along with sample indicators.

There is no doubt that the amount of research that is being carried out on school grounds can be very problematic for students, teachers and parents. Every effort to improve quality will only improve it and will make the educational service provided to a higher level.

## 6. Conclusions

Based on the literature analysis of the subject, it can be said that the problem of control and assessment is not easy, and as W. Okoń states (Maszczak, 2003, pp. 19–24), 'there is probably no problem in the pedagogy with which such different and sometimes contradictory views as school evaluation are concerned.' This also applies to the assessment of the functioning of the school, which for years has been at the centre of animated and often controversial discussions. It is a constantly open problem that draws the attention of teachers, students and their parents, as well as educational authorities and educators and psychologists—subject researchers (Maszczak, 2003, pp. 19–24).

Today the school believes that learning the structure of the teacher's activities and its determinants (conditions, factors) can make the teacher's work more effective and rational. Every job, including that of a teacher, is a set of activities aimed at achieving specific and beneficial effects. A characteristic feature of teaching activities is that it may involve directing the activities of pupils, parents and interacting with them (Strzyżewski, 1996).

## References

Ansell, T. (1997). *Zarządzanie jakością w sektorze usług finansowych*. Transl. by M. Jankowska. Warszawa: Związek Banków Polskich. ISBN 8386621125.

Bagiński, J. (ed.). (2004). *Zarządzanie jakością*. Warszawa: Oficyna Wydawnicza Politechniki Warszawskiej. ISBN 8372074798.

Bank, J. (1997). *Zarządzanie przez jakość*. Transl. by A. Teodorowicz. Warszawa: Wydawnictwo Gebethner i Ska. ISBN 8391146510.

Bogaj, A. (1993). *Efektywność kształcenia*. In: W. Pomykało (ed.). *Encyklopedia pedagogiczna*. Warszawa. ISBN 8386169036.

Bonstingl, J. J. (2002). *Szkoły jakości – wprowadzenie do Total Quality Management w edukacji*. Transl. by M. Umińska. Warszawa: CODN. ISBN 8385910239.

Bugdol, M. (2008). *Zarządzanie jakością w urzędach administracji publicznej. Teoria i praktyka*. Warszawa: Difin. ISBN 9788372519016.

Bugdol, M., Jedynak P. (2012). *Współczesne systemy zarządzania. Jakość, bezpieczeństwo, ryzyko*. Gliwice: Helion. ISBN 9788324633982.

Crosby, P. B. (1986). *Running things: The art of making things happen*. New York: McGraw-Hill. ISBN 007014513X.

Dahlgaard, J. J., Kristensen, K., Kanji, G. K. (2004). *Podstawy zarządzania jakością*. Transl. by L. Wasilewski. Warszawa: Wydawnictwo Naukowe PWN. ISBN 830114324X.

Deming, W. E. (1950). Deming's 1950 Lecture to Japanese Management [online, accessed: 2017-11-15]. Retrieved from: http://hclectures.blogspot.com/1970/08/demings-1950-lecture-to-japanese.html.

Deming, W. E. (1982). *Quality, productivity and competitive position*. Cambridge, MA: MIT Press.

Deming, W. E. (2012). *Nowa ekonomia dla przemysłu, rządu, edukacji*. Transl. by T. Tarcholik. Wrocław: Opexbooks.pl. ISBN 9788393416110.

Duda, I. (ed.). (1994). *Słownik pojęć towaroznawczych*. Kraków: Akademia Ekonomiczna. ISBN 8386439165.

Dzierzgowska, I., Wlazło, S. (2000). *Mierzenie jakości pracy szkoły podstawowej: poradnik*. Warszawa: CODN. ISBN 8387958131.

Goźlińska, E. (2000). Nowa szkoła zawodowa – jaka? Nowa rola nauczyciela w zreformowanej szkole. *Nowa Szkoła Zawodowa*, *1*, 14–15.

Grabowski, H. (2000). *Co koniecznie trzeba wiedzieć o wychowaniu fizycznym.* Kraków: Impuls. ISBN 8388030701.

Gudanowska, A. E. (2010) Wprowadzenie do zarządzania jakością w przedsiębiorstwie produkcyjnym. *Ekonomia i Zarządzanie*, *2* (4), 161–170.

Haffer, R. (2003). *Systemy zarządzania jakością w budowaniu przewag konkurencyjnych przedsiębiorstw*. Toruń: Wydawnictwo Uniwersytetu Mikołaja Kopernika. ISBN 8323114250.

Hamrol, A. (2005). *Zarządzanie jakością z przykładami*. Warszawa: Wydawnictwo Naukowe PWN. ISBN 8301144866.

Hamrol, A., Mantura, W. (2011). *Zarządzanie jakością. Teoria i praktyka*. Warszawa: Wydawnictwo Naukowe PWN. ISBN 9788301167752.

Horbaczewski, D. (2006). Filozoficzne źródła współczesnego pojmowania jakości. *Problemy Jakości*, *38* (10), 9–12.

Juran, J. M. (1982). *Upper management and quality.* New York: Juran Institute.

Kolman, R. (2009). *Kwalitologia. Wiedza o różnych dziedzinach jakości.* Warszawa: Placet. ISBN 9788374881333.

Konarzewska-Gubała, E. (ed.). (2006). *Zarządzanie przez jakość. Koncepcje, metody, studia przypadków*. Wrocław: Wydawnictwo Akademii Ekonomicznej im. Oskara Langego. ISBN 8370116418.

Latzko, W. J., Saunders, D. M. (1998). *Cztery dni z dr Demingiem – nowoczesna teoria zarządzania*. Transl. by A. Ehrlich. Warszawa: Wydawnictwo Naukowo-Techniczne. ISBN 832042299X.

Ładoński, W., Szołtysek, K. (ed.). (2005). *Zarządzanie jakością*, cz. 1. *Systemy jakości w organizacji*, Wrocław: Wydawnictwo Akademii Ekonomicznej im. Oskara Langego. ISBN 8370117678.

*Mały słownik języka polskiego*. (1983). Warszawa: PWN.

Maszczak, T. (2003). *Ocena z wychowania fizycznego w obliczu przemian edukacyjnych. Wychowanie Fizyczne i Zdrowotne*, *10*.

Olejnik, T., Wieczorek, R. (1982). *Kontrola i sterowanie jakością*. Warszawa and Poznań: PWN. ISBN 8301037180.

Ostasiewicz, W. (ed.). (2004). *Ocena i analiza jakości życia*. Wrocław: Wydawnictwo Akademii Ekonomicznej im. Oskara Langego. ISBN 8370116825.

Oyrzanowski, B. (1969). Ekonomiczne problemy jakości. *Ekonomista*, *2*.

Parlament Europejski i Rady z dnia 18 grudnia 2006 r. w sprawie kompetencji kluczowych w procesie uczenia się przez całe życie (2006/962/WE).

Parlament Europejski i Rady z dnia 23 kwietnia 2008 r. w sprawie ustanowienia europejskich ram kwalifikacji dla uczenia się przez całe życie (2008/C 111/01).

Piątek, A. (1994). *Jakość opieki szansą polskiego pielęgniarstwa*. Materiały niepublikowane Komisji Standardów i Kwalifikacji Zawodowych przy Naczelnej Radzie Pielęgniarek i Położnych.

Pilch, T., Bauman, T. (2010). *Zasady badań pedagogicznych. Strategie ilościowe i jakościowe*. Warszawa: Wydawnictwo Akademickie Żak. ISBN 9788362015160.

Prussak, W. (2006). *Zarządzanie jakością. Wybrane elementy*. Poznań: Wydawnictwo Politechniki Poznańskiej. ISBN 837143541X.

Przybytniowski, J. W. (2007). Edukacja ubezpieczeniowa i jej wpływ na świadomość ubezpieczeniową (wybrane problemy). *Rozprawy Ubezpieczeniowe*, *1* (2). Warszawa: Rzecznik Ubezpieczonych.

Przybytniowski, J. W. (2014). Wiedza jako jeden z czynników wzrostu jakości usług ubezpieczeniowych. In: R. Borowiecki, A. Jaki (ed.). *Restrukturyzacja w obliczu wyzwań gospodarki globalnej*. Kraków: Fundacja Uniwersytetu Ekonomicznego. ISBN 9788362511983.

Rozporządzenie Ministra Edukacji Narodowej i Sportu w sprawie szczegółowych zasad sprawowania nadzoru pedagogicznego, wykazu stanowisk wymagających kwalifikacji pedagogicznych, kwalifikacji niezbędnych do sprawowania nadzoru pedagogicznego, a także kwalifikacji osób, którym można zlecać prowadzenie badań i opracowywanie ekspertyz z dnia 23 kwietnia 2004 r. (DzU 2004, nr 89, poz. 845).

Skrzypek, E. (2002). *Jakość i efektywność*. Lublin: Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej. ISBN 8322716265.

Stróżyński, K. (2003). *Jakość pracy szkoły praktycznie*. Warszawa and Łódź: Wydawnictwo Szkolne PWN. ISBN 8371958331.

Strzyżewski, S. (1996). *Proces kształcenia i wychowania w kulturze fizycznej*. Warszawa: Wydawnictwa Szkolne i Pedagogiczne. ISBN 8302062324.

Szczepańska, K. (2010). *Kompleksowe zarządzanie jakością TQM. Przeszłość i teraźniejszość*. Warszawa: Oficyna Wydawnicza Politechniki Warszawskiej. ISBN 9788372078858.
Sztejnberg, A. (2008). *Doskonalenie usług edukacyjnych. Podstawy pomiaru jakości kształcenia*. Opole: Wydawnictwo Uniwersytetu Opolskiego. ISBN 9788373952775.
Toruński, J. (2009). Standardy jakości procesu kształcenia. *Zeszyty Naukowe Akademii Podlaskiej, Administracja i Zarządzanie*, *83*, 25–36.
Wasilewski, L. (1998). *Podstawy zarządzania jakością*. Warszawa: Wydawnictwo Wyższej Szkoły Przedsiębiorczości i Zarządzania im. Leona Koźmińskiego. ISBN 8386846305.

# Jakość w teorii zarządzania Deminga i jej implementacja w procesie kształcenia

**Abstrakt:** H. Grabowski (2000) zdefiniował nauczyciela jako specjalistę w dziedzinie ludzkiego zachowania, którego praca polega na intencjonalnym motywowaniu do jego zmiany w kierunku społecznie pożądanym. Założenia reformy systemu edukacji w Polsce jasno określają zadania ogólne szkoły, w których stwierdza się, że nauczyciele winni dążyć do wszechstronnego (wielokierunkowego) rozwoju ucznia jako nadrzędnego celu pracy edukacyjnej. Edukacja szkolna polega na harmonijnej realizacji przez nauczycieli zadań w zakresie nauczania, kształcenia umiejętności i wychowania. Zadania te stanowią wzajemnie uzupełniające się i równoważne wymiary pracy każdego nauczyciela. Realizacja tychże zadań musi być oparta o podstawową ideę funkcjonowania współczesnej szkoły: że uczeń jest podmiotem wszelkich działań nauczyciela (szkoły). Artykuł ma charakter wstępny i stanowi materiał do badań na przyszłość. Ma charakter teoretyczny. Wybrana przez autorów metoda badawcza „nowego spojrzenia" ma dać alternatywny pogląd na opisywane zagadnienie, będące prezentacją szeroko rozumianej problematyki związanej z nowym spojrzeniem na jakość kształcenia na poziomie szkół podstawowych i ponadpodstawowych, z wykorzystaniem metody Deminga.

**Słowa kluczowe:** system edukacji, jakość, wiedza, Deming, zarządzanie

# Strategic accounting: The need and prerequisites

**Wasilij Rudnicki**

Małopolska School of Economics in Tarnów

Faculty of Management and Tourism

**Oksana Kundrya-Vysotska**

Lviv Educational Institute of the Higher Educational Institution 'Banking University'

**Abstract:** The article describes the necessity and methodological peculiarities of strategic accounting. It is proved that the need for strategic accounting is due to the new information requests of large business for the effective implementation of business strategies. It shows the main characteristics and objects of strategic accounting, the main characteristics of the strategic accounting paradigm, which confirm the integrity and the need to develop a new accounting methodology. It proposes the conceptual approach to the construction of the strategic accounting system by creating accounting information streams aimed at information provision of strategic management. It is proved that considering the instability and inconsistency of the external macroeconomy in which the enterprises operate, the concept of external factors, risks, uncertainties, the concept of space and time fractals, decision making and forecasting is the basis of the conceptual structure of strategic accounting.

**Key words:** strategic accounting, strategic accounting paradigm, information flows, information support

## 1. Introduction

An enterprise is an open economic system that operates in an environment that is characterized by uncertainty. In order to bring world-class management and corporate culture closer to domestic enterprises, it is necessary to pay attention to the efficiency of the information system and its development. To optimize the formation of accounting information, increase its informativeness and usefulness for managers, a conceptual review of the theory, methodology and accounting practices is required.

The processes of globalization lead to the intersection of traditional accounting with elements of planning, forecasting, analysis and pricing. The combination of various sectors of the economy has led to the formation of the multifunctional object, based on the use of different knowledge of various branches of science, which organizationally and methodologically unite all areas of accounting in a single system that ef-

Corresspondence to:
Oksana Kundrya-Vysotska
Lviv Educational Institute of the Higher
Educational Institution 'Banking University'
Faculty of Finance and Management
Department of Accounting and Taxation
Chornovola Avenue 61, 79020, Lviv, Ukraine
Tel.: +38 032 297 72 22
E-mail: kundrya-vysotska@ukr.net

fectively 'works for the future' of the entity. That is why there is a problem with certainty in the quality characteristics of the strategic accounting.

Today the scientific controversy in relation to the strategic accounting formation has not reached a quality completion. That is why it is necessary to study the main characteristics of the new strategic accounting paradigm.

To the problems of strategic accounting a significant amount of scientific works of foreign and domestic scientists has been devoted, including: F. F. Butynets, S. F. Holov, Glen A. Welsh, B. Rayan, S. Hoshal, D. R. Hensen, M. M. Mouven, D. U. Senkov, L. P. Radetska, L. V. Ovod. Other scientists offer definitions in which special attention is paid to external orientation of strategic management accounting: Simmonds, Bromwich, Lord, Drury, Inns, Cooper, Kaplan.

Apart from important scientific results there are still unresolved problems regarding its content characteristics and as result practical use, and that is why the main characteristics of the strategic accounting require special attention and detailed consideration.

The processes of globalization caused the development of accounting which led to combination of traditional accounting with the elements of planning, forecasting, analysis and pricing. The unification of different sectors of the economy has led to necessity of forming a multi-functional chain, based on the knowledge in different scientific branches and consolidation of all modern accounting and analytical tendencies in a single system which can 'work effectively' for the entity.

Consequently, the methodology of strategic accounting today is the subject of extensive analytical research in the context of logical dichotomy of the accounting system under the influence of objective globalization processes.

## 2. Preconditions of the strategic accounting formation

Modern management accounting is associated with the forecasting of the entity's business, but the period of this forecasting is from month to year. In the twentieth century business practices have evolved and become more complex, gradually causing the instability of the economic environment and the evolution of management accounting as a result. So, in the USA and other developed European countries in the 1960's and 1970's the process of integration financial and management accounting, analysis, pricing, planning and control into a unified data processing system, aimed at making strategic decisions, has been started. This accounting system gained the characteristics of strategic accounting and ensured the implementation of not only current tasks, but also the global strategic objectives of the enterprise. Over time, this system continued the further improvement based on the understanding of the role and significance of information resources in forecasting business.

On this basis, we need to find out the essential difference between the traditional approach to cost management and cost concept as a part of strategic accounting. The difference lies in a completely different paradigm of cost management. Let's pay attention to the main differences of traditional approach to management expenses and strategic management expenses:

The difference in the definition of the goal. The purpose of the traditional approach is to reduce costs in any way as the main way of preserving and gaining competitive

advantage. This goal is also present in the cost planning of strategic accounting, but it closely depends on the company's core strategy. It means that an increase in costs in a particular area is permissible if it leads to an adequate reduction in costs in other areas or gives the firm another competitive advantage.

The difference in the choice of methods of cost analysis. The traditional approach is based on the assessment of the final cost of product. Instead, the system of strategic cost management studies the process of cost formation at each link in the production chain.

The difference in cost definition. Cost management within the traditional system is mainly considered in terms of sales volume. Expenses are divided into variables, constant and mixed. The volume of sales is considered as a decisive factor in the cost formation. Cost management in strategic accounting primarily depends on the company's strategy. It is considered in terms of wider structural and functional factors.

A brief description of the differences in cost management between the traditional system and the strategic accounting system gives an understanding that strategic accounting provides a wider and more efficient toolkit for making managerial decisions. At present accounting system must meet the business strategy, its effectiveness must be evaluated based on their impact on the objectives of the enterprise. The modern accounting system should be oriented not only to the satisfaction of external users' information needs, but to the provision with internal needs of the enterprise management as well.

That is why the requirements for a high level of management accounting are increasing. They should be: focused, systematic, integrated, comprehensive, efficient and optimal. It should be noted that such a system of accounting has already been developed in world corporations.

## 3. General description of strategic accounting

Strategic accounting has emerged as a supplement to management accounting in terms of forecasting for many years. In the late 1980s the British Institute of Accountants has allocated financial resources for research in this area. The results of this work were published as *Management accounting: Pathways to progress* by M. Bromwich and A. Bhimani (Bromwich and Bhimani, 1994). In this work the authors drew attention to strategic accounting from the standpoint of future development. It should be noted that in spite of great attention to strategic accounting, it hasn't got the comprehensive conceptual basis.

John Innes defines strategic accounting as a system for providing information for strategic decision making at an enterprise (Innes, 1998). As a rule, strategic decisions have a long-term character and have a comprehensive impact on the company's activities. This opinion is shared by Cooper and Kaplan, who argue that strategic accounting practices are designed primarily to support enterprise's overall competition through the use of information technology to detail cost accounting (Cooper and Kaplan, 1988).

However, other scientists offer definitions in which special attention is paid to external orientation of strategic accounting. For example, Simmonds, who first proposed the term *strategic accounting*, considers it as a method of analyzing competitor's business as well as

own business (Simmonds, 1981). Later Bromwich, an active supporter of strategic accounting, gave the following definition: it is a method of analyzing financial information about the markets of the enterprise's activity, the structure of costs and tracking the strategy of the enterprise, as well as the strategy of competitors in these markets (Bromwich and Bhimani, 1994). Since there was no common understanding of the concept of 'strategic accounting' in 1996, Lord gave an overview of literature and learned some basic principles of strategic accounting (Lord, 1996):

1) going beyond the internal orientation of traditional management accounting and obtaining information from competitors;
2) determining the relationship between enterprise strategy and application of management accounting;
3) obtaining competitive advantages through the use of methods of reducing costs or increasing the level of differentiation of the enterprise production.

A comprehensive study of the essence of strategic accounting, conducted by Colin Drury in his work *Accounting and cost management*, confirms the controversy of scientists as to whether strategic accounting should have a mainly external orientation or not (Drury, 2005).

Proceeding from this, the purpose of strategic accounting is to provide management with all the necessary information to manage the business in favour of its owners and other interested partner groups. The latest are creditors, clients, providers, society.

The tasks of strategic accounting are:

– to provide the information for analysis of potential markets for the enterprise;
– to provide the strategic analysis of own potential and identify key success factors of enterprise;
– to outline activities;
– to determine indicators of the evaluation of the key factors of the company's success;
– to provide the information for implementation of the enterprise's strategy;
– to ensure feedback between the achieved results and their compliance with strategic goals;
– to give information on the long-term results of different activities.

The s u b j e c t of strategic accounting is the enterprise's activity in the previous, current and future periods.

The o b j e c t s of strategic accounting are certain types of the enterprise activities, centres of responsibility, budgets and long-term plans.

The u s e r s of strategic accounting information are senior management (board of directors, president, vice presidents, etc.), as well as lower levels of management. For senior executives, this information is required for strategic decisions and their monitoring, for managers of lower levels—for implementation of enterprise strategy.

So, strategic accounting can be considered as a method of displaying financial and accounting problems of the enterprise. Strategic accounting is a combination of management accounting and financial reporting system focused on strategic decision making.

## 4. Conceptual approaches to strategic accounting

The demand for strategic accounting depends on the needs and goals of the enterprise, and its structure is influenced by a number of important factors (Figure 1).

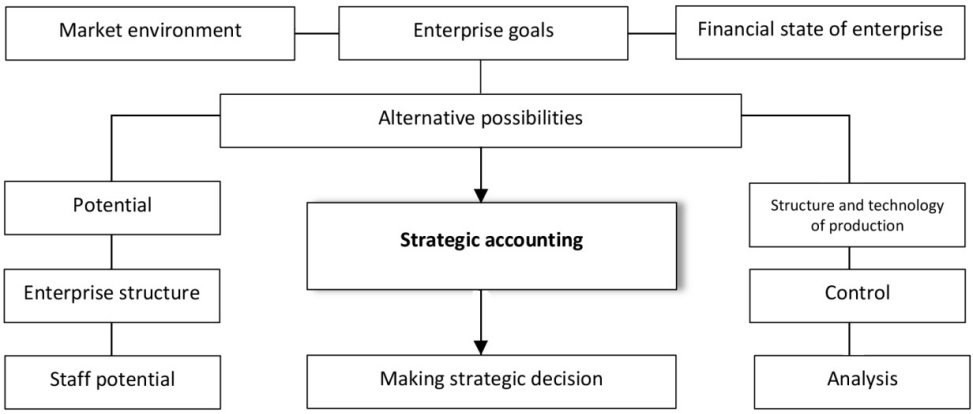



Figure 1. Factors influencing strategic accounting

S o u r c e: Authors' own elaboration.

Studies have shown that modern strategic accounting is developing in two directions:

1) development of indicators for assessing the state of the enterprise on the basis of financial and management accounting;
2) development of the independent strategic accounting on the basis of management information.

Today, strategic accounting is based on the concept, where particular attention is paid to cost accounting and development of strategies aimed at the formation and implementation of a stable competitive advantage of the enterprise. According to it, accounting information can meet the needs of strategic accounting in various ways, namely: use of credentials for market analysis, provision of key information related to selected strategies, provision of feedback on achieved results and their compliance with strategic goals. So strategic accounting should focus more on external factors such as profitability of competitors, market share, etc. The choice of a general strategy of the enterprise directly affects the system of strategic accounting. The conceptual basis of strategic accounting is formed by the difference in strategic accounting paradigm from the traditional accounting paradigm.

From this we can conclude that the strategic accounting paradigm defines the conceptual structure of strategic accounting and is characterized by such main components (Figure 2).

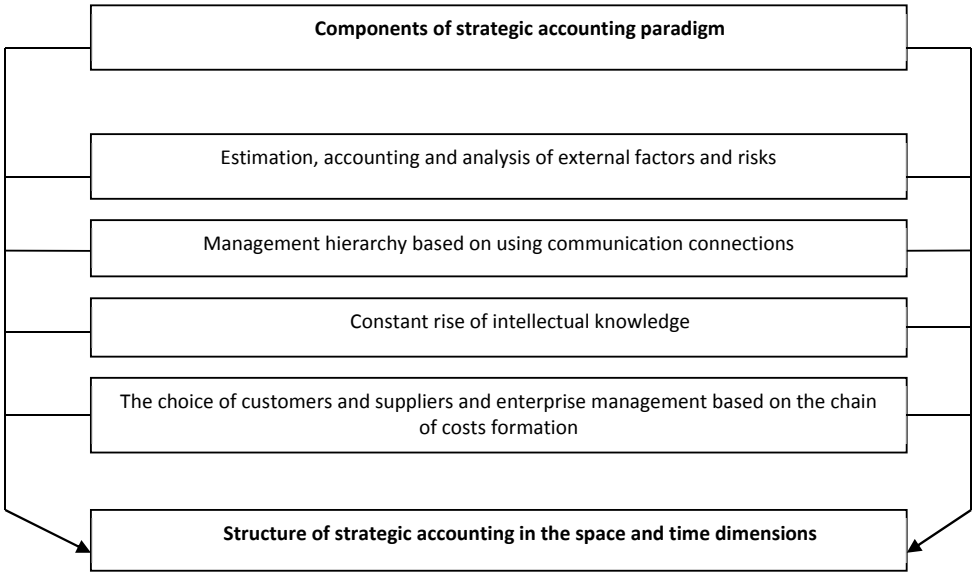



Figure 2. Characteristics of strategic accounting paradigm

Source: Authors' own elaboration.

This approach involves taking into account different situations affecting property, solvency, enterprise reserve system, determination and analysis of aggregate net assets and net liabilities.

Taking into account the instability and inconsistency of the external macroeconomy in which enterprises operate, the concept of external factors, risks, uncertainty, the concept of space and time fractals, decision making and forecasting is the basis of the conceptual structure of strategic accounting.

The concept of external factors determines the company's strategy by 80%. The study, assessment and registration of a system of factors and analysis of their impact on the property of the enterprise, and its solvency is based on the use of the instrument of accounting engineering—the derivative balance. Determining the influence of the system of factors is one of the main principles of accounting engineering.

The concept of risk determines the need for risk as a compulsory element of doing business and choosing a strategy for protecting against risks.

The uncertainty concept is associated with a low level of prediction, the reliability of information about the external environment and the processes occurring in it. If there is a risk, you can estimate the likelihood of adverse effects that may arise in one or another situation. The greater the external influence and the dependence on the external environment, the higher the level of uncertainty.

Hypothesis of uncertainty necessitates the use of fractals of space and time, because in reality the market loses stability as soon as it is deprived of its fractal structure. The concept of space and time dimensions lies at the basis of the formation of the derivative balance.

The concept of fractal theory is due to the emergence of the theory of fractal market, the rapid development of digital information systems and technologies. This allows you to manage fractals of space (internal and external segments of activity, segments of the formation value of products) and fractals of time (investments, innovations).

It should be noted that the conceptual structure of strategic accounting is based on the principles of accounting modelling. The processes of forming models are present in all sciences. Accounting is not an exception. Accounting modelling involves the development and testing of models of strategic accounting of situational and organizational nature. For strategic accounting, the basic model is the 'Model of financial strategy', which provides an opportunity to carry out a comprehensive forecasting of the future financial condition of the company based on the study of its financial results. It enables to form a strategic direction of economic and financial activity of the enterprise. The model can be formed according to individual projected indicators and a group of related indexes. This model can be developed in dynamics for several years for each calculated index. After calculating a particular model, a general assessment of the financial and economic state of the enterprise is carried out to identify possible prospects for its development, as defined in the general model. Different indices that characterize various aspects of financial and economic activity of the enterprise may be included in the structure of accounting indicators.

The main characteristics and aspects of strategic accounting are: influencing the structure of strategic management, strategic diagnostics of the external environment, strategic thinking and behaviour in the conditions of globalization, strategic planning information policy, strategic decisions, evaluation of the implementation of the strategy, mechanism and procedures of accounting.

So, the conceptual structure of strategic accounting involves the application of the paradigm of global strategic management, information systems and technologies, the concepts of external factors, risks, uncertainty, fractal aspect, change management theory, decision making, forecasting and reengineering, accounting modelling, which form the basis of strategic accounting.

## 5. Conclusions

Based on the above mentioned conceptual approach to the formation of a strategic accounting, appropriate technical means were offered, which are based on accounting information flows focused on providing strategic management, including information in the dimensions of space and time which is formed by financial engineering instruments.

This conceptual approach takes into account both new information technologies and new strategic management needs associated with obtaining and using accounting and analytical information in space and time dimensions.

Formation of the strategic accounting system at the enterprise should be accompanied by the union of planning and accounting units to facilitate the coordination of all functions of the management system. To ensure comparisons of strategic management information and financial reporting, the accounting process should be organized on the basis of data integration. Traditional accounting as a quantitative assessment and presentation of the facts of economic

activity should be strengthened by analyzing its state and results for the development of the forecast of enterprise development in a changing competitive environment.

The use of a strategic accounting system should take place with the participation of professional accountants and analysts, and be provided with resources and active participation of management. Further research may consist in the development of information support for competition strategy based on accounting and analytical data.

## References

Bromwich, M., Bhimani, A. (1994). *Management accounting: Pathways to progress*. London: Chartered Institute of Management Accountants. ISBN 1874784272.

Cooper, R., Kaplan, R. S. (1988). Measure costs right: Make the right decisions. *Harvard Business Review*, September–October, 96–103.

Innes, J. (1998). Strategic management accounting in tones. In: J. Innes (ed.). *Handbook of Management Accounting* (pp. 928–929). London: Gee. ISBN 1860890865.

Lord, B. R. (1996). Strategic management accounting: The emperor's new clothes? *Management Accounting Research, 7* (3), 347–366.

Simmonds, K. (1981). Strategic management accounting. *Management Accounting*, *59* (4), 26–29.

Друри, К. [Drury, C.]. (2005). *Управленческий и производственный учет*. Пер. с англ. Москва: Юнити-Дана. ISBN 5238008996.

Райан, Б. (1998). *Стратегический учет для руководителей*. Пер. с англ. под ред. В. А. Микрюкова. Москва: Аудит, Юнити. ISBN 5851770449.

Семанюк, В. З. (2010). Формування підсистеми стратегічного обліку в умовах ринкових відносин. *Формування ринкових відносин в Україні: збірник наукових праць*, *114* (11), 59–64.

# Strategiczna rachunkowość zarządcza – koncepcje i potrzeby

**Abstrakt:** W artykule podjęto temat funkcji strategicznej rachunkowości zarządczej w przedsiębiorstwie oraz roli informacyjnej, jaką odgrywa ona w skutecznej realizacji strategii biznesowych. Pokazano główne cechy i podmioty strategicznej rachunkowości zarządczej, a także paradygmaty tej rachunkowości, potwierdzające jej integralność i wskazujące na potrzebę opracowania nowej metodologii rachunkowości. Zaproponowano koncepcyjne podejście do budowy strategicznego systemu rachunkowości w przedsiębiorstwie poprzez tworzenie przepływu informacji w celu wsparcia informacyjnego zarządzania strategicznego. Wskazano, że ze względu na niestabilność i brak spójności otoczenia makroekonomicznego przedsiębiorstwa koncepcja czynników zewnętrznych, ryzyka, niepewności, koncepcja fraktali przestrzennych i czasowych, podejmowania decyzji i prognozowania jest podstawą organizacji systemu strategicznej rachunkowości zarządczej.

**Słowa kluczowe:** strategiczna rachunkowość zarządcza, paradygmaty rachunkowości zarządczej, przepływ informacji, informacja w zarządzaniu

# ERGONOMICS

# The usage of colours as a text highlighting technique

**Paweł Krzos**

Wrocław University of Science and Technology

Faculty of Computer Science and Management

**Abstract:** The need of using text highlighting techniques exists in various cases. There are numerous different techniques available, among others: font colour, background colour, underlining, font weight, font style or capitalization. The guidelines describing the usage of colours in different contexts can be found in many sources. Over the last century studies in this field have been conducted but the impact of colours on the pop-out effect has not been comprehensively investigated so far. The present study analyzes that phenomenon and establishes preliminary ranking of best colours to use for text highlighting basing on opinions of 82 students. Two highlighting methods: text colour and background colour, with six basic colours: red, green, blue, cyan, magenta and yellow, have been examined. The results show that significant differences between colours exist. The stability of answers has been confirmed but some of the data is inconsistent. Limitations as well as directions for future work are also described.

**Key words:** text highlighting, colours usability, visual document analytics

## 1. Introduction

### 1.1. Text highlighting

The very most of information is presented as a natural language text. Nowadays we are struggling with huge amount of data which leads the readers to skimming the documents (Nielson, 1997). Because of that it is very important to attract attention to the most essential ideas. It can be done especially by text highlighting. The best known methods to distinct a part of a text are: background colour, font colour, font size, font style (italics, subscript), font weight (bold font), font family, underlining, additional borders, letter spacing, shadowing, or capitalization. Some work has already been done to understand the usage of highlighting in paper and digital documents (Churchill, 2000; Marshall, 1997; Schilit, 1998). It has also been proved that highlighting has remarkable meaning in the field of educational psychology (Peterson, 1992; Nist, 1987; Silvers, 1997). Some articles had been writ-

Correspondence to:
Paweł Krzos
Politechnika Wrocławska
Wydział Informatyki i Zarządzania
Wybrzeże Wyspiańskiego 27
50-370 Wrocław, Poland
Tel.: +48 793 777 204
E-mail: pawel.krzos@pwr.edu.pl

ten before the computer displays started to be used but they are also important to understand the flow of studies in the area of visual analytics. This article is focused on the context of usability of contemporary software and deepens Strobelt et al. (2016) analysis. Strobelt has conducted an experiment where the following aspects have been determined:

– a ranking of nine commonly-used text highlighting techniques,
– the degree of visual interference between pairs of highlighting techniques,
– the effectiveness of techniques for visual conjunctive search.

It was an in-depth study, however only one colour has been used for font and background highlighting. The authors suggested developing next studies to check if there would be differences between other colour combinations. This paper aims to verify it.

## 2. Colour in text

At first some basic definitions should be explained. Readability is the ease with which a reader can understand a written text. Legibility has an influence on readability and describes the ease of distinguishing individual letters or characters from each other.

There are two main colour models: subtractive and additive. The first one explains the mixing of a limited set of dyes which enables obtaining a wider range of colours. The most popular subtractive model, used especially for printing purposes, is CMY (Hasan, 2012) with cyan, magenta and yellow colours. The second one explains the mixing of a number of different beams, the most often: red, green and blue (RGB) (Hasan, 2012), which altogether create white colour (instead of multiplication to black in CMY model). The same colours can be described by various models where besides hue also other visual properties such as luminance are taken into consideration. This study is limited only to examine the 6 basic colours coming from subtractive and additive models.

The first research in the field of using colours has been carried out by Le Courier over a hundred years ago (Livre, 1912). As a result the ranking of legibility depending on font and background colour has been developed. The most legible pair was black and yellow what is quite surprising in comparison to widely used combination of black and white. The study has been revised in 2008 by Humar et al. (2008), who tested the legibility of a web page text presented on CRT displays. They have proved that negative polarity (pairs yellow/ black and white/ blue) performs best in their case. The comparison of both studies is presented in Table 1 below.

Table 1. The text legibility ranking of Humar et al. and Le Courier studies

| Text/ background | Study | |
|---|---|---|
| | Humar et al. | Le Courier |
| Yellow/ black | 1 | 7 |
| White/ blue | 2 | 5 |
| Black/ yellow | 3 | 1 |
| White/ black | 4 | 10 |
| Black/ white | 5 | 6 |
| Blue/ white | 6 | 4 |
| Red/ yellow | 7 | 11 |

| Text/ background | Study | |
|---|---|---|
| | Humar et al. | Le Courier |
| White/ red | 8 | 8 |
| Red/ white | 9 | 3 |
| Red/ green | 10 | 13 |
| Green/ white | 11 | 2 |
| White/ green | 12 | 9 |
| Green/ red | 13 | 12 |

S o u r c e: Author's own elaboration based on Humar, 2008.

Both researches have concentrated on the text legibility in general. They have not investigated the impact of colour on the highlighting techniques though. Over the next century since the first Le Courier's experiment a number of studies have been carried out. A substantial insight has been given in a series of surveys by M. Tinker and D. Paterson (Tinker, 1928; 1929a; 1929b; 1929c; 1929d; 1929e; 1932; 1940; 1942; 1944; 1946; 1955; 1963). L. Matthews has proved that hue, in contrast to luminance, has no statistically significant effect on the readers' visual performance (Matthews, 1987). The similar results have been achieved by S. Pastor (1990). The topic has been further investigated, among others by Hill and Scharff (Hill, 1997), van Schaik (Ling, 2002; Pearson, 2003), Wang and Chen (Wang, 2003), Hall and Hanna (Hall, 2004) and Humar et al. (Humar, 2008). Summarizing, many various studies have been carried out but the consistent conclusion cannot be drawn. The results are often contradictory to each other and it would be nearly impossible to establish only one colour ranking. Despite of that Strobelt et al. (Strobelt, 2016) have proven that there are statistically significant differences in search performance between various highlighting techniques. They have also suggested checking if other colour combinations would have any influence on the results. Therefore, the main objective for this study is to verify the hypothesis that the preferences in choosing the colour of text highlighting exist.

## 3. Method

Six basic colours have been chosen for testing: cyan (#00FFFF), magenta (#FF00FF), yellow (#FFFF00), red (#FF0000), green (#00FF00) and blue (#0000FF). The background colour for whole document has been fixed to white and the font colour for background highlighting has been fixed to black. The two types of highlighting: font colour and the background colour, have been investigated in separate surveys. Each combination of two colours has been shown to participants, 15 pairs for font colour and 15 pairs for background colour in total. Each pair has been shown per 10 seconds and the participant had to fill the attached questionnaire answering the question: 'Which colour would you use for highlighting the text?'. One word located exactly in the centre of the paragraph has been highlighted. All colour variants have been displayed to participants before the survey so that they should be well informed about all possibilities to choose from. 82 participants have been recruited as volunteers (gender: 43 females, 39 males, age 17–27). The pairs have been shown in random order. The col-

our blind test has been carried out to exclude colour blind people from the survey, yet everybody has passed it. The survey has been carried out twice with one hour break to check the stability of answers. The figures below depict the exemplary pairs which have been shown to the participants. The content has been presented on the 17″ LCD display. The participants have been sitting 1 metre in front of the screen. There were no distracters.

The results have been counted and normalized to the scale of 1–9 so that they could be an input to the AHP matrix (Saaty, 1977). The significance of differences between colours has been checked using ANOVA and also pairwise comparison with student's t-test. The stability of ranking between two runs has been checked with dependent t-test for paired samples. The consistency of ranking has been verified with AHP. No special statistical software has been used. The calculations have been done in Microsoft Excel.

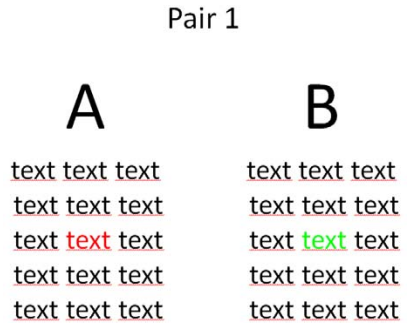



Figure 1. The exemplary pair from the first survey: highlighted fonts (left: red, right: green)

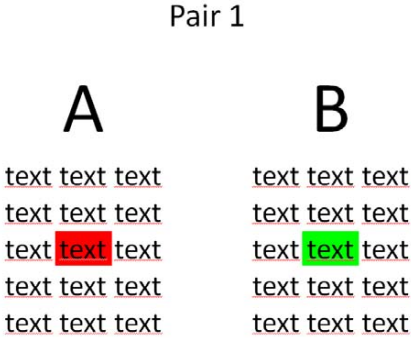



Figure 2. The exemplary pair from the second survey: highlighted backgrounds (left: red, right: green)

## 4. Results and discussion

### 4.1. Study 1: font colour

The results of the study are presented in the tables below. In Table 2 colours have been grouped according to the results of the significance test for each pair (results from the second run are shown in brackets). Tables 3 and 4 present AHP matrixes with coefficients calculated as normalized count of answers for the first and the second run correspondingly.

Table 2. The ranking of font colours

| Colour | G | R | M | B | C | Y | Mean | StDev |
|---|---|---|---|---|---|---|---|---|
| G | A (A) | | | | | | 0.74 (0.78) | 0.23 (0.20) |
| R | | B (B) | B (B) | B (B) | | | 0.57 (0.57) | 0.31 (0.32) |
| M | | B (B) | B (B) | B (B) | | | 0.56 (0.54) | 0.22 (0.25) |
| B | | B (B) | B (B) | B (B/C) | (C) | | 0.54 (0.49) | 0.26 (0.30) |
| C | | | | (C) | C (C) | | 0.38 (0.41) | 0.30 (0.30) |
| Y | | | | | | D (D) | 0.22 (0.20) | 0.26 (0.26) |

S o u r c e: Author's own elaboration.

Table 3. AHP matrix for font colours, the first run

| Colour | R | G | B | C | M | Y |
|---|---|---|---|---|---|---|
| R | 1.00 | 0.36 | 2.95 | 2.17 | 0.84 | 5.10 |
| G | 2.76 | 1.00 | 4.70 | 5.49 | 4.12 | 6.85 |
| B | 0.34 | 0.21 | 1.00 | 4.51 | 1.78 | 5.29 |
| C | 0.46 | 0.18 | 0.22 | 1.00 | 0.23 | 3.93 |
| M | 1.20 | 0.24 | 0.56 | 4.32 | 1.00 | 6.46 |
| Y | 0.20 | 0.15 | 0.19 | 0.25 | 0.15 | 1.00 |

S o u r c e: Author's own elaboration.

Table 4. AHP matrix for font colours, the second run

| Colour | R | G | B | C | M | Y |
|---|---|---|---|---|---|---|
| R | 1.00 | 0.32 | 3.15 | 1.78 | 1.00 | 5.49 |
| G | 3.15 | 1.00 | 5.88 | 6.85 | 3.93 | 7.63 |
| B | 0.32 | 0.17 | 1.00 | 2.76 | 1.39 | 5.29 |
| C | 0.56 | 0.15 | 0.36 | 1.00 | 0.56 | 3.54 |
| M | 1.00 | 0.25 | 0.72 | 1.78 | 1.00 | 6.66 |
| Y | 0.18 | 0.13 | 0.19 | 0.28 | 0.15 | 1.00 |

S o u r c e: Author's own elaboration.

The order of colours is the same for both runs of the test. ANOVA showed significant differences between the colours (first run: F=37.03, second run: F=38.80). The best colour for text highlighting is green while yellow is the worst. The rest, apart from cyan, is quite good without meaningful differences between each other. Cyan has been higher rated in the second

run which led to weaker difference in ranking from blue, no longer statistically significant. Dependent t-test for paired samples has proved that there are no significant differences between the runs (the biggest Z-score: 0.89). In both cases CR values are acceptable (first run: CR=0.054, second run: CR=0.020) which means that the results are consistent.

The interesting finding is that green has been chosen as the most preferable colour. In this study any reading context has been intentionally removed, however there are many examples of connection between font colour and the type of highlighted text (e.g. blue hyperlinks). Despite of this, green has been the mostly selected colour. The first three colours are compliant with the ranking established by Le Courier (cf. Table 1). The low rating of yellow can be explained by the poor contrast with white background so that the text is hardly readable.

## 4.2. Study 2: background colour

The results are presented just as those for Study 1.

Table 5. The ranking of background colours

| Colour | C | Y | G | M | R | B | Mean | StDev |
|---|---|---|---|---|---|---|---|---|
| C | A<br>(A) | A<br>(A) | <br>(A) | | | | 0.82<br>(0.80) | 0.22<br>(0.20) |
| Y | A<br>(A) | A/A2<br>(A) | A2<br>(A) | | | | 0.80<br>(0.75) | 0.18<br>(0.21) |
| G | <br>(A) | A2<br>(A) | A2<br>(A) | | | | 0.70<br>(0.75) | 0.17<br>(0.19) |
| M | | | | B<br>(B) | B<br>(B) | | 0.35<br>(0.35) | 0.15<br>(0.15) |
| R | | | | B<br>(B) | B<br>(B) | | 0.30<br>(0.31) | 0.17<br>(0.18) |
| B | | | | | | C<br>(C) | 0.03<br>(0.04) | 0.10<br>(0.14) |

S o u r c e: Author's own elaboration.

Table 6. AHP matrix for background colours, the first run

| Colour | R | G | B | C | M | Y |
|---|---|---|---|---|---|---|
| R | 1.00 | 0.13 | 8.80 | 0.12 | 0.34 | 0.12 |
| G | 7.83 | 1.00 | 8.61 | 0.28 | 8.02 | 0.27 |
| B | 0.11 | 0.12 | 1.00 | 0.12 | 0.12 | 0.11 |
| C | 8.22 | 3.54 | 8.41 | 1.00 | 8.22 | 8.80 |
| M | 2.95 | 0.12 | 8.02 | 0.12 | 1.00 | 0.12 |
| Y | 8.41 | 3.73 | 8.80 | 0.11 | 8.02 | 1.00 |

S o u r c e: Author's own elaboration.

Table 7. AHP matrix for background colours, the second run

| Colour | R | G | B | C | M | Y |
|---|---|---|---|---|---|---|
| R | 1.00 | 0.13 | 8.41 | 0.12 | 0.39 | 0.13 |
| G | 7.83 | 1.00 | 8.80 | 0.46 | 7.63 | 0.72 |
| B | 0.12 | 0.11 | 1.00 | 0.12 | 0.13 | 0.12 |
| C | 8.22 | 2.17 | 8.61 | 1.00 | 7.83 | 1.98 |
| M | 2.56 | 0.13 | 7.83 | 0.13 | 1.00 | 0.12 |
| Y | 7,80 | 0,38 | 7,80 | 0,26 | 8,20 | 1,00 |

S o u r c e: Author's own elaboration.

The same as in Study 1 the order of colours has not changed in two runs. ANOVA showed also that significant differences exist (first run: 298.7, second run: F=239.5). Cyan has been evaluated as the best colour but green and yellow are just behind. They are followed by significantly different group of magenta and red colour while blue is located at the very end of the ranking. No significant differences between the runs have been found (the biggest Z-score: 1.10). The AHP analysis showed that the results from the first run are strongly inconsistent (first run: CR=0.235, second run: CR=0.087). The same as in Study 1, the second run had more coherent answers but they are still near the border of tolerance.

The opinions about background colours have been expressed more strongly (many values in AHP matrixes are close to extremes). Though, the results are less consistent than those from the first study. Pastel colours (cyan, green, yellow, magenta) are well known to be used in highlighters. There is no meaningful difference between top three of them. Magenta has in total lower score, probably because it is perceived as females' colour and is not willingly used by males. Red and blue perform well in font colour distinction but they are definitively not a good choice for background highlighting. Especially blue has been evaluated very poorly. It can be explained by low contrast between black text and dark background. It would be an interesting study to check how dark background colours generate a pop-out effect with other font colours (e.g. white or yellow). It remains, however, beyond the scope of this paper.

## 5. Limitations and future work

The survey has been carried out under several limitations. Only 6 colours have been taken into consideration. The main settings (surrounding text and background, font colour in the second survey) have been set to fixed values. The main factor differentiating the colours was only hue. The context of reading has been consciously taken out. In future other colour combinations can be investigated. Developing the tests under conditions closer to reality (authentic documents or web pages) would also be a good idea. The study can be revised on bigger data sample as well as the differences between various groups (gender, age etc.) can be examined. The relationship between general preferences (e.g. somebody's favourite colour) and colour ranking can also be investigated. Despite of the same order of colours in two runs of each study the issues with consistency of the ranking arisen. The insufficient preparation of participants can explain the differences between both runs but this topic should be

further investigated, e.g. more runs can be executed. The other methodology can be used to obtain more objective results. The test environment similar to once proposed by Strobelt et al. (2016) can be prepared or even the eye-tracking devices can be used.

## 6. Conclusions

This study confirms that the differences between willingness of using colours as a highlighting technique exist. The ranking of font colours and background colours has been established and has not changed in both runs of the experiment (G/R/M/B/C/Y and C/Y/G/M/R/B correspondingly). The issue with the consistency of given answers is present though. The survey gives a preliminary insight and has potential for further development. Despite of all limitations it can be clearly seen that incorrect usage of colour can be easily noticed by readers and it has an impact on the text legibility.

Acknowledgements

Special thanks to Professors Jerzy Grobelny and Rafał Michalski from the Wrocław University of Science and Technology for valuable comments and suggestions. The acknowledgements are given also to all participants for their commitment in this study.

## References

Churchill, E. T., Trevor, J., Bly, S., Nelson, L., Cubranic, D. (2000). Anchored conversations: chatting in the context of a document. In: *Proceeding of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 454–461). New York: ACM Press. ISBN 1581132166.

Hall, R. H., Hanna, P. (2004). The impact of web page text-background colour combinations on readability, retention, aesthetics and behavioural intention. *Behaviour & Information Technology*, *23* (3), 183–195.

Hill, L. S. (1997). Readability of screen displays with various foreground. Background color combinations, font types and word styles. In: *Proceedings of the Eleventh National Conference on Undergraduate Research* (pp. 742–746). Austin, Texas.

Humar, I., Gradišar, M., Turk, T. (2008). The impact of color combinations on the legibility of a Web page text presented on CRT displays. *International Journal of Industrial Ergonomics, 38* (11–12), 885–899.

Ibraheem, N. A., Hasan, M. I., Khan, R. Z., Mishra, P. K. (2012). Understanding color models: A review. *ARPN Journal of Science and Technology*, *2* (3), 265–275.

Ling, J., van Schaik, P. (2002). The effect of text and background colour on visual search of web pages. *Displays*, *23*, 223–230.

Livre, L. C. (1912). Lisibilité des affiches en couleurs. In: *Cosmos* (p. 255). Sheldons Limited House.

Marshall, C. (1997). Annotation: from paper books to the digital library. In: *Digital Libraries '97 2nd ACM International Conference on Digital Libraries* (pp. 131–140). New York: ACM Press. ISBN 0897918681.

Matthews, L. M., Mertins, K. (1987). The influence of color on visual search and subjective discomfort using CRT display. In: *Proceedings of the Human Actors Society 31st Annual Meeting* (pp. 1271–1275). Santa Monica: HFES.

Nielsen, J. (1997). *How users read on the Web* [online, accessed: 2017-08-10]. Retrieved from: http://www.useit.com/alertbox/9710a.html.

Nist, S. H., Hogrebe, M. C. (1987). The role of underlining and annotating in remembering textual information. *Reading Research and Instruction*, *27* (1), 12–25.

Pastoor, S. (1990). Legibility and subjective preference for color combinations in text. *Human Factors*, *32* (2), 157–171.

Pearson, R., van Schaik, P. (2003). The effect of spatial layout of and link colour in web pages on performance in a visual search task and an interactive search task. *International Journal on Human-Computer Studies*, *59* (3), 327–353.

Peterson, S. (1992). The cognitive functions of underlining as a study technique. *Reading Research and Instruction*, *31* (2), 49–56.
Saaty, T. L. (1977). A scaling method for priorities in hierarchical structures. *Journal of Mathematical Psychology*, *15* (3), 234–281.
Schilit, B. G. (1998). Beyond paper: Supporting active reading. In: *Proceedings of CHI '98* (pp. 249–256). New York: ACM Press.
Silvers, V. L., Kreiner, D. S. (1997). The effects of pre-existing inappropriate highlighting on reading comprehension. *Reading Research and Instruction*, *36* (3), 217–223.
Strobelt, H., Oelke, D., Kwon, B. C., Schreck, T., Pfister, H. (2016). Guidelines for effective usage of text highlighting techniques. *IEEE Transactions on Visualization and Computer Graphics*, *22* (1), 489–498.
Tinker, M. P. (1928). Influence of type form on speed of reading. *Journal of Applied Psychology*, *12*, 359–368.
Tinker, M. P. (1929a). Studies of typographical factors influencing speed of reading: II. Size of type. *Journal of Applied Psychology*, *13* (2), 120–130.
Tinker, M. P. (1929b). Studies of typographical factors influencing speed of reading. III. Length of line. *Journal of Applied Psychology*, *13* (3), 205–219.
Tinker, M. P. (1929c). Studies of typographical factors influencing speed of reading: V. Simultaneous variations of type site and line length. *Journal of Applied Psychology*, *13* (2), 72–78.
Tinker, M. P. (1929d). Studies of typographical factors influencing speed of reading: VI. Black type versus white type. *Journal of Applied Psychology*, *13* (2), 241–247.
Tinker, M. P. (1929e). Studies of typographical factors influencing speed of reading. VII. Variations in color of print and background. *Journal of Applied Psychology*, *13* (2), 471–479.
Tinker, M. P. (1932). Studies of typographical factors influencing speed of reading: X. Style of type face. *Journal of Applied Psychology*, *16*, 605–613.
Tinker, M. P. (1940). *How to Make Type Readable: A Manual for Typographers, Printers, and Advertisers, Based on Twelve Years of Research Involving Speed of Reading Tests Given to 33,031 Persons*. New York: Harper & Brothers.
Tinker, M. P. (1942). Reader preferences and typography. *Journal of Applied Psychology*, *26*, 38–40.
Tinker, M. P. (1944). Eye movements in reading black print on white background and red print on dark green background. *American Journal of Psychology*, *57*, 93–94.
Tinker, M. P. (1946). Readability of mixed type forms. *Journal of Applied Psychology*, *30*, 631–637.
Tinker, M. P. (1955). *Tinker speed of reading test*. Minneapolis: University of Minnesota Press.
Tinker, M. P. (1963). *Legibility of Print*. Ames: Iowa State University Press.
Wang, H. C. (2003). Effects of screen type, Chinese typography, text/background color combination, speed, and jump length for VDT leading display on users' reading performance. *International Journal of Industrial Ergonomics*, *31* (4), 249–261.

## Wykorzystanie kolorów jako techniki wyróżniania tekstu

**Abstrakt:** W różnych sytuacjach występuje potrzeba wyróżnienia fragmentu tekstu. W tym celu dostępnych jest wiele różnych technik, między innymi: kolor czcionki, kolor tła, podkreślenie, wielkość i styl czcionki, kapitalizacja. Wytyczne opisujące użycie kolorów w różnych kontekstach można odnaleźć w wielu źródłach. W ciągu ubiegłego stulecia przeprowadzono liczne badania w tej dziedzinie, jednak jak dotąd nie badano wpływu kolorów na intensywność efektu wyróżniania (ang. *pop-out effect*). Na podstawie przeprowadzonej ankiety i analizy tego zjawiska określony został ranking najlepszych kolorów używanych do wyróżniania tekstu. Zweryfikowane zostały dwie metody (kolor czcionki i kolor tła) dla sześciu podstawowych kolorów. Badanie zostało przeprowadzone dwukrotnie na tej samej grupie respondentów, aby sprawdzić stabilność odpowiedzi. Spójność opinii została zbadana przy użyciu metody AHP. Wyniki wskazują, że istnieją

znaczne różnice między kolorami. Preferencje zostały pogrupowane w klasy. Stabilność odpowiedzi została potwierdzona, jednak niektóre wyrażane poglądy nie są spójne. Przeprowadzone badanie stanowi wstęp do omawianego tematu. Wiele czynników pozostaje poza zakresem niniejszego artykułu i stanowi potencjał do dalszych eksperymentów (m.in. specyfika kulturowa, odcienie kolorów, kontekst prezentacji).

**Słowa kluczowe:** wyróżnianie tekstu, kolory w tekście, wizualna analiza dokumentu

# Ergonomic awareness and its shaping


## Aleksandra E. Jasiak

Poznan University of Technology

Faculty of Engineering Management



**Abstract:** The article presents the problem of formation of ergonomic awareness in the group of academic teachers, students of the University of Technology and the University of Economic Science in Poznań. A survey has been carried out to verify the knowledge of basic terms from the area of ergonomics, as well as the term of awareness and its interpretation in the group of examined people. The problem of forming ergonomic awareness has been discussed in different age groups. Methods of forming ergonomic awareness and methods adjusted to different age groups mentioned before have been presented. Both general social activities for shaping ergonomic awareness in the entire society and individual activities, directed on specific individuals, have been distinguished.



**Key words:** ergonomic awareness, principle terms, social groups, conclusions


## 1. Introduction

The role of ergonomics and its aspects in man's life is very important. Its principles are used at present for designing workstations, but also in the private sphere—for designing and perfecting places of leisure, fun, but also in case of elements of home furnishings, devices and objects of everyday use (Olszewski, 2013). There are many examples: from places for work and play on the computer (chairs, desks, parts of computer devices, like for example a computer mouse), to devices for the household and things for everyday use (like pens, ergonomic cutlery, beds and mattresses and many other). Many people do not realize how often they use benefits of the ergonomics in their everyday life. Some of them perceive ergonomics as an aspect connected only with professional activities. Still, it is very important for their health to know and implement into practice principles of the ergonomics. A person with proper knowledge of this subject is able to understand that ergonomics and its rules help keeping a good health condition for longer. Therefore, it is so important to shape ergonomic awareness in the society. This refers


Correspondence to:
Aleksandra E. Jasiak
Politechnika Poznańska
Wydział Inżynierii Zarządzania
Katedra Ergonomii i Inżynierii Jakości
pl. Marii Skłodowskiej-Curie 5
60-965 Poznań, Poland
Tel.: +48 61 665 33 84
E-mail:
aleksandra.jasiak@put.poznan.pl

not only to people who are occupationally active, who should know how to adjust their workstations for their own needs in accordance to principles of ergonomics. Ergonomic awareness is also important outside work because it can give many advantages for the man's health.

## 2. The purpose of the paper

This article is aimed at defining the term of 'ergonomic awareness' on the basis of already existing definitions of the ergonomics and awareness that the author has found in literature of the subject. Moreover, it is important to present the problem of ergonomic awareness to the group of participants of the survey. The paper also shows how to shape ergonomic awareness in the society.

## 3. Ergonomic awareness—definitions

The discussion on ergonomic awareness requires studying and understanding terms of ergonomics and awareness that can be found in vast literature.

The idea of ergonomics was used for the first time by Wojciech Jastrzębowski. He defined ergonomics as 'science on using forces and skills given to man by his Creator' (Jastrzębowski, 1857). According to the International Ergonomic Association, ergonomics 'studies relations between man and his occupation, devices and (material) environment in its wider meaning—including work, leisure, situations at home and during travelling' (Pacholski, 1986). In 1983 the Polish Ergonomic Association has formed a definition: 'Ergonomics is an applied science for optimizing the adjustment of devices, machines, technologies, organization and material work environment, as well as objects of everyday use, to requirements and needs of the physiologic, psychological and social demands of man' (www.ergonomia-polska.com, 2017). The definition suggests that ergonomics does not refer only to the work environment, but it is also used for objects of everyday use. It is important to remember that ergonomics is a discipline based on other sciences, like psychology of work, sociology of work, physiology of work, occupational health and safety, anthropometrics or social and technical sciences, like machine construction and engineering.

The definition of awareness can be found in dictionaries of the Polish language, but also in psychology dictionaries. It is basically a term that refers to human psychology. According to the PWN e-dictionary, awareness can be defined in a few different ways: as 'knowing about the existence of something', 'aims and targets common for all members of a certain group', 'state of consciousness' and 'man's ability to acquaint and asses himself and his environment, characteristic for a man' (www.sjp.pwn.pl, 2017).

The Polish Language Dictionary edited by professor M. Szymczak defines awareness as:

- an ability to be conscious in categories of terms of what is the subject of registered perception and sensation,
- the higher level of the psychological development that is characteristic for a man,
- the mind's ability to reflect an objective reality conditioned by social forms of man's life and shaped in time of historical psychological development,
- the threshold of awareness, lower limit of sensibility, under which external and internal stimulants do not deliver messages to the central nervous system (Szymczak, 1989).

This is a very developed definition that categorizes man's awareness as a part of his/ her psychics.

According to the online Multimedia Encyclopedia WIEM, awareness is:

– a physiological state of the central nervous system conditioned by a correct functioning of the cerebral cortex and the reticular formation that allows keeping the orientation on the place, time and situation (also called 'the higher state of consciousness')—definition used in medical science,
– a psychological term with many meanings:
  a) skills to be aware of one's own behaviour,
  b) the highest level of man's psychological development allowing reflection on reality,
  c) a state of consciousness, waking, receiving stimuli,
  d) ability to experience sensations and emotional states,
– a primal term in philosophy, whose meaning is being explained while using it, alike the primal terms of mathematics are being explained in the process of their application:
  a) it means (approximately) consciousness, ability to focus the orientation and feelings, it constitutes the basis for creating knowledge and memorizing,
  b) as self-awareness—it is a specific feature of the human species.

According to what has been established in phenomenology, awareness is always intentional and directed on a specific material or abstractive object and connected with the sensation of own 'I':

– in religions it is connected with the idea of the soul,
– modern researches on awareness involve different areas of knowledge, like: psychology, philosophy, biology (neuro-physiology), psychiatry and physics (www.portalwiedzy.onet.pl, 2017).

Basing on existing definitions of ergonomics and awareness, it is possible to determine components of ergonomic awareness, like the knowledge about oneself in aspects of ergonomics, watching over fulfillment of the rule of ergonomics, perception based on the knowledge of perception of ergonomics and watchfulness—interpreted as due dilligence, care for the ergonomic conditions of human life, resulting from understanding of significance of the issue. This leads to a conclusion that ergonomic awareness is a certain state of mind, of perception, based on a proper knowledge of ergonomics, which focuses on ensuring that conditions of external environment were adjusted to person's psychical and physical conditions.

## 4. Formation of ergonomic awareness in different age groups

Shaping ergonomic awareness is related to one's education and accepting specific attitudes and believes based on the knowledge from the area of ergonomics. It is connected with preparing individual activities and behaviours in order to popularize them in social groups or entire societies, sharing ergonomic culture, consolidation of the belief about the existence of mutual connections between the level of the quality of life of individuals and societies (Domeracki, Tyburski, 2011). Education and formations are the most important for shaping the awareness; they determine educational programmes for different age groups: in primary

schools, high schools or universities; they significantly influence man's development from pedagogic point of view.

Man shapes his worldview and attitudes, believes and awareness on the basis of different sources of information, such as media, work environment, social environment, etc. Each group of age is susceptible to slightly different messages affecting the development of attitudes and believes on ergonomics. The knowledge on ergonomics is the crucial element in each of these groups. Only a certain level of knowledge can guarantee a proper formation of awareness from this area. In this case, education remains the main source of knowledge: both scholar or academic, and the knowledge gained from individual studies from books, magazines, TV programmes, etc.

Presenting certain values, views or attitudes to school pupils is an elementary method for shaping the awareness in this area. If the same values or attitudes are shown both by teachers and parents, there is a bigger chance that the influenced person will develop a required awareness. One must keep in mind that it is crucial to present the knowledge from the area of ergonomics that would be suitable for the age of the receiving person. In this case everything depends on how children will be directed by their teachers and parents.

A little older people, high school students, have already developed certain values, views and attitudes. In this case formation of ergonomic awareness would be the most efficient provided it functions basing on different sources: school education, external environment, the media.

The same methods work for adults. In this case scholar education is not so important anymore; it is mainly replaced by the influence of the external environment, and especially the work environment of the specific individual. Therefore, it is so important that employers are also aware of the fact that the environment they create affects in a way their staff attitudes and awareness. Therefore, it is crucial to promote ergonomic attitudes and knowledge in the work environment and to give information on material, economical and health benefits resulting from this awareness of the environment. It is fundamental to make employers aware that an employee with ergonomic awareness would bring him mere profits. Such employee has a better knowledge of safe work, he is more efficient and he generates less losses (like accidents at work or sick leaves). Therefore, the promotion of ergonomic awareness in the work environment is so important. In case of older people, with already shaped views and awareness, any changes of attitudes are very difficult. Older people often want to keep their beliefs, they think that what was acceptable until now, is the best solution and shouldn't change. Unfortunately, they do not want to hear about many new truths that came out along with the development of science, including ergonomic science. Of course, there are some older people who are more open to new knowledge, new information and scientific inventions. This group more easily accepts knowledge of ergonomic and is more susceptible on the shaping of ergonomic awareness.

Developing the awareness is a challenge on many levels. Depending on the group, approaches to this issue differ. Still, it is certainly important both for man, groups and entire societies to ensure that ergonomic awareness develops and systemizes on the basis of knowledge of the subject.

Present elaboration uses results of a survey that examined knowledge of the term of 'ergonomics', as well as the term of 'ergonomic awareness' and its interpretation in the examined groups. Groups that participated in the survey were:

– academic teachers,
– students of the Poznan University of Technology,
– students of the Poznań University of Economics and Business.

## 5. Analysis of the present situation on the basis of results of the survey

### 5.1. Part one

Examined respondents from the three groups mentioned above had to answer the following question: what is ergonomics and what is ergonomic awareness? A part of questionnaire forms enclosed also a question about how do respondents evaluate their ergonomic awareness and closed questions concerning the best (according to the respondents) way of shaping ergonomic awareness. Examined people were students from different fields of study of the Poznan University of Technology, the Poznań University of Economics and Business, and academic teachers of these universities.

521 responses were obtained in total of the survey, including answers to all questions from the query. 20% of them had to be rejected because of lack of logical relations between these answers and the topic of the research. The first illustration shows results of particular groups of answers.

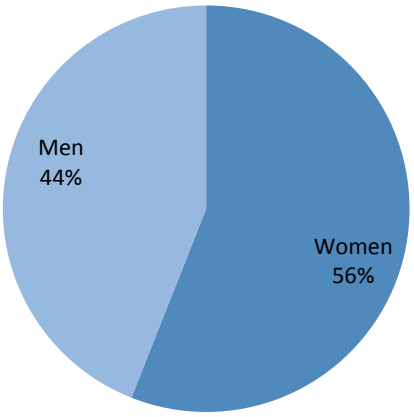



Figure 1. Structure of respondents by gender

S o u r c e: Author's own elaboration based on the research.

The majority of respondents were women—56%, while men were 44% of participants of the research.

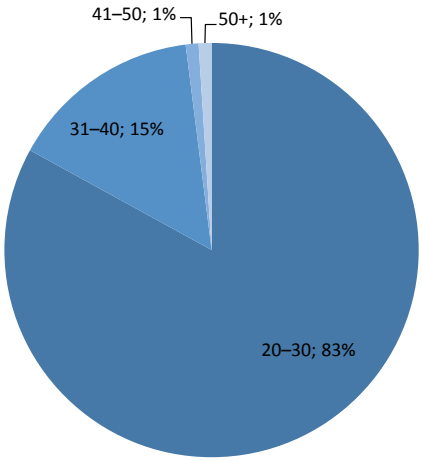



Figure 2. Structure of respondents by age

S o u r c e: Author's own elaboration based on the research.

Quantitative data shown in Figure 2 proves that most of the examined people were in the age between 20 and 30 years (83%). The second biggest sub-group was represented by participants aged from 31 to 40 years (14%). Remaining groups enclosed people between 41 and 50 years (1%) and older than 50 years (1%).

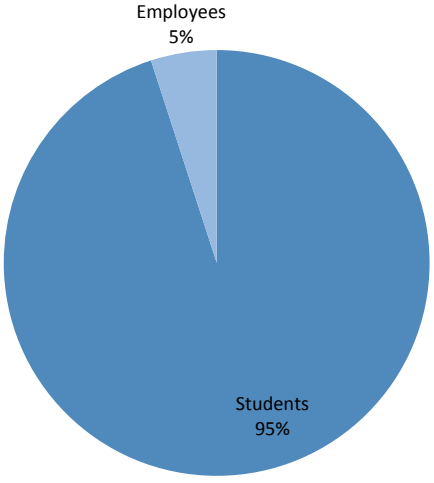



Figure 3. Structure of respondents by their status

S o u r c e: Author's own elaboration based on the research.

It is important to underline that as it was shown in Figure 3, 5% of respondents were employees of the Poznan University of Technology. The rest of the examined group were students or graduates.

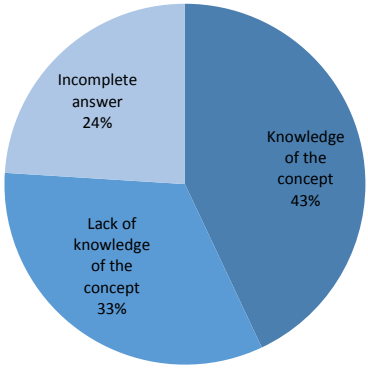



Figure 4. Structure of respondents in view to their knowledge of the concept of ergonomics

S o u r c e: Author's own elaboration based on the research.

As it was illustrated in Figure 4, the analysis shows that 43% of respondents know the idea of ergonomics and on this basis they are able to interpret the concept of ergonomic awareness. This part of examined people could correctly define the term of 'ergonomics' and connect this knowledge with the term of 'awareness' in a logical way. Therefore, interpretation of the term 'ergonomic awareness' was satisfying in this group. 33% of respondents did not know at all the concept of ergonomics, so they were not able to interpret the term of 'ergonomic awareness'. Those were mostly people, who confused ergonomics with economics, or who referred this concept to economic aspects of professional occupation. However, 24% of answers were incomplete, only partially correct. This may point at the fact that respondents have met the concept of ergonomics but they do not fully understand it. The majority of examined people relate ergonomics and ergonomic awareness strictly to professional activities.

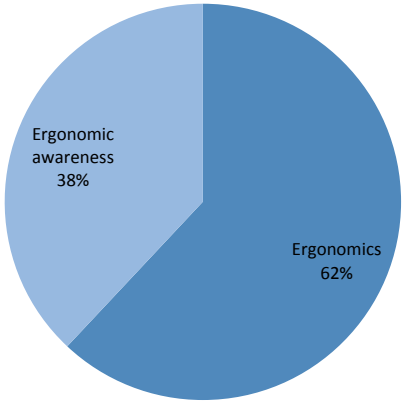



Figure 5. Structure of respondents in view to their knowledge of the concept

S o u r c e: Author's own elaboration based on the research.

Figure 5 illustrates the percentage of knowledge of particular terms that were asked in questionnaire forms. In the group of participants who could define concepts presented in the survey in a correct and logical form, 62% answered properly about the term of 'ergonomics' and 38%—about 'ergonomic awareness'. This shows that the majority of examined people know and recognize the term of 'ergonomics', while they still do not handle with the idea of 'ergonomic awareness'. This may result from the diversified interpretation of the concept of awareness itself, but also from the fact that ergonomic awareness is a relatively new term for the respondents.

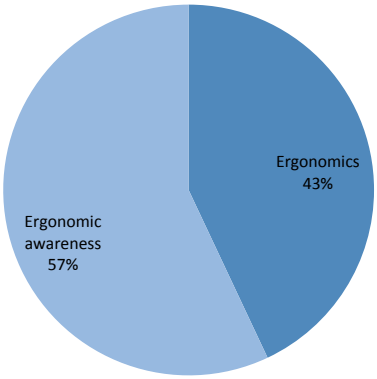



Figure 6. Structure of respondents in view to their unacquaintance of the concept

S o u r c e: Author's own elaboration based on the research.

Figure 6 shows a percentage of unacquaintance of concepts about which respondents were asked in the survey. In the group of incorrect answers, 57% referred to ergonomic awareness, and 43%—to ergonomics. Like it has been already noticed, this may result from the low recognition of the term 'ergonomic awareness' and from diversified interpretation of the term 'awareness' itself.

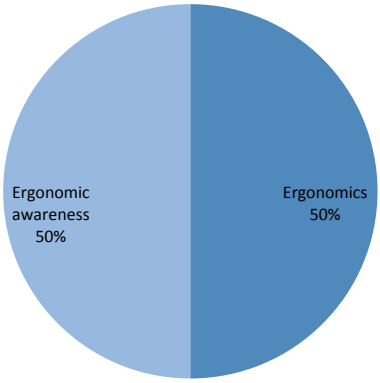



Figure 7. Percentage share of partially correct responses of examined people

S o u r c e: Author's own elaboration based on the research.

The frequency of the occurrence of incomplete answers or partially correct ones was the same for both terms of 'ergonomics' and 'ergonomic awareness'—see Figure 7. Moreover, examined people asked about assessing their own ergonomic awareness gave answers as follows:

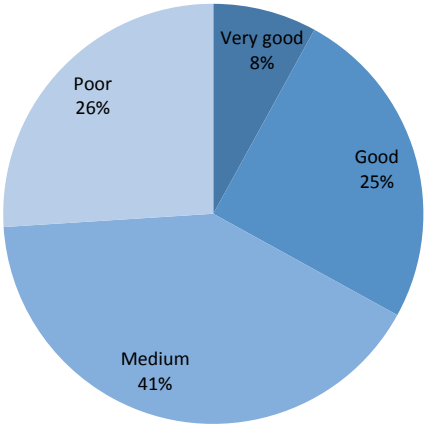



Figure 8. Structure of respondents in view to their assessment about own ergonomic awareness

S o u r c e: Author's own elaboration based on the research.

As it was shown in Figure 8, 41% of respondents declared to have a medium level of ergonomic awareness, 26% declared to have a poor ergonomic awareness and 25% stated that they highly assessed their ergonomic awareness. Only 8% declared to have a very good ergonomic awareness. What was interesting, those who assessed their ergonomic awareness as very good or good could not correctly interpret terms from the survey, while people who assessed their awareness as medium or poor could correctly and logically interpret both terms of 'ergonomics' and 'ergonomic awareness'.

Respondents were asked about their opinion on the best ways to shape ergonomic awareness. The majority (88%) suggested the improvement of the didactic process on ergonomics as well as the practical exercises and seminars on the subject. Only 12% of examined people stated that only practical exercises and seminars on the subject would help. Not any respondent gave any other, additional method for shaping ergonomic awareness.

## 5.2. Student's view

This paper has used the survey 'Świadomość ergonomiczna i jej kształtowanie' ['Ergonomic awareness and its shaping'] (Goścień, Krupa, Piechocka, 2017), prepared for widening described research and verifying the knowledge on the principle term connected to the ergonomics and ergonomic awareness. The contents of the survey are presented in Annex 1.

Several dozen students completed the questionnaire. Here below the author presents the analysis of obtained results.

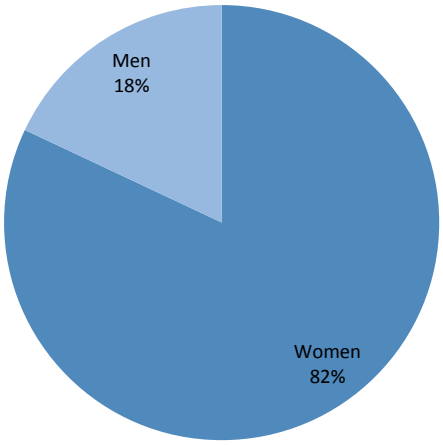



Figure 9. Structure of respondents by gender

S o u r c e: Author's own elaboration based on the research.

As it was shown in Figure 9, the majority of respondents were women—82%, while men were 18% of the examined people.

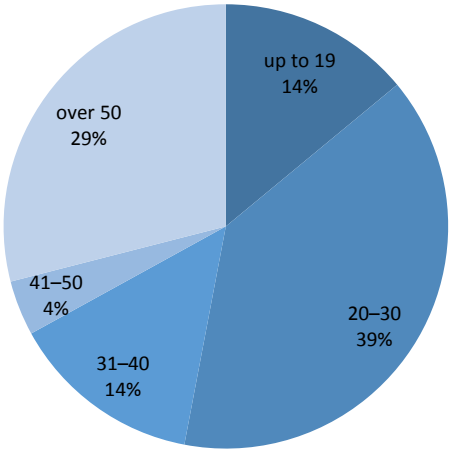



Figure 10. Structure of respondents by age

S o u r c e: Author's own elaboration based on the research.

Figure 10 shows the age structure of participants of the survey. The biggest part of examined group was represented by people between 20 and 30 years (39%). The next biggest group was in the age of more than 50 years (29%). People between 41 and 50 years represented the smallest part of the examined group (4%).

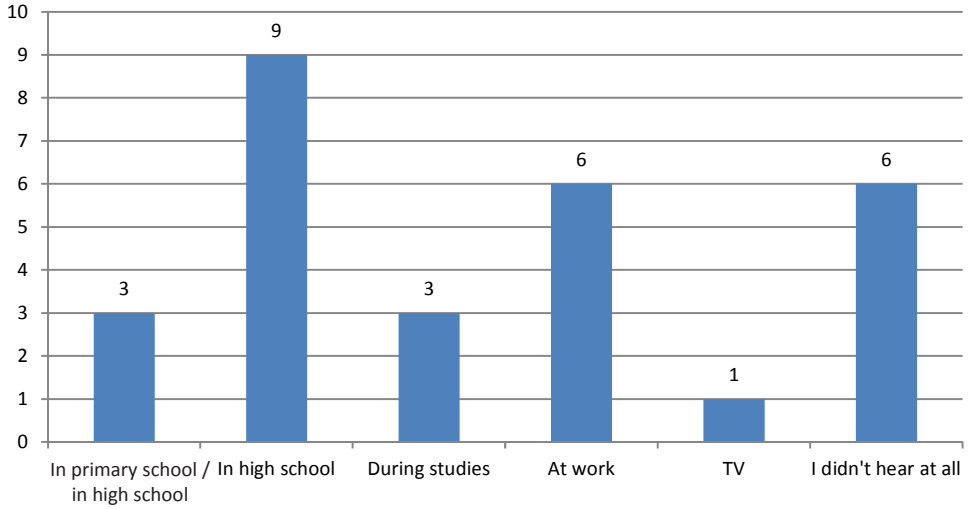



Figure 11. Structure of respondents in view of their first meeting of the term of 'ergonomics'

S o u r c e: Author's own elaboration based on the research.

The majority of respondents pointed at secondary school and work as place where they first met the concept of ergonomics (see Figure 11). The smallest parts of respondents declared to hear about ergonomics from the media (only one person) or that they did not meet this concept at all (2 respondents).

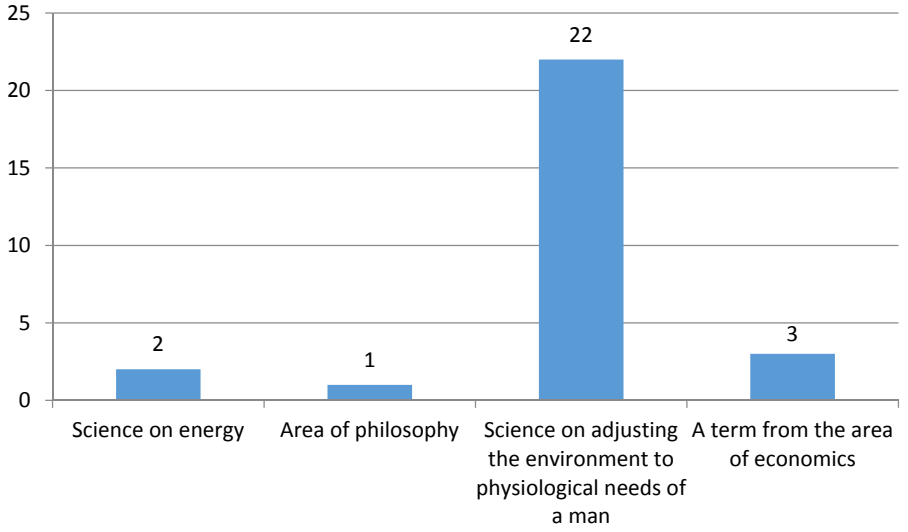



Figure 12. Structure of responses given to the question what ergonomics was

S o u r c e: Author's own elaboration based on the research.

In case of the question 'What is ergonomics?' respondents mostly pointed at the correct answer (22 examined participants, i.e. 79%), i.e. 'science on adjusting the environment to physiological needs of a man' (see Figure 12).

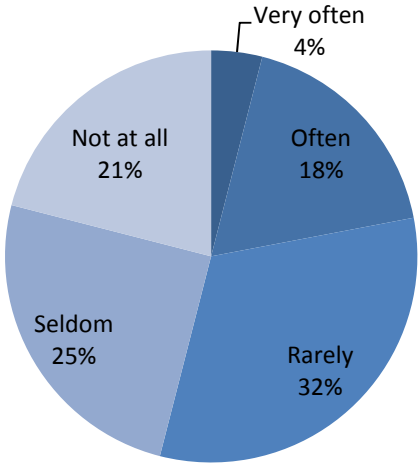



Figure 13. Responses of the examined group to the question: 'How often in your everyday life do you meet the term of "ergonomics"?'

S o u r c e: Author's own elaboration based on the research.

One can draw conclusion from Figure 13 that the majority of respondents rarely or seldom hear the term of 'ergonomics' in their everyday life. 21% of respondents stated that they do not meet this concept. Only 18% of participants of the survey were frequently meeting the term of 'ergonomics' and 4%—very often.

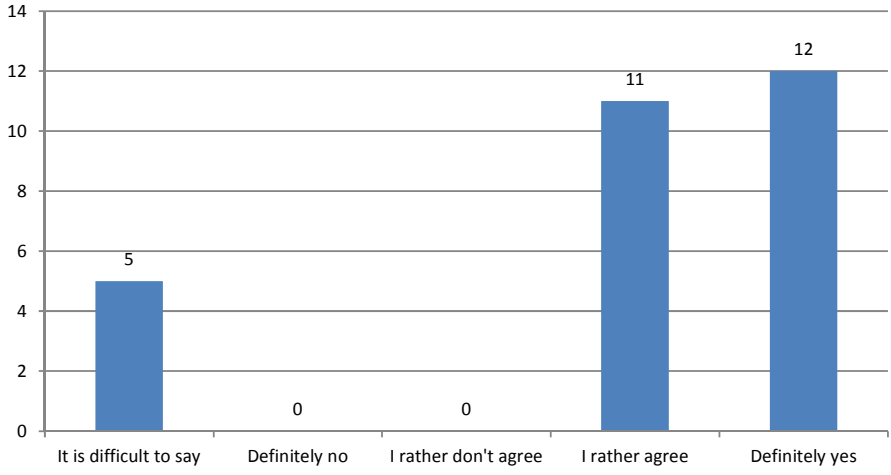



Figure 14. Responses of the examined group to the question: 'Do you think that following rules of ergonomics in private and professional life is important for man's health?'

S o u r c e: Author's own elaboration based on the research.

23 respondents think that following rules of ergonomics is important. 5 people have difficulties with deciding whether ergonomics is important or not (see Figure 15).

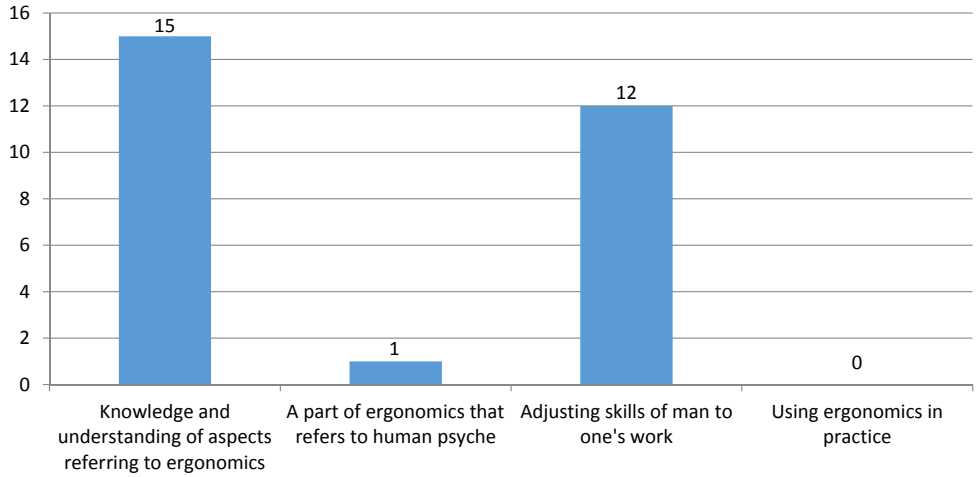



Figure 15. 'What is ergonomic awareness?' Number of answers for particular variants

S o u r c e: Author's own elaboration based on the research.

Ergonomic awareness was understood by 15 respondents as 'knowledge and understanding aspects of ergonomics', while 12 people stated that they understand this term as 'adjusting skills of a man to his/ her work'.

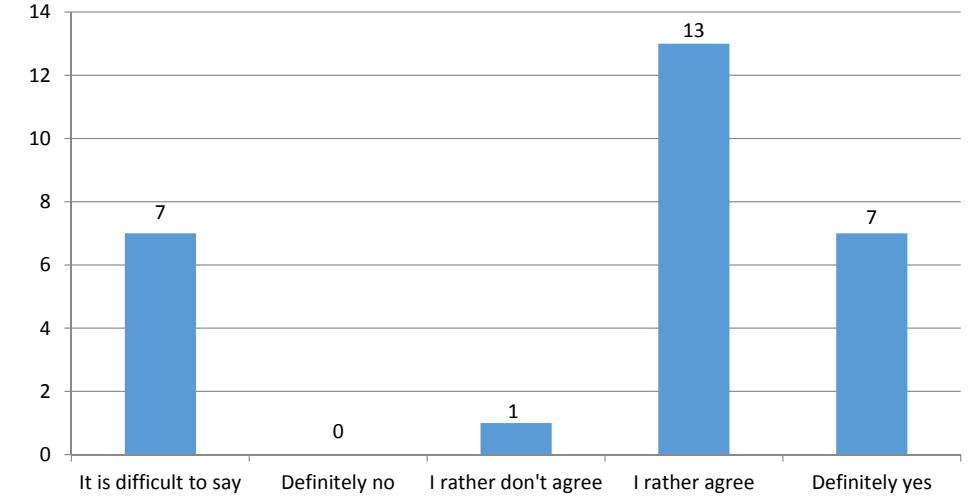



Figure 16. 'Do you think ergonomic awareness should be shaped since the earliest years of childhood?' Number of answers for particular variants

S o u r c e: Author's own elaboration based on the research.

Figure 16 shows that 13 respondents think ergonomic awareness should be shaped since the earliest years of childhood. However, 7 respondents did not have their own opinion on this subject.

The questionnaire enclosed also two open questions, to which respondents had to give answers with their own words. The first question: 'What does ergonomics put emphasis on?' obtained correct answers. The majority of respondents related ergonomics to the external environment where man lives. The next question was: 'What kind of actions can be undertaken for shaping ergonomic awareness?' In this case examined people mostly pointed at education. There were no answers relating the subject with methods such as popularization of the topic in media or using advertizing spots.

## 6. Conclusions of the analysis

Students who mainly took part in the survey represented the group aged between 20 and 30 years, with secondary or higher education. The analysis of questionnaires showed that 43% of the respondents know the term of 'ergonomics' and on this basis they can interpret the concept of 'ergonomic awareness'. However, 33% of respondents do not know the term of 'ergonomics' and they do not know how to interpret the concept of 'ergonomic awareness'.

41% of the examined people assessed their ergonomic awareness as medium and 26% assessed it as poor, 25%—declared to have a good ergonomic awareness, and 8%—a very good one. Those who declared to have a good or a very good ergonomic awareness could not interpret correctly terms from the survey, while people who assessed their awareness as medium or poor interpreted these concepts correctly.

An additional, deepening knowledge survey was carried out on the subject of knowledge of ergonomics and ergonomic awareness in the examined group. Most of respondents—32% declared that they first met ergonomics in secondary school. 79% respondents gave a correct answer to the question: 'What is ergonomics?', which was: 'science on adjusting the environment to physiological needs of a man.' The next analyzed problem was the aspect of meeting the concept of ergonomics in everyday life. More than a half of respondents did not meet this tem and only 3.6% had any contact with this concept. 82% of the survey's participants think that following principles of ergonomics is important for man's health, however, 18% of them have difficulties with deciding whether ergonomics is important or not. 54% of respondents think that ergonomic awareness is the knowledge and understanding of aspects on ergonomics, while 43% of respondents understand this term as adjusting man's skills to his work. 13% of respondents think that ergonomic awareness should be shaped since the earliest childhood.

## 7. Methods for shaping ergonomic awareness

Methods for shaping ergonomic awareness differ depending on the age of those whom we want to educate. In case of children, on the level of primary school, shaping of ergonomic awareness must be based on propagating proper knowledge from the area of ergonomics, in a way adjusted for children in this age. It can be made by interesting lessons on ergonomics, during which educators could present ergonomics in a positive light, as something good and useful in everyday life, having good impact on our health. It would be also a good method to

organize workshops on ergonomics. Children would actively participate in games and tasks suitable to their abilities and this would facilitate their education of the subject. This form of classes would also make children recognize ergonomics as something positive and form certain habits, and this is a very important aspect for shaping ergonomic awareness.

In the case of young people (i.e. people at secondary school level), not only school classes on ergonomics are needed (in form of theoretical or practical classes, workshops or additional courses). In this case one must use messages in the media, like radio and TV campaigns, social events for promoting positive influence of ergonomics on man's health or promoting pro-ergonomic attitudes. Information in the media and social media would play a very important role for shaping correct attitudes and behaviours.

The formation of ergonomic awareness in minds of adults or elders must be focused on courses, trainings or lectures organized by work environment, but also by the social and scientific environment. In this case it is important to give theoretical knowledge on ergonomics, but also to provide practical classes. In addition, the formation of certain attitudes and behaviours on ergonomics can result from messages from the media, for example advertisement or promotion campaigns that could change the perception of ergonomics and its principles in everyday life.

## 8. Conclusions

The general knowledge of people on ergonomics and ergonomic awareness is on a medium level. Students and other young people know more about it and notice more aspects related to ergonomics in their everyday life. Older people don't know the concept or ergonomics and they find it incomprehensible. Therefore, one should emphasize more this area of knowledge because ergonomics serves for improving work conditions.

The problem of shaping ergonomic awareness in the society is a very important issue. Research run for needs of the present article are only introducing wider analysis of the subject. Presented research does not extract the topic connected with ergonomic awareness and shaping it in the society. Therefore, the author states that it is necessary to continue research in this area.

# Annex 1

## Survey questionnaire

Gender:
- □ woman
- □ man

Age:
- □ up to 19
- □ 20–30
- □ 31–40
- □ 41–50
- □ over 50

Education:
- □ None
- □ Primary
- □ High school
- □ Vocational
- □ Secondary
- □ Higher

1) Please mark when you first heared about ergonomics:
   a) in primary school or in high school
   b) in secondary school
   c) during studies
   d) at work
   e) I didn't hear about ergonomics at all
2) What is ergonomics?
   a) science on energy
   b) area of philosophy
   c) science on adjusting the environment to physiological needs of a man
   d) a term from the area of economics
3) How often in your everyday life you meet the term of 'ergonomics'?
   a) very often
   b) often
   c) rarely
   d) seldom
   e) not at all

4) Do you think that following rules of ergonomics in private and professional life is important for man's health?
   a) definitely yes
   b) I rather agree
   c) I rather don't agree
   d) definitely no
   e) it is difficult to say
5) What does ergonomics put emphasis on?

   ……
6) What is ergonomic awareness?
   a) knowledge and understanding of aspects referring to ergonomics
   b) a part of ergonomics that refers to human psyche
   c) adjusting skills of man to his/ her work
   d) using ergonomics in practice
7) Do you think that ergonomic awareness should be shaped since the earliest years of childhood?
   a) definitely yes
   b) I rather agree
   c) I rather don't agree
   d) definitely no
   e) it is difficult to say
8) What kind of actions can be undertaken for shaping ergonomic awareness?

   ……..

## References

Domeracki, P., Tyburski, W. (2011). *Podstawy edukacji i kształtowania świadomości społecznej w duchu zrównoważonego rozwoju*. Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika. ISBN 9788323127406.

Goścień, Ł., Krupa, A., Piechocka, R. (2017). Świadomość ergonomiczna i jej kształtowanie – kwestionariusz do badań w ramach przedmiotu *makroergonomia* pod kierownictwem dr hab. inż. Aleksandry Jasiak. Poznań: Politechnika Poznańska.

Jastrzębowski, W. B. (1857). Rys Ergonomii czyli Nauki o Pracy opartej na naukach poczerpniętych z Nauki Przyrody. *Przyroda i Przemysł*, 29–32.

Laboratorium Ergonomii Politechniki Wrocławskiej [online, accessed: 2017-04-27]. Retrieved from: www.ergonomia.ioz.pwr.wroc.pl /klasyczna-ergonomia-definicje.php.

Olszewski, J., (2003). *System pracy w warunkach globalnego społeczeństwa informacyjnego*. Poznań: Wydawnictwo Uniwersytetu Ekonomicznego. ISBN 9788374177757.

Pacholski, L. (ed.). (1986). *Ergonomia*. Poznań: Wydawnictwo Politechniki Poznańskiej.

Pawlak, H., Buczaj, A., Pecyna, A., Konowałek, M. (2016). Świadomość ergonomiczna pracowników biurowych i ich pracodawców. *Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie*, *31* (3), 141–148.

Polskie Towarzystwo Ergonomiczne [online, accessed: 2017-04-27]. Retrieved from: www.ergonomia-polska.com.

*Słownik języka polskiego PWN* [online, accessed: 2017-04-29]. Retrieved from: www.sjp.pwn.pl.

Szymczak, M. (1981). *Słownik języka polskiego.* Warszawa: Państwowe Wydawnictwo Naukowe. ISBN 8301002816.

*Wielka internetowa encyklopedia multimedialna WIEM* [online, accessed: 2017-04-29]. Retrieved from: www.portalwiedzy.onet.pl.

# Świadomość ergonomiczna i jej kształtowanie

**Abstrakt:** W artykule przedstawiono problematykę dotyczącą kształtowania świadomości ergonomicznej wśród wykładowców uczelni, studentów Politechniki Poznańskiej i studentów Uniwersytetu Ekonomicznego w Poznaniu. W tym celu na wybranej grupie respondentów przeprowadzono badania przy pomocy kwestionariuszy, weryfikujące znajomość podstawowych pojęć dotyczących ergonomii, a także pojęcia świadomości i jej interpretacji wśród badanych. Przedyskutowany został problem kształtowania świadomości ergonomicznej w różnych grupach wiekowych. Przedstawiono sposoby kształtowania świadomości ergonomicznej. Wskazano na metody, z uwzględnieniem wcześniej omawianych grup wiekowych. Wyróżniono zarówno działania ogólnospołeczne, mające na celu wykształcenie świadomości ergonomicznej w odniesieniu do całego społeczeństwa, jak i działania indywidualne, kierowane bezpośrednio do konkretnej jednostki.

**Słowa kluczowe:** świadomość ergonomiczna, podstawowe pojęcia, grupy społeczne, konkluzje

# TOURISM

# Entrepreneurship in tourism as exemplified by the Lubusz Voivodeship. Present state and development perspectives


## Krzysztof Sala

Pedagogical University of Cracow

Faculty of Political Science



**Abstract:** Tourism is a vibrant economy in Poland and in the world. As a positive economic policy phenomenon, it plays an increasingly important role in the economies of most countries of the world. Tourism helps in combating such negative economic phenomena as unemployment or recession. It also causes disproportionately lower environmental risks compared to industry. The purpose of this publication is to present the state of entrepreneurship on the example of the tourism industry. One of the most interesting and least popular regions in Poland—Lubusz Voivodeship was analyzed. The work presents the economic and tourist potential of the Lubusz Voivodeship. The characteristics of the most important tourist values, transport accessibility and tourism infrastructure were characterized. The development of accommodation, catering and number of nights were accurately analyzed. The data shown are compared with data from other regions of Poland. The article also attempts to show the future of entrepreneurship in tourism in the Lubusz Voivodeship and points out the areas needed to make changes. The thesis set out in the paper was the assumption that tourism can be an important area for entrepreneurship development in the Lubusz Voivodeship. However, further efforts are needed to exploit the existing potential.

The article was created using compact book materials, periodicals, as well as netographic information and statistics. The research method used in the publication is a literary critique and analysis of existing data. The results of the study positively verify the thesis.



**Key words:** accommodation, catering, entrepreneurship, development, tourism



Correspondence to:
Krzysztof Sala
Uniwersytet Pedagogiczny im. KEN w Krakowie
Wydział Politologii
Instytut Prawa, Administracji i Ekonomii
ul. Podchorążych 2, 30-084 Kraków, Poland
Tel.: +48 12 662 62 13
E-mail: Krzysztofsal@onet.pl


## 1. Admission

Tourism is one of the fastest growing economic phenomena in Poland and in the world. The number of participants has already exceeded one billion. As an economically advantageous phenomenon, it plays an increasingly important role in the economies of most countries of the world, providing valuable revenue. Tourism helps to counteract negative phenom-

ena such as unemployment or recession. It is also important to be aware of the small risks to the environment.

The purpose of this publication was to present the state of entrepreneurship on the example of the tourism industry in the Lubusz Voivodeship—one of the lesser known regions in Poland. The work presents the economic and tourist potential of that region. The characteristics of the most important tourist values, transport accessibility and tourist infrastructure were characterized. The development of accommodation, catering and number of nights were accurately analyzed. The data presented were compiled and compared with data from other regions of Poland. The article also attempts to show the future of entrepreneurship in the tourism of the region and indicate the areas needed to make changes. The hypothesis set out in the paper was the assumption that tourism can be an important business area in the Lubusz Voivodeship. However, further efforts are needed to exploit the existing potential. The article was created using compact book materials, periodicals, as well as netographic information and statistics. The research method used in the publication is a literary critique and analysis of existing data. The results of the study positively verify the thesis.

## 2. The economic and tourist potential of the Lubusz Voivodeship

Lubusz Voivodeship is one of the 16 voivodeships of Poland, located in the western part of the country. It covers an area of 13 987.89 square kilometres. The region, apart from the Opole Voivodeship, is among the least populous in the country. The population in December 2016 amounted to only 1 017 376 inhabitants, which constituted about 2.6% of the population of Poland. The seat of the governor is Gorzów Wielkopolski, and the local government of the province—Zielona Góra.

The average monthly gross wage in the enterprise sector was PLN 3853.03 in June 2017 and the unemployment rate was 7.1%. The average employment in the corporate sector in June 2017 amounted to 124.5 thousand persons and the number of entities in the national economy in the REGON register was 112 357. The above ratios place the region below the national average.

The Lubusz Voivodeship is a cluster of several historical lands (Rymar, 2007). It consists of such lands as (Dubowski, 1955):

- Lubusz Land,
- Lower Silesia,
- The New March,
- Greater Poland,
- Lower Lusatia.

Such situation causes high cultural diversity and affects tourist attractiveness (Garbacz, 2016). The tourist potential of the Lubusz Voivodeship consists of elements such as:

- natural and anthropogenic qualities,
- communication accessibility,
- tourist infrastructure.

The Lubusz Voivodeship is a special region on the tourist map of the country. Characteristic in the formation of the area of the region is a system of alternate depressions of the proglacial

stream valley and upland strips produced by the last glaciation (Toczewski, 2008). The province includes a large number of lakes (e.g. Lubuskie, Dobiegniew and Poznań) and valleys (e.g. Lower Noteć, Obornicka Valley of Warta, Valley of Lower Warta). The Lubusz Voivodeship boasts the highest forest cover in Poland—49%. The most valuable natural features of the region include two national parks and eight landscapes. National Park 'Warta Mouth' was established in 2001 as one of the most valuable waterfowls in Poland. Drawieński National Park is a protected area of valuable wildlife complexes established in 1990. The Mużakowski Park covers an area of about 560 hectares, which in 2004 was included in the prestigious UNESCO List (Garbacz, 2012). Other valuable natural areas of the region include:

– Lower Silesia Forests,
– Shaft of Greenland.

The region's anthropogenic values include numerous castles, palaces, manors, fortifications and religious monuments (Bielinis-Kopeć, 2008). They are located mainly in both capitals of the voivodeship, as well as in the largest cities in the region (Table 1).

Table 1. Anthropogenic qualities of the largest cities in the Lubusz Voivodeship

| Town | Examples of anthropogenic values |
|---|---|
| Zielona Góra | Township, Saint Jadwiga of Silesia, Church of Our Lady of Czestochowa |
| Gorzów Wielkopolski | Urban layout of the so-called New Town, Cathedral of the Assumption of Our Lady |
| Nowa Sól | Urban-architectural complex from the 19th–20th centuries |
| Żary | City, castle-palace complex |
| Żagań | Church Assumption of the Blessed Virgin Mary, Prince's Palace |
| Świebodzin | Castle of the Joannites, walls |
| Międzyrzecz | Castle, Church of the Saint John the Baptist |

S o u r c e: Author's own elaboration based on: http://www.nid.pl/pl/Informacje_ogolne/Zabytki_w_Polsce/rejestr-zabytkow/zestawienia-zabytkow-nieruchomych/LBS-rej.pdf.

Other historical towns of the voivodship include (Pilch and Kowalski, 2012; Zdrenka, 2016):

– Szprotawa,
– Kozuchów,
– Bytom Odrzański,
– Krosno Odrzańskie,
– Santok,
– Słubice,
– Gubin.

The region has over-the-top advantages in the following forms of tourism:

– wine tourism (e.g. Lubuskie Wines and Honey Route),

– military tourism (e.g. Międzyrzecz, Kostrzyn),
– water-tourism (e.g. Paradyż, Łagów, Lubniewice)
– ethnic tourism (whole region).

In addition, there are opportunities to practice such forms of tourism as:
– cultural tourism (e.g. Romanesque Route, Hetman Stefan Czarniecki Trail),
– active tourism (e.g. bicycle trail 'Green Oder', walking-bike trail 'Waterlady Trail'),
– religious tourism (e.g. Cistercian Route, Goat Mountain Churches Trail) (Wasilkiewicz, 2016).

There are also many cultural and music events of international importance in the region: 'Woodstock Station' in Kostrzyn, 'Tomato Festival' in Przytoczna, Lubuskie Summer Film in Łagów or International Bus Theatre Festival 'BuskerBus' in Zielona Góra.

The transport accessibility of the region provides numerous road, rail or water connections. The largest number of tourists arrive in the region by road. The most important road routes are:
– A2 motorway,
– A18 motorway,
– S3 expressway.

Tourists can also take advantage of convenient rail connections. The most important of them are:
– railway line no. 3 (Western Poland—Kunowice),
– railway line no. 273 (Wrocław Główny—Szczecin Główny),
– railway line no. 14 (Łódź Kaliska—Tuplice).

Waterways of the Lubusz Voivodeship include the waterways of the Oder, Warta, Lusatian Neisse and Noteć. Oder through the Oder—Spree Channel has water connections with Western Europe. There is also the Zielona Góra-Babimost Airport. However, its importance for the tourism of the region is little.

Excellent transport accessibility combined with water and forest facilities make Lubusz Voivodeship an ideal destination for weekend or longer trips.

Neighbourhood location near the border with Germany should be regarded as another asset. The region is one of the areas frequented by the Germans. Good connections and short travel and competitive prices play a major role here.

Tourism infrastructure plays an important role in stimulating the development of tourism. It includes all facilities that enable tourists to stay in the area, such as accommodation, catering, services, etc. The state of accommodation in Lubusz Voivodeship in 2016 is shown in Table 2.

Table 2. Accommodation in the Lubusz Voivodeship in 2016

| Accommodation facilities | Number |
|---|---|
| Hotels | 60 |
| Motels | 14 |
| Pensions | 13 |

| Accommodation facilities | Number |
|---|---|
| Other hotel facilities | 39 |
| Youth hostels and hostels | 3 |
| School youth hostels | 8 |
| Holiday centres | 27 |
| Colony centres | 4 |
| Training and leisure centres | 23 |
| Tourist cottages | 22 |
| Campsites | 18 |
| Guest rooms | 10 |
| Agritourism houses | 26 |
| Other objects | 22 |

S o u r c e: Author's own elaboration based on: zielonagora.stat.gov.pl/download/gfx/zielona-gora/pl/.../turystyka_2016boczek.pdf.

In 2016, hotels and other hotel facilities (e.g. non-categorized hotels) played the largest role in the accommodation facility in Lubusz Voivodeship. The smallest meaning was given to youth hostels and hostels and campsites.

## 3. Entrepreneurship in tourism in the Lubusz Voivodeship

When analyzing entrepreneurship in the field of tourism in Lubusz Voivodeship, the most important indicators of its development should be examined. First, the number of accommodation facilities should be analyzed.

In 2016 there were 10 125 accommodation establishments in Poland. Lubusz Voivodeship in 2016 had 289 accommodation facilities, including 198 full-year accommodations in various categories, which unfortunately is one of the lowest rates in the country. On average 100 square kilometres of the area of the Lubusz Voivodeship was occupied by 2 tourist accommodation establishments (nationwide—3). With 1000 citizens of the Lubusz Voivodeship was an average of 18 beds. Accommodation facilities in the region offered in 2016 18.4 thousand accommodations, which constituted 2.5% of the total number of beds in Poland. The situation in this area in the region in recent years is illustrated in Figure 1.

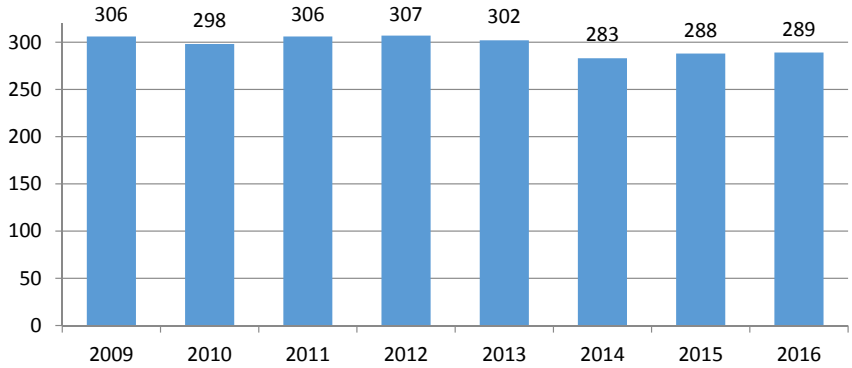



Figure 1. Number of accommodation facilities in the Lubusz Voivodeship in 2009–2016

S o u r c e: Author's own elaboration based on: zielonagora.stat.gov.pl/download/gfx/zielona-gora/pl/.../turystyka_2016boczek.pdf.

The analysis of the data included in Figure 1 clearly indicates the variation in the number of accommodation facilities during the period considered, with a noticeable upward trend since 2014.

The location of accommodation facilities in the Lubusz Voivodeship is unequal. In 2016 (the average number of 21 objects per one county) the most tourist accommodation establishments were located in the counties of: Świebodzin (41), Międzyrzecz (36), Słubice (32), Sulęcin (28), Wschowa (27), in the city of Gorzów Wielkopolski (10), and in the counties of: Żary (11 objects), Strzelce-Drezdenko and Zielona Góra (21). The smallest number of accommodation facilities were in the counties of: Żagań (6), Gorzów Wielkopolski (10), and Żary (11).

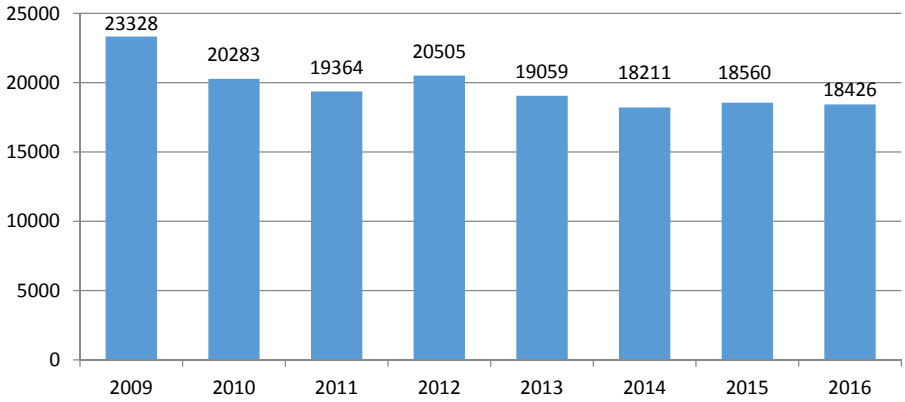



Figure 2. Number of beds in the Lubusz Voivodeship in 2009–2016

S o u r c e: Author's own elaboration based on: zielonagora.stat.gov.pl/download/gfx/zielonagora/pl/.../turystyka_2016boczek.pdf.

The analysis of the data presented in Figure 2 indicates the variation in the number of beds during the period considered. As compared to the corresponding period of 2015, the number of beds increased in seven counties (especially in the Krosno Odrzańskie County: 19.4%, and in the Sulęcin County by 11.5%). In the Żary County it decreased by 39.6%.

It is worth analyzing the situation in the field of gastronomy in the voivodeship in question. The number of catering establishments in tourist facilities in the Lubusz Voivodeship is shown in Figure 3.

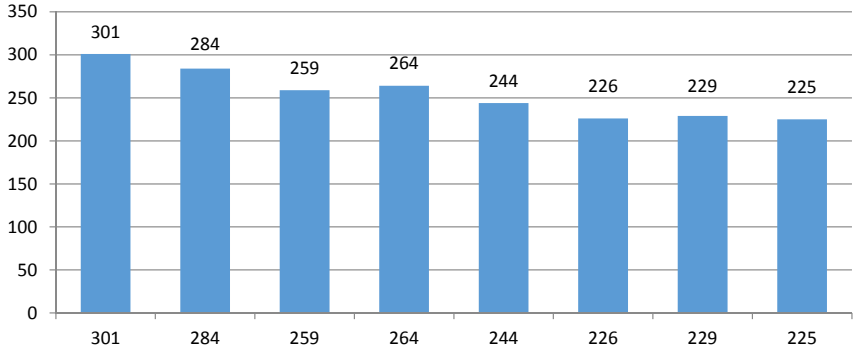



Figure 3. Number of catering establishments in tourist facilities in the Lubusz Voivodeship in 2009–2016

S o u r c e: Author's own elaboration based on: zielonagora.stat.gov.pl/download/gfx/zielona-gora/pl/.../turystyka_2016boczek.pdf.

The analysis of the data presented in Figure 3 shows the variations in the number of catering establishments in tourist facilities during the period considered. This situation undoubtedly affected the fluctuations in the number of beds.

Another indicator of the situation on the tourist market of the region is the number of nights spent, as shown in Table 3.

Table 3. Number of nights spent in tourist accommodation establishments by regions in the first half of 2013, 2015 and 2016

| Region | 2013 | 2015 | 2016 |
|---|---|---|---|
| Total | 26 069.9 | 29 625.2 | 32 134.2 |
| Lower Silesia | 2637.6 | 3102.3 | 3510.3 |
| Kujawy-Pomerania | 1418.2 | 1603.8 | 1718.7 |
| Lublin | 654.1 | 708.6 | 753.1 |
| Lubusz | 477.2 | 500.3 | 501.0 |
| Łódź | 945.2 | 1054.2 | 1033.5 |
| Lesser Poland | 4376.5 | 4906.9 | 5399.6 |
| Mazovia | 2877.7 | 3289.5 | 3506.0 |

| Region | 2013 | 2015 | 2016 |
|---|---|---|---|
| Opole | 246.3 | 286.8 | 362.4 |
| Subcarpathia | 954.0 | 1174.8 | 1232.8 |
| Podlasie | 425.7 | 457.5 | 460.3 |
| Pomerania | 2099.9 | 2499.6 | 2828.8 |
| Silesia | 2050.2 | 2272.0 | 2405.1 |
| Świętokrzyskie | 628.1 | 702.7 | 744.8 |
| Warmia-Masuria | 921.6 | 969.9 | 1128.9 |
| Greater Poland | 1211.8 | 1499.0 | 1546.3 |
| West Pomerania | 4145.7 | 4597.3 | 5002.6 |

S o u r c e: Author's own elaboration based on Central Statistical Office of Poland (GUS) data.

The data presented in Table 3 clearly show an increase in the occupancy of tourist facilities in the analyzed period. Compared to other provinces, they are among the least in Poland.

In Lubusz Voivodeship in 2016, 23.7% of the total number of tourists using accommodation were foreigners. The largest number of foreign tourists visiting the Lubusz region came from Europe—140.4 thousand (73.2% are citizens of the European Union). The inhabitants of Europe who visited the Lubusz Voivodeship in 2016 were mainly from Germany—33.8%, from Lithuania—11.4%, from Ukraine—9.2%, and from Russia—8.5%.

## 4. Prospects for entrepreneurship development in tourism in the Lubusz Voivodeship

The existing, great tourist potential of the Lubusz Voivodeship does not, unfortunately, translate into a satisfactory level of tourist development of entrepreneurship. Occurrences of leisure or sightseeing do not generate tourist traffic on a satisfactory level. This region is more of a role in tourism as a transit area than a destination for leisure. Small, in comparison with other regions of Poland, the number of accommodation facilities and places or catering facilities translates into a small number of overnight stays. The consequences of such a situation are low income from tourism business activities.

The cause of the existing state of affairs can be traced back to the past (Czyżniewski, 2012). Like most areas of the so-called Recovered Territories, from post-war to the 1990s, Lubusz Voivodeship was an extremely neglected and under-invested region (Dolata, 2007). For decades, many facilities have been deliberately dismantled to obtain building materials. Many valuable monuments have been devastated and ragged. In many cities today, you can see permanent ruins (e.g. Kostrzyn, Gubin, Żary). Yet twenty years ago by the average tourist this region was seen as a pristine and unknown area.

The situation began to change sharply only at the end of the twentieth century, with systemic changes. The region has gradually gained modern transport connections, revitalization

of many monuments has started, investments in the tourism industry have begun. The process of change is still ongoing. But still the situation is far from ideal.

Contemporary situation of the examined area requires multidirectional actions. The 2014 development strategy for the development of Lubusz Voivodeship tourism up to 2020 provides detailed guidance on the necessary measures in the area of regional tourism.

Firstly, a competitive tourist image of the region should be created. An image that would be readily associated with an average tourist with the attractions of Lubusz Voivodeship, and above all it would stop him for a longer time. This would bring new jobs and increase tourism income.

Further efforts should focus on creating a comprehensive information and promotion system and tourism signage in the region. Thanks to this, the tourist would get reliable and accurate information about attractions, events and reasons for visiting the site. Information should also reach out to foreign buyers. A tourist from Western Europe who is choosing to go to Poland is much closer to Mazovia, Lesser Poland or even Greater Poland.

In order to break away from the transit nature of the stay, it is still necessary to continue to develop tourist products. Especially those that would emphasize the uniqueness of the region. Tourism in the region is poorly developed in terms of business or pro-health tourism. The deposits of mineral waters in Łagów and Gorzów Wielkopolski are not currently commercially exploited (Michniewicz et al., 2006). These now popular forms of tourism, grown by people with higher incomes, would contribute to the growth of tourism income.

Improving the quality of service provided is the development of tourist infrastructure.

There are no higher class accommodation facilities in the province. The number of 4-star objects does not exceed five, there are no 5-star objects (Table 4).

Table 4. Categorization of hotels in the Lubusz Voivodeship in 2017

| Hotel category | Number |
|---|---|
| * Hotel | 13 |
| ** Hotel | 10 |
| *** Hotel | 30 |
| **** Hotel | 5 |
| ***** Hotel | 0 |

S o u r c e: Author's own elaboration based on MSiT.

In addition, improving the quality of services would be to strengthen the tourism cooperation and development platforms and improve the staff for tourism in the region. The competence of employees and management personnel could help to improve the current situation and increase innovation.

The region does not fully benefit from the development of cross-border tourism and the opportunities offered by cross-border tourism. In today's economic reality, borders are bound, not shared. Germany is one of the nations that spend most of their leisure time on tourist

destinations. The border position opens up opportunities for attracting wealthy neighbours behind the copper. Of course, every tourist is looking for a suitable tourist offer. This offer should also be available in the Lubusz Voivodeship.

Other necessary actions include:

– development of leading forms of tourism,
– development of physical and mental recreation.

## 5. Conclusions

The Lubusz Voivodeship in Poland is an area of above average tourist value, both natural and anthropogenic. Another great asset is the perfect state of the natural environment, not degraded by industry and man. For this you need to add a constantly improving state of communication availability.

However, the level of entrepreneurship development in tourism in this area should be considered insufficient. The biggest challenge for the region is the need to develop tourism infrastructure and attract more tourists. There is also a need for greater promotion of the region and its emergence in the minds of tourists.

Lubusz Voivodeship deserves to be a place of longer tourist stays, not just a transit area. It is also worth investing in tourism as a relatively green field of the economy.

## References

Bielinis-Kopeć, B. (ed.). (2008). *Zamki, dwory i pałace województwa lubuskiego*. Zielona Góra: Wojewódzki Urząd Ochrony Zabytków. ISBN 9788392466932.

*Charakterystyka Parku Mużakowskiego* (2009). In: Łęknica – serwis miejski [online, accessed: 2017-01-09]. Official Web Site of Leknica city. Retrieved from: http://www.leknica.pl/turystyka/parki-formy-ochrony-przyrody/park-muakowski/67-charakterystyka.

Czyżniewski, T. (2012). *Zielona Góra przełomu wieków XIX/XX*. Łódź: Księży Młyn Dom Wydawniczy. ISBN 9788377290125.

Dolata, M. (2007). *Małe i średnie przedsiębiorstwa w gospodarce województwa lubuskiego*. Poznań: Wydawnictwo Naukowe Bogucki. ISBN 836024717X.

Dubowski, A. (1955). *Ziemia Lubuska*. Warszawa: Wydawnictwo Sport i Turystyka.

Garbacz, K. (2012). *Przewodnik po zabytkach województwa lubuskiego*. Warszawa: Agencja Wydawnicza "PDN". ISBN 9788393488506.

Garbacz, K. (2016). *Lubuskie. Mały album dawnej architektury*. Warszawa: Agencja Wydawnicza "PDN". ISBN 9788393885381.

GUS. *Statystyka regionalna* [online, accessed: 2017-02-02], Warszawa: Główny Urząd Statystyczny. Retrieved from: http://stat.gov.pl/statystyka-regionalna/.

GUS. (2015). *Powierzchnia i ludność w przekroju terytorialnym w 2015 r.* [online, accessed: 2016-11-12]. Warszawa: Główny Urząd Statystyczny. Retrieved from: http://stat.gov.pl/obszary-tematyczne/ludnosc/ludnosc/powierzchnia-i-ludnosc-w-przekroju-terytorialnym-w-2015-r-,7,12.html.

Lodzińska, E., Wieczorek, W. et al. (2016). *Wielkopolskie i Lubuskie: przewodnik + atlas*. Warszawa: Demart. ISBN 9788379120116.

Lubuski Wojewódzki Konserwator Zabytków [online, accessed: 2017-01-30]. Retrieved from: http://www.lwkz.pl/.

Michniewicz, M., Czerski, M., Kiełczawa, J., Wojtkowiak, A., Biel, A. (2006). Obszary potencjalnego występowania wód termalnych na bloku przedsudeckim na tle jego budowy geologicznej. In: T. Przylibski (ed.). *Studium możliwości rozpoznania nowych wystąpień wód zmineralizowanych, swoistych i termalnych na obszarze bloku przedsudeckiego*. Raporty Instytutu Górnictwa. Ser. SPR I-11/S-5/2007. Wrocław: Politechnika Wrocławska.

Park Narodowy „Ujście Warty" [online, accessed: 2017-02-09]. Chyrzyno. Official Web Site of Warta Mouth National Park. Retrieved from: http://www.pnujsciewarty.gov.pl/.

Pilch, J., Kowalski, S. (2012). *Leksykon zabytków architektury Pomorza Zachodniego i ziemi lubuskiej*. Warszawa: Arkady. ISBN 9788321347301.

Port Lotniczy Zielona Góra [online, accessed: 2016-11-19]. Zielona Góra Airport official Web Site. Retrieved from: http://airport.lubuskie.pl/.

*Program rozwoju lubuskiej turystyki do 2020 r. Cz. 2 programowa* (2014). Lubuskie warte Zachodu [online, accessed: 2017-08-21]. Retrieved from: http://obserwuj.lubuskie.pl/uploads/documentsearch/id48/PRLT_DO_2020_ROKU_czesc_II_programowa.pdf.

Rymar, E. (2007). *Klucz do ziem polskich czyli Dzieje Ziemi Lubuskiej aż po jej utratę przez Piastów i ugruntowanie władzy margrabiów brandenburskich*. Gorzów Wielkopolski: Wojewódzka i Miejska Biblioteka Publiczna. ISBN 9788390724959.

Sanik, G. (2017). *Raport GUS turystyka w Polsce w 2016 r.* [online, accessed: 2017-08-21]. Eloblog. Retrieved from: http://eloblog.pl/raport-gus-turystyka-w-polsce-w-2016-roku/.

Toczewski, A. (2008). *Historia Ziemi Lubuskiej: krótki zarys dawnych dziejów*. Zielona Góra: Muzeum Ziemi Lubuskiej: Towarzystwo Przyjaciół Ziemi Lubuskiej. ISBN 8388426222.

Wasilkiewicz, K. (2016). *Templariusze i Joannici w biskupstwie lubuskim (XIII–XVI w.)*. Gniezno: Instytut Kultury Europejskiej Uniwersytetu im. Adama Mickiewicza w Poznaniu. ISBN 9788365287212.

Zdrenka, J. (ed.). (2016). *Powiat Krosno Odrzańskie (do 1815 roku)*. Toruń: Wydawnictwo Adam Marszałek. ISBN 9788380194076.

# Przedsiębiorczość turystyczna na przykładzie województwa lubuskiego – stan obecny i perspektywy rozwoju

**Abstrakt:** Turystyka to prężna dziedzina gospodarki w Polsce i na świecie. Jako korzystne dla polityki ekonomicznej zjawisko odgrywa coraz bardziej istotną rolę w gospodarkach większości państw świata. Turystyka pomaga w zwalczaniu takich negatywnych zjawisk ekonomicznych jak bezrobocie czy recesja. Wywołuje przy tym niewspółmiernie niższe zagrożenia dla środowiska naturalnego w porównaniu do przemysłu. Celem niniejszej publikacji było przedstawienie stanu przedsiębiorczości na przykładzie branży turystycznej. Analizie poddano jeden z najciekawszych i jednocześnie mało popularnych regionów w Polsce – województwo lubuskie. W pracy dokonano prezentacji potencjału gospodarczego i turystycznego ziemi lubuskiej. Dokonano charakterystyki najważniejszych walorów turystycznych, dostępności komunikacyjnej oraz infrastruktury turystycznej. Dokładnej analizie poddano stan rozwoju bazy noclegowej, gastronomicznej oraz liczbę udzielonych noclegów. Ukazane dane porównano z danymi z innych regionów Polski. W artykule dokonano również próby ukazania przyszłości przedsiębiorczości w turystyce w województwie lubuskim oraz wskazano na obszary koniecznych do dokonania zmian. Tezą postawioną w pracy było założenie, że turystyka może stanowić ważny obszar rozwoju przedsiębiorczości w regionie lubuskim. Konieczne są jednak dalsze działania w celu wykorzystania istniejącego potencjału.

Artykuł powstał na podstawie zwartych materiałów książkowych, czasopism, jak również informacji netograficznych i danych statystycznych. Metoda badawcza zastosowana w publikacji to krytyka piśmiennicza i analiza danych zastanych. Wyniki badań pozytywnie weryfikują postawioną tezę.

**Słowa kluczowe:** baza noclegowa, baza gastronomiczna, przedsiębiorczość, rozwój, turystyka

# Reviewers of the articles published in 2017

Prof. Piotr Bartkowiak, PhD—Poznań University of Economics and Business, Poland
Prof. Jacek Bendkowski, PhD—Silesian University of Technology, Poland
Prof. Andrzej Borowicz, PhD—University of Lodz, Poland
Prof. Gabrijela Budimir Šoško, PhD—High Business School Nikola Šubić Zrinski in Zagreb, Croatia
Prof. Krešimir Buntak, PhD—University North in Varaždin, Croatia
Prof. Jolanta Chluska, PhD—Czestochowa University of Technology, Poland
Prof. Wiesław Drobek, PhD— Opole University of Technology, Poland
Prof. Joanna Działo, PhD—University of Lodz, Poland
Prof. Iwona Foryś, PhD—University of Szczecin, Poland
Prof. Katarzyna Głąbicka-Auleytner, PhD—Kazimierz Pulaski University of Technology and Humanities in Radom, Poland
Prof. Ewa Górska, PhD—Warsaw University of Technology, Poland
Prof. Mariola Grzybowska-Brzezińska, PhD—University of Warmia and Mazury in Olsztyn, Poland
Prof. Marek Grzybowski, PhD—Gdynia Maritime University, Poland
Prof. Witold Grzywiński, PhD—Poznań University of Life Sciences, Poland
Prof. Edyta Gwarda-Gruszczyńska, PhD—University of Lodz, Poland
Prof. Wojciech Jarecki, PhD—University of Szczecin, Poland
Prof. Bartosz Jasiński, PhD—University of Economics in Wrocław, Poland
Prof. Sławomir Kalinowski, PhD—Poznań University of Life Sciences, Poland
Prof. Magdalena Knapińska, PhD—Poznań University of Economics and Business, Poland
Prof. Czesław Mesjasz, PhD—University of Economics in Cracow, Poland
Prof. Agnieszka Misztal, PhD—Poznan University of Technology, Poland
Prof. Mirosław Moroz, PhD—University of Economics in Wrocław, Poland
Prof. Ivars Muzis, PhD—Riga Teacher Training and Educational Management Academy, Latvia
Prof. Jerzy Olszewski, PhD—Poznań University of Economics and Business, Poland
Prof. Teresa Orzeszko, PhD—University of Economics in Wrocław, Poland
Prof. Halina Pawlak, PhD—University of Life Sciences in Lublin, Poland
Prof. Saša Petar, PhD—Polytechnic Pula, Croatia
Prof. Małgorzata Porada-Rochoń, PhD—University of Szczecin, Poland
Prof. Elisabete Rodrigues, PhD—Polytechnics Institute of Portalegre, Portugal
Prof. Edyta Rudawska, PhD—University of Szczecin, Poland
Prof. Leszek Rudnicki, PhD—State University of Applied Sciences in Nowy Sącz, Poland
Prof. Jan Siekierski, PhD—Małopolska School of Economics in Tarnów, Poland
Prof. Małgorzata Sławińska, PhD—Poznan University of Technology, Poland
Prof. Maria Smejda, PhD—Bielsko-Biała School of Finances and Law, Poland

**Information for the Authors**

The Editorial Board accepts for publication only scientific articles dedicated to economics, management, tourism and recreation problems. Entries should be submitted in electronic form (MS Word document sent on a CD/DVD or via e-mail). The length of work (including illustrative material, bibliography and abstracts) must not exceed 15 pages. The publication should be divided into parts and contain headings. The text must be accompanied by an abstract in Polish and English (150–200 words) including: purpose, methods, obtained results and conclusions as well as key words in English and Polish, which do not repeat words from the title. The detailed information on how to prepare a text print (format of the footnotes, bibliography, descriptions of tables and figures) is posted on the journal's website: http://zn.mwse.edu.pl.

Prepared texts which do not adhere to the editorial guidelines will not be accepted for publication. We kindly ask the Authors to attach their full contact details (including telephone number and e-mail address), as well as affiliate information (title, name of institution or other entity).

The Editorial Board does not accept texts that have been published in other publications. The condition for publication is a positive review by the Publishing House. The Editorial Board does not return the submitted texts and does not pay royalties. Papers published in *The Małopolska School of Economics in Tarnów Research Papers Collection* are protected by copyright; they may only be reprinted with the consent of the Editorial Board.

**Informacja dla Autorów**

Redakcja przyjmuje do publikacji wyłącznie teksty o charakterze naukowym poświęcone problemom ekonomii, zarządzania, turystyki i rekreacji. Prace należy składać w formie elektronicznej (dokument MS Word przesłany na płycie CD/DVD lub e-mailem). Objętość pracy (łącznie z materiałem ilustracyjnym, bibliografią i streszczeniami) nie może przekraczać 15 stron. Opracowanie powinno być podzielone na części i zawierać śródtytuły. Do tekstu należy dołączyć streszczenie w języku polskim i angielskim (150–200 słów) zawierające: cel, metody, uzyskane wyniki oraz wnioski, a także słowa kluczowe w języku polskim i angielskim, które nie powtarzają słów z tytułu. Szczegółowe informacje o sposobie przygotowania tekstu do druku (format przypisów, bibliografia, opisy tablic i rysunków) są zamieszczone na stronie internetowej czasopisma: http://zn.mwse.edu.pl.

Teksty przygotowane w sposób niezgodny ze wskazówkami redakcji nie będą przyjmowane do druku. Autorów prosimy o dołączenie do pracy pełnych danych adresowych (wraz z numerem telefonu i adresem e-mail), jak również informacji afiliacyjnej (tytuł naukowy, nazwa uczelni lub innej jednostki).

Redakcja nie przyjmuje tekstów opublikowanych w innych wydawnictwach. Warunkiem publikacji jest pozytywna recenzja wydawnicza. Redakcja nie zwraca nadesłanych tekstów i nie wypłaca honorariów autorskich. Prace opublikowane w „Zeszytach Naukowych Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie" są chronione prawami autorskimi, ich przedruk może nastąpić wyłącznie za zgodą Redakcji.