University of Economics in Katowice

your place

your space

your future

# Critical success factors of ICT-based organizational creativity support

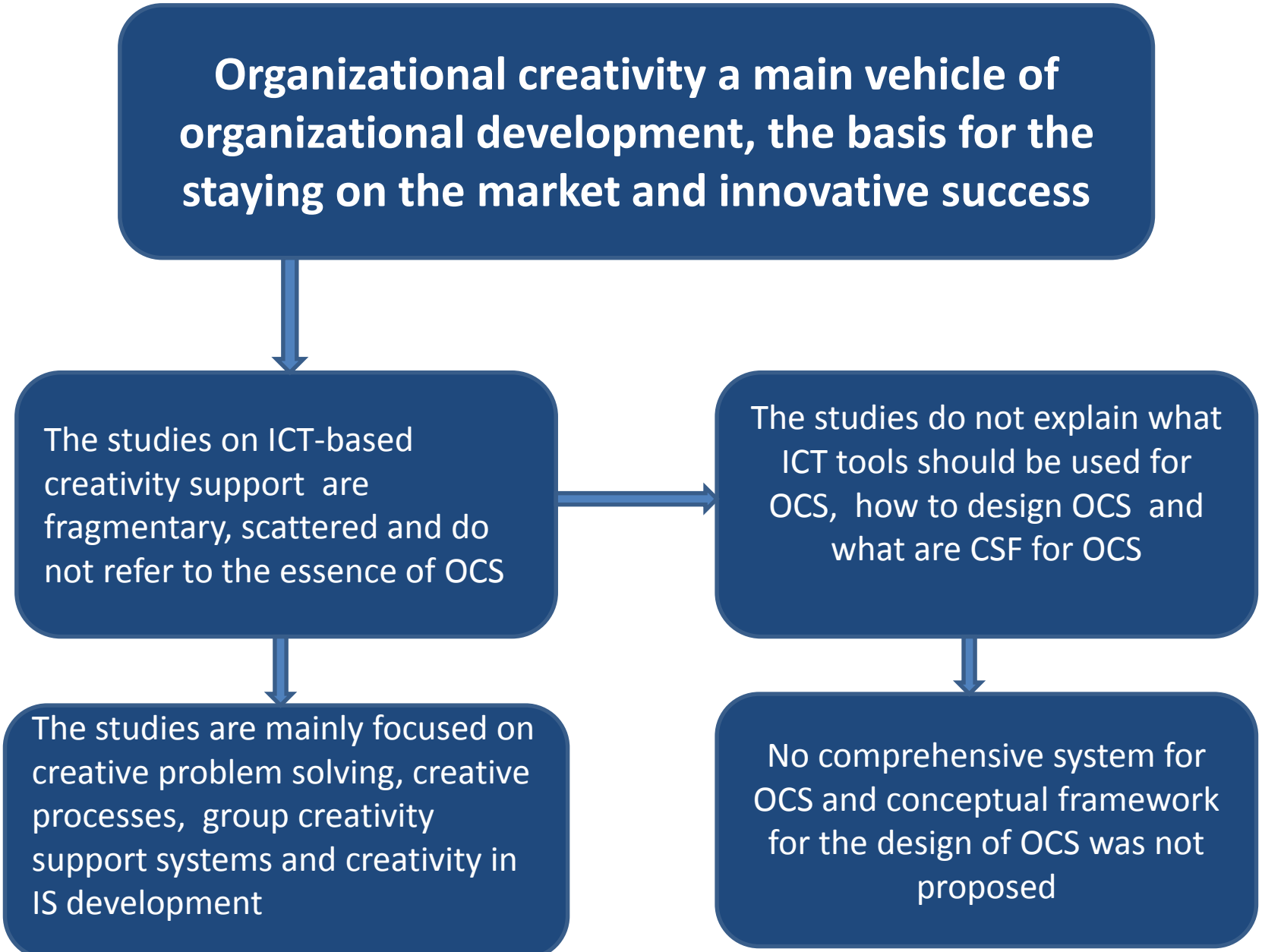
**Celina Olszak**

**ICT for Practice 2017**

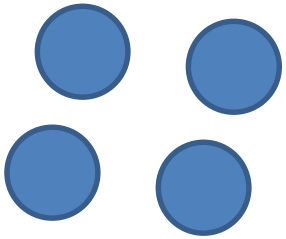
**9-10 October 2017, VSB-Technical University Ostrava**

# AGENDA

1. **Motivation for the Study**
2. **Organizational creativity and its ICT-based support**
3. **Research method**
4. **Research Findings and Discussion**
5. **Conclusions**

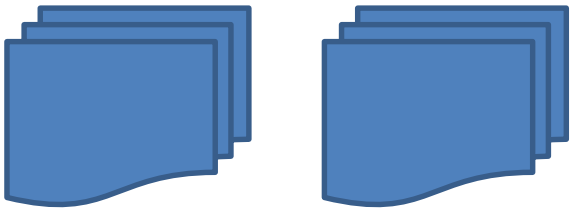

Organizational creativity a main vehicle of organizational development, the basis for the staying on the market and innovative success
The studies on ICT-based creativity support are fragmentary, scattered and do not refer to the essence of OCS
The studies do not explain what ICT tools should be used for OCS, how to design OCS and what are CSF for OCS
The studies are mainly focused on creative problem solving, creative processes, group creativity support systems and creativity in IS development
No comprehensive system for OCS and conceptual framework for the design of OCS was not proposed

# IT-based Organizational Creativity Support



New and useful ideas that concern some products, services and managerial practices


Creativity compared to information, knowledge, and knowledge systems




*Increase the cognitive process, individual inspiration, the learning and reasoning of individual persons*


*Combine the properties of ICSS with collaboration and coordination support*


*Increase competitive advantage and an organization's performance*

# ICT & Creativity

| Impact of ICT on creativity | Authors |
|---|---|
| Information flow and communications | Dewett (2003), Woodman, Sawyer & Griffin (1993) |
| Information collecting, analysis of information, exploration and classification of problem domain | Indurkhya (2013), Lubert (2005) |
| Discovering knowledge, identification of interdependences and organizational learning | Indurkhya (2013), Green (2002) |
| Visualization of information | Lubert (2005), Green (2002) |
| Codification of knowledge | Dewett ( 2003), Shneiderman (2007) |
| Collaboration and group work | Shneiderman (2007), Dewett (2003) |
| Searching new ideas, recombination of ideas, ranging of ideas, knowledge acquisition | Indurkhya (2013) |
| Brainstorming, stimulation of user's imagination, modelling of creative processes | Nakakoji (2006) |
| Ideas/knowledge mapping, libraries of images, thesauri | Shneiderman (2007) |
| Human-computer interaction | Ulrich & Mengiste (2014), Lubert (2005) |
| Disseminating the effects of creative cooperation | Indurkhya (2013), Muller & Ulrich (2013), Klijn & Tomic (2010), Lubert (2005) |

# Research Objectives

The study attempts to answer the following questions:

(1) What ICT tools may be used to support organizational creativity in organizations?

(2) What ICT functions are important for supporting organizational creativity?

(3) What information resources should be applied in ICT-based organizational creativity support?

(4) What benefits are achieved by ICT-based organizational creativity support?

(5) What are the critical success factors for ICT-based supporting organizational creativity?

# Research Method

✓The survey was based on a questionnaire method.
✓The questionnaire consisted of 26 questions (single choice-questions, five-pint Likert scale).
✓The collected data was processed using SPSS.

✓The invitation to survey was sent to 345 companies which are related to the services sector (71.1%) and manufacturing (28.9%).
✓The respondents were mostly managers (47%), operational staff (32.3%), employees of R&D department (12.1%), ICT specialists (7.8%) and other employees (e.g. project managers – 0.9%).

✓The research was conducted in 2015 using on-line tools – SurveyMonkey.
✓232 companies presented fully complete data. Relatively high returnability was recorded – 67.5%.

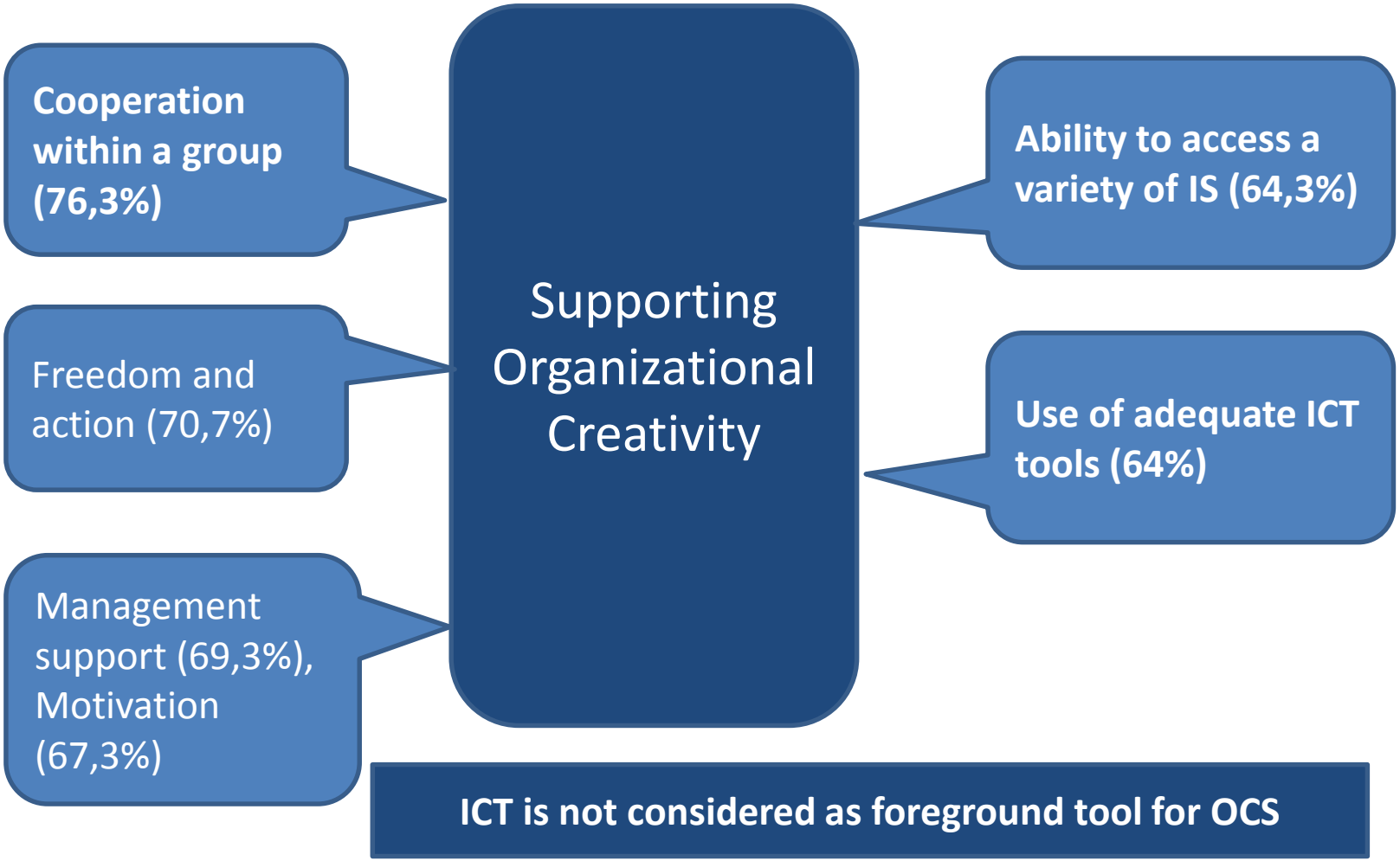
# Main themes in questionnaire

| | |
|---|---|
| (1) What do you associate the term '*organizational creativity*' with? | (14) Please specify the quality of information that employees of your organization use in organizational creativity? |
| (2) Does the work performed require from employees of your organization to be creative ? | (15) Which categories of information is your organization looking for in the context of organizational creativity? |
| (3) Are employees your organization motivated to be creative and break away from cliché-thinking? | (16) Is creativity in your organization supported by ICT and in which areas? |
| (4) Are employees in your organization familiar with processes, technologies and customers of your organization? | (17) Which ICT functions do you consider as important in supporting organizational creativity? |
| (5) In which departments/areas of your organization functioning is creativity developed or where, in your opinion, it should be developed? | (18) Which ICT functions are used in supporting the organizational creativity in your organization? |
| (6) Does creativity translate into better functioning of the organization in your opinion and how is it expressed? | (19) What tools are used in your organization to support organizational creativity? |
| (7) At which organizational levels is creativity developed in your organization? | (20) What makes it difficult to use ICT tools to support organizational creativity in your organization? |
| (8) Who is required to be creative in your organization? | (21) How new ideas/concepts/new knowledge are communicated in your organization? |
| (9) What hinders/kills organizational creativity in your organization? | (22) Does your organization have a repository (common base) which stores new ideas/new knowledge? |
| (10) What factors do you consider as important in supporting organizational creativity? | (23) How does ICT boost creativity in your organization? |
| (11) Does your organization have a strategy (e.g. objectives, tasks) in terms of organizational creativity? | (24) What factors do you consider as important for the development of computer-aided organizational creativity? |
| (12) Do employees in your organization have sufficient knowledge, information, expertise to generate new and useful ideas for the organization? | (25) What hinders the development of IT-based organizational creativity in your opinion? |
| (13) Do employees in your organization use specialized information resources in their work? | (26) Is there an R & D department (research and development) in your organization or its equivalent (e.g. department of progress and rationalization)? |

# Findings


Ability to change (36.6%)
Knowledge discovery (30.2%)
Learning organization (19.4%)
Creative analytics (19%)
Organizational Creativity
Innovation (47.8%)
New and useful ideas about management practices and competitive strategies (41.8%)

# Findings


Cooperation within a group (76,3%)
Freedom and action (70,7%)
Management support (69,3%), Motivation (67,3%)
Supporting Organizational Creativity
Ability to access a variety of IS (64,3%)
Use of adequate ICT tools (64%)
ICT is not considered as foreground tool for OCS

## ICT functions in organizational creativity support in studied organizations

| Indications (ICT are used to: ) | Definitely yes | Rather yes | Neither yes nor no | Rather no | Definitely no |
|---|---|---|---|---|---|
| Quick access to various databases and knowledge repositories | **28,0** | **51.3** | 12.5 | 6.0 | 2.2 |
| Finding problems | 25.9 | 36.6 | 27.2 | 8.2 | 2.2 |
| Identification of creative needs | 19.8 | 42.2 | 22.8 | 12.9 | 2.2 |
| Knowledge coding | **17.7** | **40.9** | 25.4 | 12.9 | 3.0 |
| Discovering new knowledge | 19.4 | 42.7 | 24.1 | 10.3 | 3.4 |
| Knowledge generalization | 15.5 | 37.9 | 32.3 | 10.8 | 3.4 |
| Hierarchization and decomposition of knowledge | **17.7** | **40.5** | 28.9 | 10.3 | 2.6 |
| Knowledge mapping | 16.8 | 43.5 | 23.3 | 12.9 | 3.4 |
| Information analysis/filtering/ aggregating | **19.5** | **45.4** | 22.5 | 10.9 | 1.7 |
| Computer simulations | 21.6 | 40.1 | 25.0 | 10.3 | 3.0 |
| Information visualization | 19.8 | 40.5 | 28.0 | 9.5 | 2.2 |
| Teamwork | 20.7 | 40.9 | 28.4 | 7.8 | 2.2 |
| Information dissemination/ communication | **24.1** | **42.2** | 23.7 | 8.2 | 1.7 |
| Other (transferring knowledge) N=1 | - | 100.0 | - | - | - |

# ICT tools used in organizational creativity support

| Indications | Definitely yes | Rather yes | Neither yes nor no | Rather no | Definitely no |
|---|---|---|---|---|---|
| **Search engines (e.g. Google, Yahoo)** | **39,7** | **37.9** | 16.8 | 5.6 | 0.0 |
| **Spreadsheets** | **39.2** | **28.9** | 23.3 | 6.5 | 2.2 |
| Data mining and Business Intelligence | 23.3 | 34.9 | 24.6 | 12.9 | 4.3 |
| Big data | 13.8 | 31.0 | 34.1 | 17.2 | 3.9 |
| Data warehouses | 19.8 | 31.5 | 30.2 | 14.7 | 3.9 |
| Databases | 30.3 | 28.9 | 26.5 | 12.6 | 1.7 |
| Decision support systems | 16.8 | 32.8 | 32.3 | 12.5 | 5.6 |
| Expert systems | 22.0 | 30.6 | 27.6 | 14.2 | 5.6 |
| Customer relationship management systems | 19.5 | 39.3 | 27.3 | 9.2 | 4.7 |
| Teamwork systems | 23.3 | 30.2 | 32.8 | 9.5 | 4.3 |
| CAD, systems | 14.7 | 32.8 | 25.9 | 19.8 | 6.9 |
| Computer simulations | 20.7 | 31.5 | 31.0 | 12.5 | 4.3 |
| Data visualization systems | 24.6 | 28.0 | 30.6 | 13.8 | 3.0 |
| **Electronic mail** | **41.8** | **28.4** | 21.6 | 7.8 | 0.4 |
| Intranets | 25.4 | 36.6 | 26.3 | 9.1 | 2.6 |
| Extranet | 18.6 | 34.7 | 32.9 | 9.9 | 3.9 |
| **Discussion forums, social networking portals** | **16.8** | **44.4** | 25.9 | 8.6 | 4.3 |
| Other (environment analysis) N=1 | - | 100.00 | - | - | - |

# Utilization of specialist information resources for organizational creativity development

| Indications | Definitely yes | Rather yes | Neither yes nor no | Rather no | Definitely no |
|---|---|---|---|---|---|
| **Internal documentation/reports** | **21,1** | **55.2** | 16.4 | 5.2 | 2.2 |
| Specialist studies, books | 15.1 | 40.1 | 31.5 | 10.8 | 2.6 |
| **Internal databases** | **24.1** | **39.2** | 20.3 | 13.4 | 3.0 |
| Patent databases | 12.5 | 37.5 | 28.4 | 12.9 | 8.6 |
| Library databases | **10.8** | **33.2** | 30.6 | 15.5 | 9.9 |
| Government databases | **10.3** | **27.6** | 35.8 | 17.2 | 9.1 |
| Knowledge portals | 13.4 | 42.7 | 31.0 | 10.3 | 2.6 |
| **Social networking portals** | **12.5** | **45.7** | 26.3 | 11.2 | 4.3 |
| Other (technical documentation, gigabytes of technical documentation; trade magazines) N=2 | 50.0 | 50.0 | - | - | - |

# ICT impact on organizational creativity revival

| Indications | Definitely yes | Rather yes | Neither yes nor no | Rather no | Definitely no |
|---|---|---|---|---|---|
| **Communication improvement** | **24,1** | **38.4** | 26.7 | 8.6 | 2.2 |
| **Quicker access to various information resources** | **27.6** | **36.2** | 28.4 | 5.6 | 2.2 |
| **Easier information analysis** | **22.4** | **38.4** | 29.3 | 7.3 | 2.6 |
| Knowledge coding improvement | 20.7 | 30.6 | 34.5 | 11.2 | 3.0 |
| New knowledge acquisition | 22.9 | 32.9 | 33.3 | 8.7 | 2.2 |
| Other (enhancing motivation) N=1 | - | 100.0 | - | - | - |

# Organizational Creativity Enhancement Index

✓ A more detailed analysis was conducted on organizational creativity enhancement index.

✓The index  was worked out based on the previously indentified factors .

✓The analysis was performed according to Spearman's rank correlation test.

# The relationship between ICT functions and organizational creativity enhancement – Spearman's rank correlation coefficients

| ICT functions used in organizational creativity support | Spearman's coefficient | ICT function impact on the level of organizational creativity enhancement |
|---|---|---|
| **Quick access to various knowledge databases and repositories** | Correlation coefficient | **0.460** |
| | Significance (two-tailed) | 0.000 |
| **Finding problems** | Correlation coefficient | **0.516** |
| | Significance (two-tailed) | 0.000 |
| Identifying creative needs | Correlation coefficient | 0.530 |
| | Significance (two-tailed) | 0.000 |
| **Knowledge coding** | Correlation coefficient | **0.635** |
| | Significance (two-tailed) | 0.000 |
| Discovering new knowledge | Correlation coefficient | 0.590 |
| | Significance (two-tailed) | 0.000 |
| Knowledge generalizing | Correlation coefficient | 0.558 |
| | Significance (two-tailed) | 0.000 |
| Knowledge hierarchization and decomposition | Correlation coefficient | 0.553 |
| | Significance (two-tailed) | 0.000 |
| Knowledge mapping | Correlation coefficient | 0.530 |
| | Significance (two-tailed) | 0.000 |
| Information analysis/filtration/aggregation | Correlation coefficient | 0.584 |
| | Significance (two-tailed) | 0.000 |
| **Computer simulations** | Correlation coefficient | **0.606** |
| | Significance (two-tailed) | 0.000 |
| Information visualization | Correlation coefficient | 0.566 |
| | Significance (two-tailed) | 0.000 |
| Teamwork | Correlation coefficient | 0.560 |
| | Significance (two-tailed) | 0.000 |
| Providing information/communication | Correlation coefficient | 0.605 |
| | Significance (two-tailed) | 0.000 |

# The impact of ICT tools on organizational creativity enhancement - Spearman's rank correlation coefficients

| Tools used in organizational creativity support | Spearman's coefficient | Impact of ICT tools on the level of organizational creativity enhancement |
|---|---|---|
| **Search engines (e.g. Google, Yahoo)** | Correlation coefficient | **0.462** |
| | Significance (two-tailed) | 0.000 |
| **Spreadsheets** | Correlation coefficient | **0.516** |
| | Significance (two-tailed) | 0.000 |
| Data mining and Business Intelligence | Correlation coefficient | 0.473 |
| | Significance (two-tailed) | 0.000 |
| **Big data** | Correlation coefficient | **0.437** |
| | Significance (two-tailed) | 0.000 |
| Data warehouses | Correlation coefficient | 0.576 |
| | Significance (two-tailed) | 0.000 |
| **Databases** | Correlation coefficient | **0.591** |
| | Significance (two-tailed) | 0.000 |
| Decision support systems | Correlation coefficient | 0.497 |
| | Significance (two-tailed) | 0.000 |
| Expert systems | Correlation coefficient | 0.566 |
| | Significance (two-tailed) | 0.000 |
| Customer relationship management systems | Correlation coefficient | 0.528 |
| | Significance (two-tailed) | 0.000 |
| **Teamwork systems** | Correlation coefficient | **0.581** |
| | Significance (two-tailed) | 0.000 |
| CAD, systems | Correlation coefficient | 0.481 |
| | Significance (two-tailed) | 0.000 |
| Computer simulations | Correlation coefficient | 0.507 |
| | Significance (two-tailed) | 0.000 |
| Data visualization systems | Correlation coefficient | 0.551 |
| | Significance (two-tailed) | 0.000 |
| Electronic mail | Correlation coefficient | 0.476 |
| | Significance (two-tailed) | 0.000 |
| Intranet | Correlation coefficient | 0.523 |
| | Significance (two-tailed) | 0.000 |
| Extranet | Correlation coefficient | 0.492 |
| | Significance (two-tailed) | 0.000 |

# The impact of the use of specialized information resources to enhance organizational creativity - Spearman's rank correlation coefficients

| Information resources | Spearman's coefficient | ICT impact on the level of organizational creativity enhancement |
|---|---|---|
| Internal documentation/ reports | Correlation coefficient | 0.443 |
| | Significance (two-tailed) | 0.000 |
| Specialist studies, books | Correlation coefficient | 0.453 |
| | Significance (two-tailed) | 0.000 |
| Internal databases | Correlation coefficient | 0.491 |
| | Significance (two-tailed) | 0.000 |
| **Patent databases** | Correlation coefficient | **0.534** |
| | Significance (two-tailed) | 0.000 |
| **Library databases** | Correlation coefficient | **0.415** |
| | Significance (two-tailed) | 0.000 |
| **Government databases** | Correlation coefficient | **0.333** |
| | Significance (two-tailed) | 0.000 |
| **Knowledge portals** | Correlation coefficient | **0.507** |
| | Significance (two-tailed) | 0.000 |
| Social networking portals | Correlation coefficient | 0.445 |
| | Significance (two-tailed) | 0.000 |

# Barriers to ICT-Based Organizational Creativity Support

- The lack of a comprehensive strategy to ICT-based OCS.
- The lack of appropriate support from management.
- The lack of effective communication and motivation for ICT use.
- The lack of adequate ICT tools.

**Other remarks:**

- ✓ The search for new ideas is sometimes considered a waste of time and money.
- ✓ Organizations are not prepared to offer employees high degree of autonomy and freedom of action.
- ✓ Organizations are focused on overcoming current problems and financial crises.
- ✓ Often unwillingness to share new ideas is manifested.
- ✓ There is a lack of professional training how to use ICT to support creativity.

# Success factors for ICT-based organizational creativity support

| Organizational culture | Information resources and knowledge | Technology |
|---|---|---|
| Strategy oriented on organizational creativity, freedom to act and agility | Access to internal and external information resources | Adequate tools and ICT infrastructure |
| Clear defined creative needs (expectations) | Capabilities to build various intelligent information repositories | Motivation to use ICT |
| Motivation to organizational creativity support | Capabilities to discover new knowledge | Appropriate skills and competences to use ICT |
| Support from senior management | Information quality | System integration |
| Group work, communication | Sharing knowledge, integration of information | User friendly ICT |
| Effective change management | Data management | Budget |

# Conclusions and Recommendations

1) From this research emerges the subject of organizational creativity and its ICT-based support as a rather poorly recognized area of research in the literature.
2) The study shows that most surveyed organizations use rather basic ICT to facilitate access to various databases and repositories of knowledge and to improve communication.
3) The most important factors for the development of ICT-based organizational creativity support is concerned with motivation to use ICT, support from management, availability of appropriate skills, clearly defined problems, and creative processes. Additionally, the responders pointed out the necessity for the freedom and flexibility of action, cooperation in a group, and access to appropriate tools.
4) In order that the organizational creativity actually becomes a driving force for the organizations, they will have to create comprehensive system solutions and managerial practices aimed at encouraging and fostering creativity.

**THANK YOU**
**FOR YOUR ATTENTION**

**QUESTIONS?**

**celina.olszak@ue.ktowice.pl**