Volume 14 • Issue 3 • 2022

sciendo

received: 23 April 2022
accepted: 31 August 2022

pages: 68-81

© 2022 D. Ciachorowski and A. M. Lis

This work is published under the Creative Commons BY-NC-ND 4.0 License.

Collective creativity in management science

Damian Ciachorowski
Anna Maria Lis

ABSTRACT

This paper aims to establish the current state of knowledge on collective creativity in management science based on a systematic literature review. A systematic review was performed based on the three-step SPL procedure proposed by Tranfield et al. (2003). Two databases (Scopus and Web of Science) were searched electronically until March 2022. Literature analysis and content analysis were performed based on the secondary data. Eighteen studies met the inclusion criteria following the systematic literature review procedure. The conducted descriptive and thematic analysis allowed establishing the state of knowledge in the analysed area and identifying the main thematic areas along with the future research directions. The research was the first to conduct a systematic literature review (SLR) on collective creativity in management science. The main contribution of this paper is its exclusive focus on analysing existing research in the collective creativity field, limited to management science. SLR allowed determining that research in the analysed area was still at a fairly early stage. Although the existing literature sheds some light on collective creativity, studies investigating the aspects of teamwork focused on problem-solving are required.

KEY WORDS

collective creativity, creativity, teamwork, innovation

10.2478/emj-2022-0027

Anna Maria Lis

Gdańsk University of Technology, Poland
ORCID 0000-0002-1527-7796

Corresponding author:
Anna.Lis@zie.pg.gda.pl

Damian Ciachorowski

Gdańsk University of Technology, Poland
ORCID 0000-0002-5226-9015

Introduction

In innovation management, collective creativity is a concept based on the psychological security required for team building (Arkko-Saukkonen et al., 2021). However, the assumptions of collective creativity originated in the arts. The term first appeared in the article by Musick (1976), who raised the issue of more effective art teaching. The meaning and use of collective creativity are constantly changing. Today, the perception of the term varies widely and is most

Ciachorowski, D., & Lis, A. M. (2022). Collective creativity in management science. *Engineering Management in Production and Services, 14*(3), 68-81. doi: 10.2478/emj-2022-0027

popular in such fields as education, business, humanities, management, urbanisation, psychology, music, and computer science. From the viewpoint of management, the first articles appeared after 2002, focusing on time management (Hatch, 2002), and then only in 2006, in an article on problem-solving (Hargadon & Bechky, 2006).

The economy is currently moving from the information age, dominated by digitisation, to the artificial intelligence era. Companies and organisations have experienced enormous benefits in replacing repetitive processes with machines and using the collected metadata to analyse and predict future actions. The growing trend suggests that machines and information systems are beginning to replace humans in almost all areas, except those requiring human creativity and imagination. This is a turning point in research popularising the concept of group solutions, as human creativity is becoming one of the most desirable skills in the labour market. It will be the driving force behind organisational changes, which will have to reorganise the work system to remain innovative and development-oriented. Moreover, given the results of the knowledge management research, it is important to create a climate for creativity at the level of the organisation and, especially, teams (Stankiewicz & Moczulska, 2015). Thus, the most important skills will be team management, especially the ability and readiness to work in teams with great cultural and generational differences. This applies to teams operating within individual organisations and various forms of network cooperation developing under virtual reality conditions (Kraus et al., 2021).

Rapid economic changes related to digitisation and process automation will result in consequences for management as a field of science. The collective creativity concept seems to be a response to the increasingly popular trend of seeking innovation in companies by focusing on human capital and using teamwork to create it. Possibly, it will become the dominant management concept in the coming years.

However, a review of analyses and research conducted in this area indicated innovation management as a relatively new and undefined field. Research shows its positive effects on team management and creativity. Nevertheless, several studies indicated this field as developing and having a lot of room for further analysis. No literature review has been conducted in the field of collective creativity so far. The only found comparison of articles and works by various authors in the field of collective creativity was the meta-analysis of team creativity conducted under the leadership of Yingjie Yuan from the University of Groningen (Yuan et al., 2022).

Thus, this study is a response to the lack of an available review of the scientific literature regarding the collective creativity concept recognised in management science. Systematic studies of various issues in this area require an attempt to systematise knowledge to define further stages of this field's development. Therefore, this paper aims to provide a comprehensive review of scholarly research on collective creativity in management science to determine the area's state of the art. The research questions posed for this study were as follows:

RQ1: How has collective creativity in management science been approached so far?

RQ2: What are the main themes discussed in relation to collective creativity?

RQ3: What are prospective directions for future research?

The main aim and research questions defined in the paper are closely related to the systematic literature review (SLR) methodology, which is characterised by the particular rigour of collecting and synthesising prior scientific research, which allows for its replicability (Okoli, 2015). The paper fills the research gap through a study synthesising the scientific research on collective creativity conducted in management science in the last decade. It identifies the main topic areas, geographical coverage, industry focus, and research methods used in the existing scholarly research on collective creativity. It also provides a foundation for future research. The study may also be useful to practitioners in understanding the nature of collective creativity and its application to business practice.

The paper is structured as follows: Section 1 describes the SLR procedure, Section 2 presents the results of the descriptive and thematic analysis, and Sections 3 and 4 provide the discussion and conclusion with theoretical and practical implications.

1. Research methods

The literature describes various procedures for conducting a systematic literature review. According to Okoli (2015), SLR should consist of eight steps, including purpose identification, draft protocol and team training, practical screening application, literature search, data extraction, quality appraisal, synthesis of studies and review writing. The methodology

MOST WIEDZY Downloaded from mostwiedzy.pl

used by Palomino et al. (2018) is especially helpful in the screening phase as it explains simply and transparently how to perform each analysis step. It contains many sets of techniques and tools to conduct SLR that can enrich the analysis and especially make the visual part more attractive. To perform a more detailed SLR, the linguistic analysis proposed by Godwin (2016) could be applied. It can be easily transferred to the network map of words. The current paper used the three-step SPL procedure proposed by Tranfield et al. (2003): review planning, conducting, and reporting.

1.1. Review planning

The first stage — review planning — can be considered a "stand-alone literature review", aiming to diagnose and summarise the literature on the subject, identify research gaps and propose further development directions for the field in terms of scientific efforts. The work described in this article started with collecting key terms to filter articles in the databases. Further filters could be applied once as many publications as possible were collected using particularly general parameters and rejecting articles that did not meet the criteria. The final number of publications was subjected to further in-depth analysis. Fig. 1 provides a graphic representation of the implemented process with the given input and output data, used key words and the specificity of the filters for each screening phase.

1.2. Conducting the review

The study was prepared based on analysing articles in Scopus and Web of Science (WoS) databases. The analysed literature had to be in the form of journal articles, conference proceedings, books or book sections. In total, the term "collective creativity" was found in 542 articles; however, only 53 articles in the Scopus database (category: Business, Management and Accounting) and 59 articles in the WoS database (category: Management & Business) were related to management and business. After merging both databases and removing duplicates, 74 articles remained for analysis, which were subjected to further selection criteria. In the analysis, the main keywords "management" and "business" were combined with the keywords related to the purpose of the analysis for greater accuracy, i.e., "innovation", "collaboration", "open innovation", "crowdsourcing", "collective knowledge", "innovation management" and "problem solving". The selection of key terms was closely related to using collective creativity to manage the organisation and its innovation processes.

The selection process was divided into three phases that disqualified articles failing to meet certain criteria for further analysis. In the first phase, the selection criteria concerned the publishing language, compliance with the types of bibliography specified in the initial analysis phase, and the publication date. It was important for articles to be published in English for greater access to a wider audience.

The compliance criterion of key terms and types of the bibliography was defined so that the publications were focused on the broadly understood management in organisations with particular emphasis on innovation and team management. The last selection criterion was the publication date. The analysis accepted articles published after 2010, aiming to be as up-to-date as possible in relation to management trends. The application of filters resulted in 63 publications qualified for further analysis.

The second phase of the selection focused on publications concerned only with collective creativity in management. Each publication was analysed based on an abstract, title and keywords. The publications selected for further analysis not only mentioned management areas but also concerned them. The analysis resulted in 41 articles accepted for further selection.

The last selection phase concerned the articles' availability. The full analysis only selected articles with their full content published under the open access principle. 23 articles were excluded from further analysis, and 18 were selected for full analysis and constituted the basis for further work.

1.3. Reporting

After all the screening phases had been carried out, 18 articles were subjected to descriptive and thematic analysis. As the descriptive part, summaries in the form of tables and graphs have been prepared. Tables 1–5 present five sets of data: measurements of publications citations; measurements of journals; groupings of keywords appearing in the review's bibliography; industrial and geographical context; and an overview of the research design, approaches, and methods included in the review's bibliography.

As part of the thematic analysis of each article, a summary of the research focus and key findings of the review's literature was prepared in the form of a table (Table 6). From each publication, the purpose

MOST WIEDZY Downloaded from mostwiedzy.pl

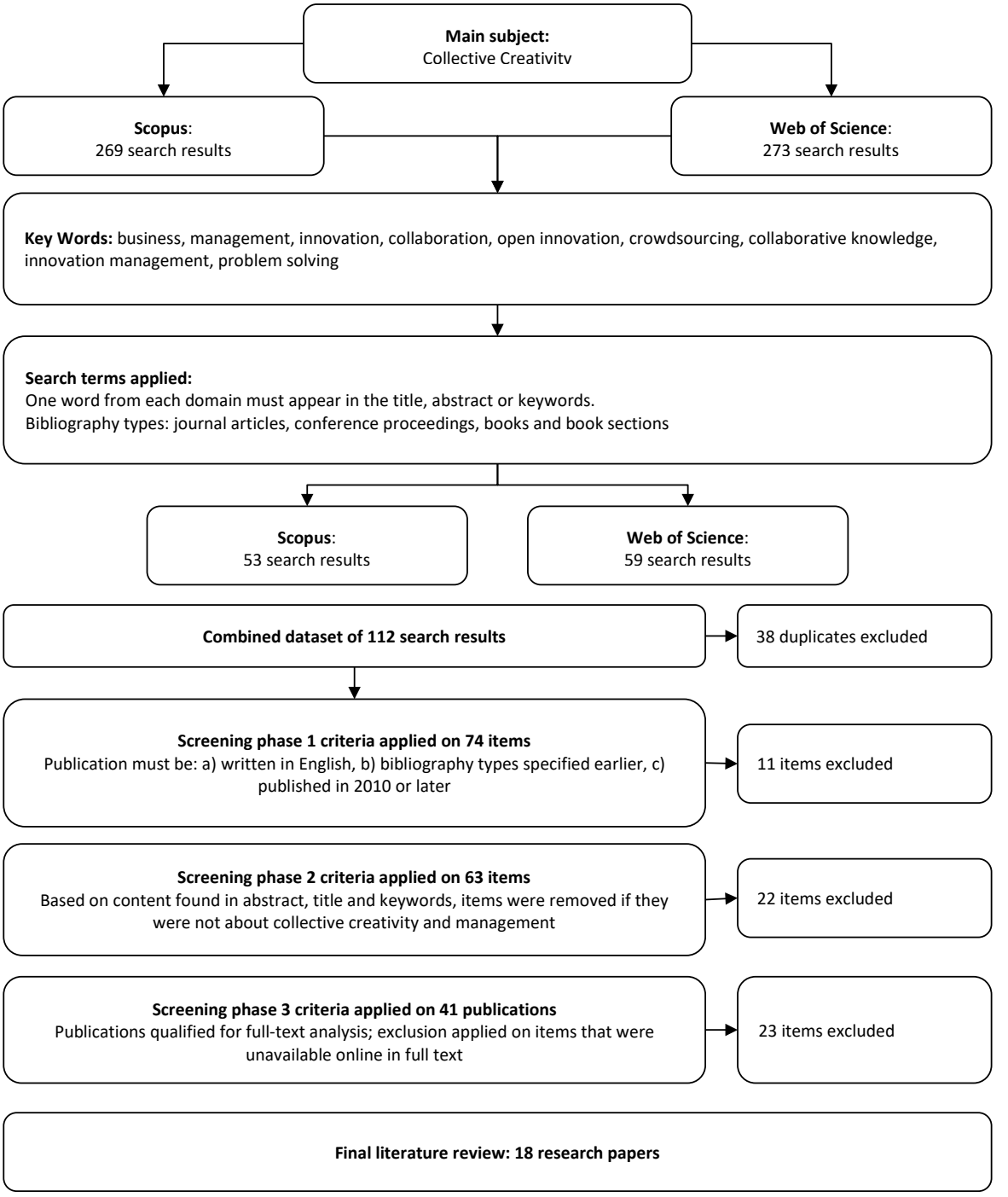

Fig. 1. Systematic literature review process

of the study and the most important conclusion concerning the conducted research were distinguished.

These analyses provided the basis for determining the limitations resulting from the conducted research and proposing future areas of research in this field.

2. Research results

2.1. Descriptive analysis

No clear growth trend could be detected (Fig. 2) in the collective creativity research during the analy-

MOST WIEDZY Downloaded from mostwiedzy.pl

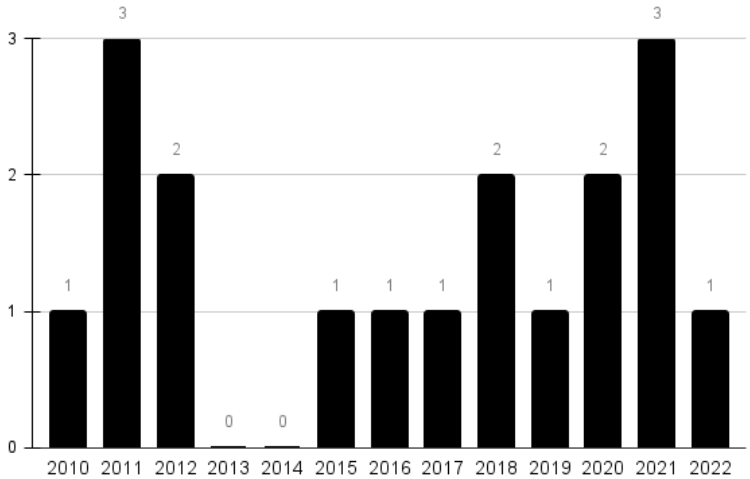

Fig. 2. Yearly publications from 2010 to 2022

Tab. 1. Measurements of publications citations

Author	Title	Venue of publication	All
Chanal and Caron-Fasan (2010)	The Difficulties Involved in Developing Business Models Open to Innovation Communities: the Case of a Crowdsourcing Platform	Management	51
Bissola and Imperatori (2011)	Organizing Individual and Collective Creativity: Flying in the Face of Creativity Cliches	Creativity and Innovation Management	41
Brown and Anthony (2011)	How P&G Tripled Its Innovation Success Rate	Harvard Business Review	38
Martins and Shalley (2011)	Creativity in Virtual Work: Effects of Demographic Differences	Small Group Research	34
Lee and van Dolen (2015)	Creative participation: Collective sentiment in online co-creation communities	Information & Management	24
Hurley et al. (2018)	Exploring the application of co-design to transformative service research	Journal of Services Marketing	23
Cirella et al. (2012)	A Process Model of Collaborative Management Research: The Study of Collective Creativity in the Luxury Industry	Systemic Practice and Action Research	15
Parjanen et al. (2012)	Brokerage functions in a virtual idea generation platform: Possibilities for collective creativity?	Innovation Organization & Management	14
Cerneviciute and Strazdas (2018)	Teamwork management in creative industries: Factors influencing productivity	Entrepreneurship and Sustainability Issues	11
Cirella (2016)	Organizational Variables for Developing Collective Creativity in Business: A Case from an Italian Fashion Design Company	Creativity and Innovation Management	11
Ehlen et al. (2017)	The Co-Creation-Wheel A four-dimensional model of collaborative, interorganisational innovation	European Journal of Training and Development	8
Astola et al. (2021)	Can Creativity Be a Collective Virtue? Insights for the Ethics of Innovation	Journal of Business Ethics	2
Bradford and Leberman (2019)	BeWeDo (R): A dynamic approach to leadership development for co-creation	Leadership	2
Vogelgsang (2020)	Transition rather than balance: Organizing constraints for collective creativity in pharmaceutical development	Creativity and Innovation Management	1
Yao et al. (2021)	The curvilinear relationship between team informational faultlines and creativity: moderating role of team humble leadership	Management Decisions	1
Bai and Li (2020)	The best configuration of collaborative knowledge innovation management from the perspective of artificial intelligence	Knowledge Management Research & Practice	0
Cirella (2021)	Managing collective creativity: Organizational variables to support creative teamwork	European Management Review	0
Yuan et al. (2022)	From individual creativity to team creativity: A meta-analytic test of task moderators	Journal of Occupational and Organizational Psychology	0

Citation details were retrieved on Feb. 19, 2022.

MOST WIEDZY Downloaded from mostwiedzy.pl

sis period of 2010–2022. The end of 2020 shows the trend of published articles remaining at the level of 2–3 per year. 2013–2014 saw a break in articles on collective creativity, and the number of publications after this break was lower than in 2010–2012.

Among all analysed articles, "The Difficulties involved in Developing Business Models open to Innovation Communities: the Case of a Crowdsourcing Platform" by Chanal and Caron-Fasan (2010) had 51 citations, which is the highest number. Among the 18 articles included in the analysis, three latest papers from 2020, 2021 and 2022 had no citations. There is a clear trend regarding the time of publication. Articles from 2010–2015 were cited on average 31 times, while articles from 2016–2022 only had an average of five citations. Collective creativity is a new and niche field of management science, considering the development of a management culture towards the use of creativity and human potential in the organisation. This field has a chance for dynamic development in the coming years. The obstacle is the lack of breakthrough research that would tangibly direct the focus of scientists and managers toward it. An opportunity for the development of this field is the progressive technological development, in particular artificial intelligence, which will replace manual and repetitive activities from the organisation and will focus the work of leaders on using human creativity and innovation, which machines and computer systems are not able to provide so far.

Noteworthy is the especially wide variety of journals in which the identified publications were published. The authors of the analysed articles published their publications in 16 different scientific journals. Of these, one turned out to be the most popular — Creativity and Innovation Management — in which three articles were published. Only three publications appeared in journals ranked above 150 h-index points: Astola et al. (2021) in the Journal of Business Ethics, Brown and Anthony (2011) in the Harvard Business Review and Lee and van Dolen (2015) in the Information & Management. The average number of h-index points was 74.

Nevertheless, as many as 12 out of 18 publications were published in journals with a lower index. Of the 18 journals, 16 had a management subject area, and two others related to psychology and marketing.

Tab. 2. Measurements of journals

Journal name	No of articles	Journal subject area	H-index in SJR
Journal of Business Ethics	1	Arts and Humanities; Business and International Management; Business, Management and Accounting; Economics and Econometrics; Law	187
Harvard Business Review	1	Business, Management and Accounting; Strategy and Management; Business and International Management; Management of Technology and Innovation; Economics and Econometrics; Medicine	179
Information & Management	1	Information Systems; Information Systems and Management; Management Information Systems	162
Journal of Occupational and Organizational Psychology	1	Applied Psychology; Organizational Behavior and Human Resource Management	114
Journal of Services Marketing	1	Marketing	102
Management Decisions	1	Business, Management and Accounting; Management Science and Operations Research	98
Small Group Research	1	Applied Psychology; Social Psychology	71
Creativity and Innovation Management	3	Business, Management and Accounting	60
European Journal of Training and Development	1	Business, Management and Accounting; Education; Organizational Behavior and Human Resource Management	57
Leadership	1	Sociology and Political Science; Strategy and Management	44
Knowledge Management Research & Practice	1	Business, Management and Accounting; Decision Science; Social Sciences	38
Systemic Practice and Action Research	1	Management of Technology and Innovation; Strategy and Management	33
European Management Review	1	Business and International Management; Strategy and Management	32
Entrepreneurship and Sustainability Issues	1	Business, Management and Accounting; Economics, Econometrics and Finance; Environmental Science	25
Management	1	Business, Management and Accounting; Strategy and Management	15
Innovation Organization & Management	1	unavailable	unavailable

Data retrieved from SJR on Feb. 20, 2022.

MOST WIEDZY Downloaded from mostwiedzy.pl

The analysed articles had 50 keywords, which were finally grouped into seven categories: management, innovation, creativity, team, ICT, leadership and other. The highest frequency of occurrence was in the management category, with as many as 13 different keywords. Mostly, they focused on cooperation and organisation management. The second most frequent category was innovation, which had nine different key phrases related to innovation in various development stages of a project and organisation. The third of the most dominant categories was creativity with eight keywords, which concerned both design and broadly understood idea generation. Less popular groups of keywords were team (7), ICT (6), and leadership (4). The main non-grouped keywords were Aikido, alcohol education and fashion textile design. The analysed articles had 50 keywords, which were finally grouped into seven categories: management, innovation, creativity, team, ICT, leadership and other.

The highest frequency of occurrence was in the management category, with as many as 13 different keywords. Mostly, they focused on cooperation and organisation management. The second most frequent category was innovation, which had nine different key phrases related to innovation in various development stages of a project and organisation. The third of the most dominant categories was creativity with eight keywords, which concerned both design and broadly understood idea generation. Less popular groups of keywords were team (7), ICT (6), and leadership (4). The main non-grouped keywords were Aikido, alcohol education and fashion textile design.

These articles were also reviewed in terms of their specificity. First, the industrial context and geographical distribution of each publication were established. Then, the focus was placed on the methodology. The form of the conducted research and its purpose were analysed and compared. In addition, data sources, data acquisition and analysis methods were found.

Teams of most analysed articles (12 out of 18) were composed of scientists from the same country. Six articles had scientists representing the USA and Italy, and the preparation of five articles involved scientists from the Netherlands and Great Britain. Chinese researchers were on teams of three articles, and two papers engaged scientists from New Zealand. Geographically, most articles were issued in Europe (8 countries), followed by Southeast Asia (China, Australia and New Zealand) and the USA. Half of the articles were related to a specific industry. The remaining 50 % were holistically related to creativity, innovation and team management in companies without identifying the dominant research industry. Table 4 presents detailed data relating to individual articles.

When it comes to research design, the majority of publications were directed at the exploratory design, and only one of them, by Brown and Anthony (2011), was focused on descriptive design (Table 5). Considering the research approach, the situation was much more diversified. Among the analysed articles, 16 of them focused on a qualitative approach, four of which combined two objectives, qualitative and quantitative. There was no study that focused solely on the quantitative approach, and articles by Chanal and Caron-Fasan (2010) and Cirella et al. (2012) were directed at the collaborative approach.

The analysis of data sources observed a uniform approach to research, i.e., the use of mixed primary and secondary sources. Two articles stood out: Brown and Anthony (2011) used only raw data, and Astola et al. (2021) used secondary data. Scientific publications differed in data-obtaining methods. Documents were used to collect data in all 18 analysed cases, and additional methods of data collection occurred in 16 cases. Only two publications used documents only. Ten publications used only two data sources, five used three sources, and one used as many as four data sources. Among the second-choice sources were questionnaires, which were used in eight publications, six articles used the interview, and one of them was a follow-up interview. Two articles used some form of an experiment to obtain data, while five publications used some form of group research, i.e., a case study (used in two articles), a co-design session, workshops, and a complex heuristic task. Desk research and online platform interactions were among the isolated forms of obtaining data for articles.

The analysed articles were characterised by a variety of methods of analysed data; nevertheless, all 18 publications used content analysis. At the same time, out of seven publications that used only one method of data analysis, it was a content analysis in all cases. Two methods of data analysis were used in six scientific articles, three methods were used in the next four publications, and one of them used as many as four data analysis methods. Inferential statistics was the second most popular analysis method used in the analysed sample in as many as seven publications. In addition to the two methods, the authors of scientific articles also used a systematic analysis (Chanal

MOST WIEDZY Downloaded from mostwiedzy.pl

Tab. 3. Groupings of keywords appearing in the review bibliography

Keyword group	Occurrence	Keywords appearing in the review bibliography
Management	13	Affective influence, brokerage functions, business model, collaborative management research, collective sentiment, constraint, HRD, interorganisational collaboration, optimal allocation, organisational change and development, organisational variables, process, professional learning
Innovation	9	Collaborative knowledge, collective creativity, innovation, innovation communities, innovation management, innovation network, open innovation, service innovation, transformative service research
Creativity	8	Co-creation, co-design, creative industries, creativity, crowdsourcing, design consultancy, efficiency in creativity, idea generation
Team	7	Collective virtue, demographic differences, team creativity, team informational faultlines, teamwork, virtual teams, virtue
ICT	6	Artificial intelligence, distance, online co-creation, user participation, user-driven, virtuality
Leadership	4	Humble leadership, leadership, leadership development, relational leadership
Other	3	Aikido, alcohol education, fashion textile design

Tab. 4. Industry and geographical context

Author(s)	Context		Geographical distribution	
Astola et al. (2021)	Multi-industry	Creative industry, movie production industry, IT industry	Single-country	The Netherlands
Bai and Li (2020)	Mono-industry	Technological industry	Single-country	China
Bissola and Imperatori (2011)	Multi-industry	Fashion and design industries	Single-country	Italy
Bradford and Leberman (2019)	Mono-industry	Sport industry	Single-country	New Zealand
Brown and Anthony (2011)	Mono-industry	Non-specified, the article is based on the experience of the P&G company	Single-country	USA
Cerneviciute and Strazdas (2018)	Mono-industry	Creative industry	Single-country	Lithuania
Chanal and Caron-Fasan (2010)	Mono-industry	Non-specified, article is based on a crowdsourcing platform	Single-country	France
Cirella et al. (2012)	Mono-industry	Luxury industry	Multi-country	Italy, USA
Cirella (2016)	Multi-industry	Fashion design industry	Single-country	UK
Cirella (2021)	Multi-industry	Fashion textile design and design consultancy industries	Multi-country	Italy, UK
Ehlen et al. (2017)	Mono-industry	Non-specified, article is based on the human resource sector	Single-country	The Netherlands
Hurley et al. (2018)	Mono-industry	Non-specified, article is based on the education sector	Multi-country	Australia, Sweden
Lee and van Dolen (2015)	Mono-industry	Non-specified, article is based on the online co-creation communities	Multi-country	The Netherlands, UK
Martins and Shalley (2011)	Multi-industry	Non-specified, article is based on a virtual field of work	Single-country	USA
Parjanen et al. (2012)	Multi-industry	Non-specified, article is based on a virtual idea generation Platform	Single-country	Finland
Vogelgsang (2020)	Mono-industry	Pharmaceutical industry	Single-country	Germany
Yao et al. (2021)	Multi-industry	Non-specified, article is based on the experience of the R&D companies	Single-country	China
Yuan et al. (2022)	Multi-industry	Non-specified, article is a review based on creative teams	Single-country	The Netherlands, USA

MOST WIEDZY Downloaded from mostwiedzy.pl

Tab. 5. Overview of the research design, approaches, and methods included in the review bibliography

Author(s)	Research design	Research approach	Data source	Data collection method	Data analysis
Astola et al. (2021)	Exploratory	Qualitative	Secondary	Documents	Content analysis
Bai and Li (2020)	Exploratory	Qualitative	Mixed	Documents, questionnaire	Content analysis
Bissola and Imperatori (2011)	Exploratory	Qualitative	Mixed	Documents, quasi-experiment	Content analysis, inferential statistics
Bradford and Leberman (2019)	Exploratory	Qualitative	Mixed	Documents, Interviews, experiment	Content analysis
Brown and Anthony (2011)	Descriptive	Qualitative	Primary	Documents, interviews	Content analysis
Cerneviciute and Strazdas (2018)	Exploratory	Qualitative	Mixed	Documents, questionnaire	Content analysis
Chanal and Caron-Fasan (2010)	Exploratory	Collaborative	Mixed	Documents, workshops	Systematic analysis, content analysis
Cirella et al. (2012)	Exploratory	Collaborative	Mixed	Documents, interviews	Reflective analysis, content analysis, data-driven analysis, co-evaluation
Cirella (2016)	Exploratory	Qualitative	Mixed	Documents, case study, interviews	Content analysis, iterative analysis, inductive analysis
Cirella (2021)	Exploratory	Qualitative, Quantitative	Mixed	Documents, questionnaire	Content analysis, inferential statistics
Ehlen et al. (2017)	Exploratory	Qualitative, Quantitative	Mixed	Documents, questionnaire, interviews	Content analysis, inferential statistics
Hurley et al. (2018)	Exploratory	Qualitative	Mixed	Documents, co-design session	Content analysis, five-phase cycle
Lee and van Dolen (2015)	Exploratory	Qualitative, Quantitative	Mixed	Documents, online platform interactions	Content analysis, textual analysis, inferential statistics
Martins and Shalley (2011)	Exploratory	Qualitative, Quantitative	Mixed	Documents, questionnaire, complex heuristic task	Content analysis, inferential statistics
Parjanen et al. (2012)	Exploratory	Qualitative	Mixed	Documents, questionnaire, case study	Content analysis
Vogelgsang (2020)	Exploratory	Qualitative	Mixed	Documents, desk research, questionnaire, follow-up interviews	Content analysis
Yao et al. (2021)	Exploratory	Qualitative	Mixed	Documents, questionnaire	Linear regression analysis, inferential statistics, content analysis
Yuan et al. (2022)	Exploratory	Qualitative	Mixed	Documents	Inferential statistics, content analysis, Schmidt-Hunter psychometric meta-analysis

& Caron-Fasan, 2010), a reflective analysis, data-driven analysis and co-evaluation (Cirella et al., 2012); an inductive and iterative analysis (Cirella, 2016), the five-phase cycle (Hurley et al., 2018); textual analysis (Lee & van Dolen, 2015), a linear regression analysis (Yao et al., 2021); and the Schmidt-Hunter psychometric meta-analysis (Yuan et al., 2022).

2.2. Thematic analysis

The main thematic threads distinguished in the analysed articles showed various approaches and the use of collective creativity in management science. Leadership and team management were one of the leitmotifs in four publications by Yao et al. (2021),

MOST WIEDZY Downloaded from mostwiedzy.pl

Tab. 6. Summary of the research focus and key findings of the reviewed literature

Author	Research focus	Key findings
Astola et al. (2021)	Investigated creativity as a collective virtue in organisations that engage in product and service innovation	Creativity in the context of innovation can be a group virtue
Bai and Li (2020)	Examine the mode, influence, and necessity of collaborative knowledge innovation management under the background of artificial intelligence	Through the optimal allocation of resources, enterprises can develop into highly efficient organisations with strong cohesion, continuous development, and selfmanagement, and form the collective creativity of enterprises, which can better adapt to the complex and rapidly changing management environment in the new era
Bissola and Imperatori (2011)	Presented an exploration of the evidence which can inform the design of collective creative projects within organisations, flying in the face of some managerial clichés	Creativity is not only about creative genius, and design for creativity is not a matter of linear correlation but implies a more sophisticated and integrative approach according to which individual creative skills, team dynamics and organisational solutions interact with each other to produce a collective creative performance
Bradford and Leberman (2019)	Investigated the movement practices of the Japanese martial art Aikido to facilitate leadership development and a relational perspective for co-creation	The research is the first to connect how Aikido movement practices generate relational leadership for leadership development to contribute to leadership studies
Brown and Anthony (2011)	Examined how P&G tripled its innovation success rate	Collective creativity can be managed and can generate sustainable sources of revenue growth no matter how big a company becomes
Cerneviciute and Strazdas (2018)	Aimed at the identification of the most important factors for the productivity of teamwork	To achieve higher productivity of a creative team, the greatest attention must be given to the factors of higher hierarchical level
Chanal and Caron-Fasan (2010)	Investigated the main strategic difficulties encountered by firms whose business models rely on public web communities to create value	The "openness" of the business model to online communities leads to the development of a multi-level incentive model adapted to the different profiles of the various contributors
Cirella et al. (2012)	Analysed a hybrid model of the CMR research process in organisations	The proposed model represents actionable protocol and knowledge to be used for designing rigorous, reflective and relevant collaborative research projects with organisations
Cirella (2016)	Aimed at proposing a theoretical framework for collective creativity within an organisational design perspective and to help clarify this concept and how collective creativity can be purposefully managed	Collective creativity, more than individual creativity, has a positive impact on client satisfaction and economic results
Cirella (2021)	Examined collective creativity as vital in creative settings, relating to interactions, communication and mutual trust between members of groups and teams, which can be managerially supported	The results provide a new scientific understanding of collective creativity in organisations and suggest future research directions, with recommendations for creative companies seeking to support collective creativity
Ehlen et al. (2017)	Aimed to design and validate a conceptual and practical model of co-creation	The model is a welcome instrument to get hold of thecomplex and unpredictable co-creation processes and activities
Hurley et al. (2018)	Explored the application of co-design to transformative service research	A recruitment strategy that uses strong networks and sensitises users through generating awareness of the underlying issue can prevent the waste of valuable resources
Lee and van Dolen (2015)	Investigated the understanding of the role of sentiment in user co-creation	Management style can affect the success of co-creation communities
Martins and Shalley (2011)	Examined how demographic differences interacted with the nature of interaction processes and difference in technical experience, to affect creativity in short-term virtual work interactions	Differences in age interacted with the processes and-differences in technical experience to affect creativity. Differences in nationality had a strong negative direct effect and interacted with differences in technical experience to affect creativity. Differences in sex and race did not significantly affect creativity

MOST WIEDZY Downloaded from mostwiedzy.pl

Parjanen et al. (2012)	Analysed how brokerage functions are able to create possibilities for collective creativity	The careful preparation of the collective creativity process, active participation of the brokers during the process and the use of the boundary objects and creativity methods are some of the ways of creating possibilities for collective creativity in virtual co-creation
Vogelgsang (2020)	Aimed to rethink this balancing proposition by asking how constraints unfold during collective creative processes	Organising constraints for collective creativity is a matter of transition rather than balance
Yao et al. (2021)	Examined the curvilinear relationship between team informational faultlines and team creativity and the moderating effects of team humble leadership on the relationship	The results indicate that the relationship between team informational faultlines and team creativity is inverted U-shaped, and such a relationship is stronger in teams with low levels of humble leadership
Yuan et al. (2022)	Investigated the development of moderating roles of task characteristics — task interdependence and task creativity requirements	Translating individual creativity into team creativity is a fundamental issue

Yuan et al. (2022), Cirella (2021), and Ehlen et al. (2017). Yao et al. (2021) compared the relationship between team informational faultlines and team creativity. This analysis was proposed in relation to the "humble leadership" concept. It was translated as other-centred leadership that is open to criticism while at the same time evaluating members' contributions to the organisation (Chui et al., 2016). The study verified a critical role of a moderator for informational faultlines effects, a greater correlation between informational faultlines and team creativity, and lower levels of humble leadership. While examining the dependencies and differences between individual and group creativity, Yuan et al. (2022) concluded that individual creativity was the basis for the development of group creativity. The analysis of 67 publications on management and creativity resulted in the formulation and verification of 12 hypotheses examining various factors of the relationship between individuality and teamwork in the organisation's lifecycle.

The team as a driving force behind organisational innovation was also analysed by Cirella (2021), who identified and analysed five factors supporting the process of collective creativity. However, the author admitted that further work on the developed factors should be a natural extension and deepening of this area's knowledge, especially when it comes to the research scale. In turn, Ehlen et al. (2017) analysed the proposed practical co-creation model — the Co-Creation Wheel. The authors analysed complex and unpredictable processes and activities in relation to the proposed model and confirmed that it was useful for this type of activity area.

Another group of articles focused on productivity, growth and development. In their description, Brown and Anthony (2011) looked for a correlation between the size of the company and the possibility of managing and growing the organisation with regard to collective creativity. Their publication describes P&G's success story and its ability to triple the innovation success rate. According to Bissol and Imperatori (2011), creativity does not depend solely on outstanding individuals and their creative abilities. Collective creativity performance depends on more complex correlations of factors, including individual skills, dynamics of teamwork and organisational solutions. In their publication, the authors dealt with the notion of creativity cliches. By contrast, Hurley et al. (2018) looked for appropriate methods and tools that used collaborative networks to prevent the loss of valuable resources.

Five analysed publications were based on experiences from specific industries and focused on research improving the quality of team cooperation, the level of innovation of the products created, the effectiveness and the overall development of the organisation. According to Cerneviciute and Strazdas (2018), greater attention should be paid to factors of higher hierarchical level to achieve greater teamwork productivity. The topic of leadership using the example of Japanese martial arts Aikido was described by Bradford and Leberman (2019). Cirella et al. (2012) focused on research on collective creativity in the luxury industry, Cirella (2016) — on the business perspective in the fashion design company, and Vogelgsang (2020) investigated group creativity for the development of the pharmaceutical industry.

A surprisingly large number of articles (5) considered the topic of collective creativity in Internet cooperation between individual team members, both organised and randomly selected at one time. Parjanen et al. (2012) discussed the topic of virtual co-creation, and Lee and van Dolen (2015) focused on creating co-creational communities working with each other online. Chanal and Caron-Fasan (2010) based their research on a study case of a crowdsourcing platform, while Martins and Shalley (2011) stud-

MOST WIEDZY Downloaded from mostwiedzy.pl

ied the impact of demographic differences on online creative work in a short period of time. Bai and Li (2020) offered a rather innovative thesis and concluded that an innovative company of our time should combine all processes, including creativity, with artificial intelligence. The article by Astola et al. (2021) should be considered a summary of all articles on product and process innovation as it focuses on the ethics of all related activities and raises questions about whether creativity could be treated as a collective virtue in organisations.

3. Discussion of the results and proposed future research avenues

The identified publications seem to be just starting the topic of research in collective creativity in the context of management science. They provide examples of certain solutions or models of group behaviour occurring in specific studied environments. The number of articles devoted to the topic of collective creativity is relatively low; however, their analysis method is becoming more complex.

Publications from simple insights and workshops are transformed into statistical analyses and the search for mathematical solutions. Scientific articles about creative cooperation between teams in a virtual environment are also a positive aspect. The barriers to the standard notion of cooperation are broken, and creativity is increasingly more often moved into environments that have nothing to do with artistic expressions.

Changing the paradigms of collaboration, collaboration in a virtual environment and the development of digitisation, and, in particular, artificial intelligence, the business environment invests and develops collaboration components that are based on creative problem-solving. Included below are the major themes identified from the SLR that may provide a starting point for future research in the field of management.

3.1. Measurability of creativity

In further research on the topic, it is worth considering the measurement of the collective creativity factor in, e.g., processes. How to measure which of the two competing teams was better in terms of group creativity? How is distributed the contribution of individual members' creativity? What process factors determined the final success of the project? How do individuals and their group roles affect team creativity? Currently, the team's effectiveness and its level of coping with difficulties are measured based on the speed of task completion or, e.g., the level of income that has been generated by the team. In none of these cases it depended solely on the creative abilities of a given team. The proposed research in this area is the isolation of the components of creativity in group problem-solving processes, an attempt to measure creativity in relation to the identified factors.

3.2. Conscious team management

Team management is mainly focused on managing people who are selected for the team based on the organisation's profile and not the problems they are to solve. It happens for task teams to have outstanding specialists or personalities incorrectly selected for group roles. This often causes conflicts in teams for the leader to handle. What if people were selected for teams in relation to the roles they are supposed to fulfil or the problems they would have to handle? What if teams not only need specialists but also people with appropriate soft skills that help the team overcome problems more effectively?

A research proposal in this area would focus on analysing the appropriate selection of teams by personality type to increase the effectiveness of group creation and finding the optimal team composition for the specific type of problems they must face.

3.3. Next step in achieving general Artificial Intelligence (AI)

Several questions require to be answered in terms of AI: Can AI be included in the process of analysing and evaluating a team's work in terms of creativity? Can AI systems be used to predict the team that will be able to solve a specific problem, and with what probability?

If future research identifies success factors in the creative process, scientists will be able to isolate and measure them, and each problem will be matched with a specific team's skills to ensure the optimal outcome of their work. Will it be possible to teach AI creativity?

This assumption is rather superficial, yet at the same time, it might be the lacking element in achieving intelligence that exceeds human ability.

MOST WIEDZY Downloaded from mostwiedzy.pl

Conclusions

The paper is a systematic presentation of scientific research on collective creativity in management science and its main themes. This study achieved its main purpose and answered research questions following the principles of a systematic literature review.

The research questions were answered based on descriptive and thematic analyses. The approach of scientists has been captured and defined in publications on collective creativity in management science.

The main contribution of this paper is the focus on the analysis of existing research in the field of collective creativity, limited to management science. The results of the conducted analysis can be greatly relevant to academic and business communities. In the case of academia, the paper develops the current state of knowledge on collective creativity in relation to management science by analysing the scientific papers in this field and identifying the main thematic areas along with future research directions. The article also has considerable practical value. The understanding of the processes involved in initiating and managing collective creativity can provide important support for leaders and team members in the process of creating and developing innovations and solving different problems.

However, the current study had some limitations. The main limitation was the systematic literature review procedure, which implies a very rigorous selection process that may have resulted in excluding some valuable publications on collective creativity. The second limitation was relying solely on academic publications as a reliable source of peer-reviewed academic knowledge without considering other publications (e.g., trade publications, company reports, etc.) that might have shed additional light on the issue of collective creativity.

Literature

Arkko-Saukkonen A., Krastina A., & Lynch M. (2021). The power of collective creativity. *Journal of Finnish Universities of Applied Science*, *1*.

Astola, M., Bombaerts, G., Spahn, A., & Royakkers, L. (2021). Can creativity be a collective virtue? Insights for the ethics of innovation. *Journal of Business Ethics*, 1-12. doi: 10.1007/s10551-021-04833-0

Bai, X., & Li, J. (2020). The best configuration of collaborative knowledge innovation management from the perspective of artificial intelligence. *Knowledge Management Research & Practice*, 1-13. doi: 10.1080/14778238.2020.1834886

Bissola, R., & Imperatori, B. (2011). Organizing individual and collective creativity: Flying in the face of creativity clichés. *Creativity and Innovation Management*, *20*(2), 77-89. doi: 10.1111/j.1467-8691.2011.00597.x

Bradford, M., & Leberman, S. (2019). BeWeDō®: A dynamic approach to leadership development for co-creation. *Leadership*, *15*(1), 58-80. doi: 10.1177/1742715017721090

Brown, B., & Anthony, S. D. (2011). How P&G tripled its innovation success rate. *Harvard Business Review*, *89*(6), 64-72.

Černevičiūtė, J., & Strazdas, R. (2018). Teamwork management in Creative industries: factors influencing productivity. *Entrepreneurship and Sustainability Issues*, *6*(2), 503-516. doi: 10.9770/jesi.2018.6.2(3)

Chanal, V., & Caron-Fasan, M. L. (2010). The difficulties involved in developing business models open to innovation communities: the case of a crowdsourcing platform. *M@ n@ gement*, *13*(4), 318-340. doi: 10.3917/mana.134.0318

Chiu, C. Y. C., Owens, B. P., & Tesluk, P. E. (2016). Initiating and utilizing shared leadership in teams: The role of leader humility, team proactive personality, and team performance capability. *Journal of Applied Psychology*, *101*(12), 1705. Doi: 10.1037/apl0000159

Cirella, S. (2016). Organizational variables for developing collective creativity in business: A case from an Italian fashion design company. *Creativity and Innovation Management*, *25*(3), 331-343. doi: 10.1111/caim.12189

Cirella, S. (2021). Managing collective creativity: Organizational variables to support creative teamwork. *European Management Review*, *18*(4), 404-417. doi: 10.1111/emre.12475

Cirella, S., Guerci, M., & Shani, A. B. (2012). A process model of collaborative management research: The study of collective creativity in the luxury industry. *Systemic Practice and Action Research*, *25*(3), 281-300. doi: 10.1007/s11213-011-9220-x

Ehlen, C., van der Klink, M., Stoffers, J., & Boshuizen, H. (2017). The co-creation-wheel: A four-dimensional model of collaborative, interorganisational innovation. *European Journal of Training and Development*, *41*(7), 628-646. doi: 10.1108/EJTD-03-2017-0027

Godwin, A. (2016, October). Visualizing systematic literature reviews to identify new areas of research. In *2016 IEEE Frontiers in Education Conference (FIE)* (pp. 1-8). IEEE. doi: 10.1109/FIE.2016.7757690

Hargadon, A. B., & Bechky, B. A. (2006). When collections of creatives become creative collectives: A field study of problem solving at work. *Organization Science*, *17*(4), 484-500. doi: 10.1287/orsc.1060.0200

Hatch, M. J. (2002). Essai: Doing time in organization theory. *Organization Studies*, *23*(6), 869-875. doi: 10.1177/0170840602236008

Hurley, E., Trischler, J., & Dietrich, T. (2018). Exploring the application of co-design to transformative service research. *Journal of Services Marketing*, *32*(6), 715-727. doi: 10.1108/JSM-09-2017-0321

MOST WIEDZY Downloaded from mostwiedzy.pl

Kraus, K., Kraus, N., & Shtepa, O. (2021). Synergetic effects of network interconnections in the conditions of virtual reality. *Journal of Entrepreneurship, Management and Innovation*, *17*(3), 149-188. doi: 10.7341/20211735

Lee, H. H. M., & van Dolen, W. (2015). Creative participation: Collective sentiment in online co-creation communities. *Information & Management*, *52*(8), 951-964. doi: 10.1016/j.im.2015.07.002

Martins, L. L., & Shalley, C. E. (2011). Creativity in virtual work: Effects of demographic differences. *Small Group Research*, *42*(5), 536-561. doi: 10.1177/1046496410397382

Musick, P. L. (1976). Primitive percepts and collective creativity. *Art Psychotherapy*, *3*, 43-50. doi: 10.1016/0090-9092(76)90016-8

Palomino, M., Dávila, A., & Melendez, K. (2018). Methodologies, methods, techniques and tools used on SLR elaboration: a mapping study. In *International Conference on Software Process Improvement* (pp. 14-30). Cham: Springer. doi: 10.1007/978-3-030-01171-0_2

Parjanen, S., Hennala, L., & Konsti-Laakso, S. (2012). Brokerage functions in a virtual idea generation platform: Possibilities for collective creativity? *Innovation*, *14*(3), 363-374. doi: 10.5172/impp.2012.14.3.363

Stankiewicz, J. S., & Moczulska, M. (2015). The involvement of employees in knowledge management in the light of the research results. *Oeconomia Copernicana*, *6*(2), 37-51. doi: 10.12775/OeC.2015.011

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, *14*(3), 207-222. doi: 10.1111/1467-8551.00375

Vogelgsang, L. (2020). Transition rather than balance: Organizing constraints for collective creativity in pharmaceutical development. *Creativity and Innovation Management*, *29*(3), 413-423. doi: 10.1111/caim.12391

Yao, J., Liu, X., & He, W. (2021). The curvilinear relationship between team informational faultlines and creativity: moderating role of team humble leadership. *Management Decision*, *59*(12), 2793-2808. doi: 10.1108/MD-12-2019-1698

Yuan, Y., Humphrey, S. E., & van Knippenberg, D. (2022). From individual creativity to team creativity: A meta-analytic test of task moderators. *Journal of Occupational and Organizational Psychology*. doi: 10.1111/joop.12380

MOST WIEDZY Downloaded from mostwiedzy.pl