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Theoretical analysis of dynamic teams: Evolution and perspectives

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Abstract

This study aims to describe and analyze scientific production in relation to dynamic teams. Through bibliometric analysis, this article explores the most studied topics, the relationships between authors and their citations. The results show that the interest of researchers, according to the number of citations, is directed towards the fields of Psychology, Business and Organizational Behavior. Likewise, a certain dispersion is observed in the topics studied and there is a lack of consensus on the concept of a dynamic team. In conclusion, the present study provides an overview of how the literature in this scientific field has developed. Future research can be directed to the study of dynamic teams in different contexts, which could deepen the analysis for a definition of the concept of dynamic team and benefit from the multidisciplinary nature of the field, as well as facilitate the transfer of ideas between different fields.

Keywords: Dynamic team; membership change; fluid team; bibliometric studies; multicast.

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Análisis teórico de equipos dinámicos: Evolución y perspectivas

Resumen

Este estudio tiene como objetivo describir y analizar la producción científica en relación a equipos dinámicos. A través del análisis bibliométrico, este artículo explora los temas más estudiados, las relaciones entre autores y sus citas. Los resultados muestran que el interés de los investigadores, según el número de citaciones, se dirige hacia los campos de Psicología, Empresa y Comportamiento Organizacional. Asimismo, se observa cierta dispersión en los temas estudiados y falta consenso sobre el concepto de equipo dinámico. En conclusión, el presente estudio proporciona una visión general de cómo se ha desarrollado la literatura en este campo científico. Futuras investigaciones pueden dirigirse al estudio de equipos dinámicos en diferentes contextos, lo que podría profundizar el análisis para una definición del concepto de equipo dinámico y lograr beneficiarse del carácter multidisciplinario del campo, así como facilitar la transferencia de ideas entre diferentes campos.

Palabras clave: Equipo dinámico; cambio de membresía; equipo fluido; estudios bibliométricos; multidifusión.

Introduction

Today, organisations design teams as dynamic entities that assemble and reassemble different sets of skills, knowledge, locations, and responsibilities to meet different needs. However, much of the research on teams and their effectiveness has been conducted under the assumption of stability. That is, it has assumed that the members are always the same, that the membership is permanent, and that the tasks, missions and goals, or the location in which they work, are determined and constant (Zhu et al., 2021).

From this perspective, recent literature reviews have described the state of research, progress, and future directions in the study of teams from a dynamic perspective (Mathieu et al., 2014; Delice, Rousseau & Feitosa, 2019). In a similar vein, Wolfson, D’Innocenzo & Bell (2022) point out that the diversity of terms used by researchers to refer to the composition of dynamic teams has been an obstacle to the progress of research in this area.

Terms like porous boundaries, multiple membership, and dispersion are increasingly present in organizations (Mortensen & Haas, 2018), and because teams are inherently

dynamic structures (Wolfson et al., 2022), researchers refer to fluid teams (Benishek & Lazzara, 2019), multiple team membership (Fodor, Curseu & Meslec, 2021), changing team membership (Wu, Nijstad & Yuan, 2022), dynamic team composition (Bell, Brown & Weiss, 2018), turnover (Hom et al., 2017), staffing (Finn, Clay & Creaden, 2022), membership fluidity (Bedwell, 2019), and membership churn (Mathieu et al., 2017). All these terms are related to dynamic teams (Li et al., 2018; Wolfson et al., 2022) to account for the changing and dynamic nature of teams.

However, research on team dynamics is fragmented because, over the past decades, it has focused on changing the composition of teams, and has left out other topics in which dynamics are implicitly involved (Wolfson et al., 2022). Given that the concept of dynamics is used to refer to “a change and the factors and rules that govern that change” (p. 2), this study takes an interdisciplinary perspective to understand how the concept of dynamic teams is studied in the scientific literature. To this end, following the recommendations of Trainer et al. (2020); and Wolfson et al. (2022), this paper develops a research focused on the theoretical analysis of the study of dynamic

teams, which aims to answer the following questions:

RQ 1. Which articles, journals and publication trends contribute most to the study of dynamic teams?

RQ 2. Which authors, institutions and countries are most relevant to the study of team dynamics?

RQ 3. In which fields of knowledge has research on teams as dynamic entities been developed?

RQ 4. How does the research on dynamic teams relate to a citation analysis?

The paper is structured as follows: First, the previous literature on dynamic teams is reviewed; second, the theoretical analysis is described, detailing the data collection process; then, the results of the study are described; and finally, the main conclusions and future research directions are presented.

1. Theoretical foundation

Since McGrath (1991) invited the research community to study the effect of time on teams, because it is an important factor in the changes that take place in them, both in terms of members, project, technology and context, researchers have recognized that change is an essential characteristic of teams (Arrow & McGrath, 1993; Arrow, McGrath & Berdahl, 2000).

The first theoretical approaches to the concept of dynamic teams relate to the combination of team member characteristics and their effects on team processes and outcomes within the input-process-outcome model (IPO) (Hackman, Brousseau & Weiss, 1976), which has guided much of the research on teams (Mathieu, Wolfson & Park, 2018). Within this framework, research has explored team reflexivity (Konradt et al., 2016), team cognition (Bedwell, 2019), cohesion and coordination (Braun et al., 2020), familiarity (Joshi et al., 2018), shared mental models (Kneisel, 2020), or transactive memory systems (Bachrach et al., 2019).

In addition, the view of teams as complex dynamic systems has had a notable influence as a general framework for study (Arrow et al., 2000), according to which teams are entities that behave in complex, flexible, and interconnected ways in response to changes in the environment. On the other hand, from the perspective of multilevel theory (Kozlowski, 2015), individuals, teams and organisations are analysed in nested structures oriented towards both higher-order goals for the whole and lower-order goals for the team (Fodor et al., 2021).

Recent literature reviews have focused on the study of teams as dynamic entities, covering different perspectives. In this regard, literature reviews have been developed on the study of methods and tools used to understand the dynamic nature of teams (Delice et al., 2019) the dynamic team functioning factors from the field of social and occupational psychology (Blanchet & Michinov, 2016), the models and methods used to understand work teams (Roberts et al., 2022), the conceptualisation of teams as complex adaptive systems (Ramos-Villagrasa et al., 2018), teams from a network perspective (Park et al., 2020), as well as the evolution and progress of the team's effectiveness (Mathieu et al., 2018).

Much of the research on dynamic teams has focused on changes in their composition (Mathieu et al., 2014; He et al., 2023). The diversity of work and areas of study analysed in the literature reviews highlights the fragmentation of the field. The present research takes as its starting point the work of Wolfson et al. (2022), who states that part of the lack of research on the dynamic composition of teams is due to the proliferation of terms and constructs that represent and influence the dynamic composition of teams in a variety of disjointed areas. In this sense, the gap that is addressed is the theoretical analysis of academic research on team dynamics based on the different terms used to study it.

1.1. Teams as dynamic entities

The characteristics that refer to the dynamic nature of teams can be grouped into several dimensions, based on the concept of dynamic membership (Arrow & McGrath, 1993; 1995). Thus, teams as dynamic entities are characterised according to their: Arithmetic, i.e., the magnitude of change and whether it is by addition, subtraction, or replacement; temporality (frequency of change, duration and continuity, regularity and temporal evolution); where change occurs (within the group or system); who changes (roles, position); and what changes (task, diversity, context).

The arithmetic dimension has mainly been analysed in terms of changes in membership, which, according to Mathieu et al. (2014), can consist of changes in the number of members (addition, subtraction or substitution of a single or simultaneous member), the formation of one or more teams and the reconfiguration of several teams. Other papers have studied team diversity, that is, team heterogeneity based on the demographic and psychological characteristics of team members, and its impact on mediating mechanisms (Horwitz & Horwitz, 2007; Jansen & Searle, 2021).

In terms of time and change in the team, development-based models are based on the idea that the team evolves over time as it carries out its activity. Under this assumption, and with the idea that different stages can be identified along this process (Tuckman, 1965; McGrath & Tschan, 2007), the sequence of activities and the tasks performed in each of them have been studied (Miller, 2003; LePine et al., 2008; Bush, LePine & Newton, 2018). In the same line, the behaviour of the set of knowledge, skills and abilities of the members and their differences at different moments or stages have been studied to determine to what extent there will be some profiles more interesting than others for each situation (Wolfson et al., 2022).

Another perspective considers that team development can take place through the

training of team members in specific skills, both individually (Marlow et al., 2018) and from a group perspective (Lacerenza et al., 2018). In relation to the dynamics related to continuity, the length of time a team member remains in a team has been studied (Huckman, Staats & Upton, 2009).

In terms of the locus of change, change has been studied from the perspective of the individual, the organisation, and the group. Work on individual compositional change explores, for example, the adaptation of people's skills to the position (Mathieu et al., 2014).

In terms of subject change, studies have been conducted, for example, on the addition of new members (Kane & Rink, 2015) or on the cooperation between newcomers and incumbents (Otten et al., 2021). In terms of role change, the transfer between the roles of outgoing and incoming members has been studied (Bunderson, Van der Vegt & Sparrowe, 2013), and in terms of position, knowledge networks between core and peripheral members have been studied, for example (Valentine et al., 2018).

On the other hand, the academic debate has broadened and some suggestions call for an exploration of the very nature of teams given the novel forms of composition and contribution to work provided by technology (Edmondson, 2012; Wageman, Gardner & Mortensen, 2012) suggests changing the definition of team, so that the concept of continuous reconfiguration can be incorporated. Similarly, Mortensen & Haas (2018) considers abandoning the concept of membership, which is binary, and considers changing the concept of membership in yes/no terms to participation, as this term can refer to different types of intervention (Mortensen & Haas, 2018).

This wealth of research has contributed significantly to the understanding of dynamic teams, which has been enriched by this diversity, but it has also meant that the field has developed in a fragmented way that has prevented it from embracing the complexity of teams as dynamic entities, as it mostly refers to a single dimension.

2. Methodology

In line with the research objectives, an analysis was conducted to assess the scientific production and impact of research on dynamic teams. Literature reviews using qualitative methods based on the experience of the researcher can reduce the reliability of research findings (Donthu et al., 2021; Mukherjee et al., 2022). However, the analysis is a technique for studying the scientific literature that uses statistical methods to objectively and accurately examine a field of knowledge by analysing the social and structural relationships between the elements under study (Mukherjee et al., 2022).

The analysis of associated words is supported by the co-occurrence of keywords used by authors in scientific articles to represent the content of their research (Callon, Courtial & Laville, 1991). The coexistence of keywords in two articles indicates similarity between the publications and their probable belonging to the same research field (Borner, Chen & Boyack, 2003). Co-word analysis seeks to evaluate productivity, development, disciplinary impact and contribution to science (Cobo et al., 2011). Consequently, this analysis was used to identify the main fields of study, represent the intellectual structure and describe the general panorama of the field of dynamic teams, the objective of this research.

The study of the research field by means of co-word analysis follows a process that includes a number of stages (Callon et al., 1991). The present study follows the proposal of Cobo et al. (2011), which divides the process into five steps: Selection of documents and keywords, extraction of co-occurrence frequencies, quantification of similarities and thematic clustering.

Population, sample, and information processing tools: Databases and Artificial Intelligence. The study population consists of documents from the collection of bibliographic reference databases indexed in the Web of Science (WoS), specifically the Social Citation Index Expanded (SCIE), Social Science Citation Index (SSCI), Art & Humanities

Citation Index (A&HCI) and Science Citation Index Expanded (ESCI) were selected. The raw data sample was obtained through a query in WoS with the selected keywords and dated 25 October 2022.

The result of the scan was a total of 306 documents, and the search was refined by selecting documents listed as articles, reviews and early access, and by excluding “proceedings”, “meeting”, “book”, “editorial material”, “reference material” or “other”. The final result was a total of 295 articles that were checked for duplicate documents. From this refinement, two articles were found that corresponded to conference documents and another eight to magazine notes, so they were eliminated. Thus, the final product of this homogenisation work consisted of 285 documents, which formed the final sample to be used for the analysis.

The 285 articles extracted in BIBXCEL were processed, identifying the keywords used by the authors, resulting in 1,068 keywords. After normalizing the list, a total of 804 keywords were obtained for analysis. These articles, constituting the research sample on dynamic teams according to at least one keyword, were subject to analysis. The frequency of co-occurrence was calculated, indicating the number of times an article appears in pairs with another sharing keywords. A new sample of fifty-two keywords, considered indicators of the research field of dynamic teams, was obtained from 143 articles with a co-occurrence frequency greater than three.

For the 143 articles analysed by the dynamic teams, a theoretical citation analysis was carried out using Scite. The results of the citation analysis were then obtained, distinguishing between citations, mentions, contrast and support for each of the articles in the sample, as determined by the tool. Supporting refers to research findings that are supported by other authors, research or papers. Finally, contrasting refers to papers in which the results were not replicated, were different or deviated.

Finally, a second artificial intelligence tool was used to process the information:

Research Rabbit. Of the tool's functionalities, only visualizations of the relationships between the authors of the sample were used.

3. Results and discussion

3.1. Demographic Research in Dynamic Teams

First, we proceed to show the results of the evolution of the publications that deal with the study of dynamic teams, according to the identification of some of the key

words that identify the subject of study. The number of publications follows an upward, albeit irregular, trend, with periods of relative regularity, followed by a significant drop and then a surge in growth. The first document is published in 1976, the level is maintained at less than 5 documents until 2001, when it starts to grow until 2006, when it suffers a sharp decline. In 2007, there is a recovery until 2015, when there is a decline and then a greater increase from 2016 onwards. An analysis of the specific journals in which papers relating to dynamic equipment are published is shown in Table 1.

Table 1
Publications and indexing

Publication	Quartile	No. articles	Total citations
Frontiers In Psychology	Q1	8	148
Siam Journal on Control and Optimization		6	84
IEEE Transactions on Automatic Control		6	69
Small Group Research	Q3	5	199
Team Performance Management		5	11
Organisation Science	Q3	4	226
Organisational Behaviour and Human Decision Processes	Q3	4	672
Journal of Management	Q1	4	514
Academy of Management Journal	Q1	3	295
IEEE Transactions on Information Theory		3	152
Review of Religious Research	Q3	3	11
IEEE Transactions on Parallel and Distributed Systems		3	57
Group & Organisation Management	Q1	3	59
Systems & Control Letters	Q1	3	17
Organizational Psychology Review	Q2	3	18

Source: Own elaboration, 2024.

In terms of journals, a total of 212 publications interested in the field of dynamic equipment and related areas were obtained. Table 1 shows an extract of the top fifteen publications, their quartile in 2021, the number of articles from the sample included

in that publication and the number of citations received. Most of the publications are in the Q1 and Q3 quartiles, indicating that some of the topics studied in relation to dynamic teams have reached high relevance. The most productive journal is Frontiers of

Psychology, with eight publications, followed by two journals belonging to the field of computer science, Siam Journal on Control and Optimization and IEEE Transactions on Automatic Control, with six publications.

It should also be noted that the journals with the highest interest among researchers, measured by the number of citations, were Organizational Behaviour and Human Decision Processes and Journal of Management, with 672 and 514 citations respectively. On the other hand, the dispersion of the field can be highlighted, as 83.5% of the 212 journals publish only one article and the maximum number of articles published is

eight, over forty-five years. Finally, it should be noted that the journals are indexed in three categories: Management, psychology, and computer science.

Table 2, shows the analysis of the results according to the classification of the publications in the Web of Science (WoS) categories. The papers are classified into 114 of the categories defined by this database. Table 2 shows only the first twelve categories into which the papers in the sample are grouped. These results show that almost 25% of the categorisation corresponds to management, followed by computer science or engineering, and then psychology.

Table 2
WoS categories

Category Wos	No.	%
Management	71	24.91%
Computer Science, Information Systems	36	12.63%
Engineering, Electrical & Electronic	33	11.58%
Psychology, Applied	32	11.23%
Telecommunications	26	9.12%
Automation & Control Systems	22	7.72%
Business	21	7.37%
Computer Science, Artificial Intelligence	16	5.61%
Computer Science, Theory & Methods	16	5.61%
Psychology, Social	15	5.26%
Operations Research & Management Science	15	5.26%
Psychology, Multidisciplinary	13	4.56%
Political Science	12	4.21%

Source: Own elaboration, 2024.

Table 3 shows a summary of the authors who have contributed most to research in Dynamic teams, reflecting their *h-index* and their university or centre of origin. A total of 762 different authors are involved in our

research articles and 93.17% of them appear in only one paper. A total of 5.24% of the researchers were involved in two papers and 0.9 % were authors of three papers.

Table 3
Authors and citations in Dynamic Team research

Author	No. of articles	Quotations	Index h	University
Chambers, E.	4	124577	178	University Centre Florida
Mathieu, JE.	5	61021	91	University Connecticut
Chen, G.	3	11920	55	Vanderbilt University
Teneketzis, D.	5	10127	45	University Michigan
Arrow, H.	3	7175	28	University of Oregon
Staats, BR.	3	5946	34	Harvard University
Yuksel, S.	7	3812	27	University Hawaii Manoa
Mahajan, A.	3	2167	22	Yale University
Chuang, YT.	3	1833	15	Natl Chung Cheng University
Saldi, N.	4	544	14	Queens University
Li, J.	3	237	7	Eindhoven University Technology

Source: Own elaboration, 2024.

In the sample, five researchers have published between three and seven papers. Yuksel, stands out as the researcher with the highest number of publications on the topic. This pattern of authorship is in line with Lotka's law of theoreticals (Nájera-Sánchez et al., 2019), according to which most authors in a research field publish a small number of papers, or, in other words, the main bibliography has been explored by a small number of authors.

On the other hand, if the number of co-signing authors or co-authors is analyzed, it is found that 88.42% of the documents are signed by at least two authors. This fact is beneficial for research, as collaboration between researchers is considered to improve the quality and impact of research (Nájera-Sánchez et al., 2019).

Finally, the results are regarding the country of origin of the authors show that 50% of the researchers are from the United States, followed by Canada with 9.5% and China with 8%.

3.2. Theoretical keyword analysis

According to the analysis of co-words in the sample, the most addressed concept, although with low intensity, during the period studied was the change of membership, present in a 2003 article and used in sixteen publications. Other topics of interest, albeit intermittently, include teams, fluid team, dynamic team, group key, and multi-agent system. If we focus on areas of research that directly suggest movement or variability in teams, such as Membership Change, Dynamic Team, Fluid Team or Team Membership Change, interest in team dynamics was initially observed in 1991 and regained prominence in 2003. Only five research topics are used more than ten times in relation to dynamic teams during this period; the remaining forty-seven are mentioned less than ten times in connection with this topic.

The research on the different concepts related to dynamic teams is of low intensity, as the terms appear once or twice per year in the research period 1991-2022. Similarly, in

2021, twenty-two of the concepts under study in the field of dynamic teams have been the subject of work, and the trend since 2016 is an increase in the number of topics under study.

Likewise, an analysis of the relationships between the authors in the sample of the bibliographic study of keywords is reflected, based on the citation relationships according to Scite, and according to the relationships obtained through Research Rabbit AI. According to the results presented above, there are three most relevant articles in the study of dynamic teams. The article with the most relationships is the work of Choi & Thompson (2005), followed by the work of Lewis et al. (2007).

In terms of the relationships found with the work of Choi & Thompson (2005), the related works share the study of team functioning when there is a change in members. This change affects group cognition and team outcomes. The experimental work examines group cognition through creativity and finds evidence that group productivity, as measured by the number of ideas, is higher when group membership changes. He also finds additional evidence of a positive and direct effect on the contribution of ideas from veterans due to the contribution of new ideas from new members. These findings are relevant to

studies of transactive memory systems when membership changes (Lewis et al., 2007), tasks (Gino et al., 2010), team adaptation (Bedwell, Ramsay & Salas, 2012), and team cognitive structure (Li & Gevers, 2018).

In terms of links with the work of Lewis et al. (2007), this is an experimental investigation into the effectiveness of transactive memory systems undergoing membership changes, which serves as a reference to work on adapting to membership changes in medical teams (Bedwell et al., 2012), the incorporation of newcomers' knowledge into collective knowledge (Kane & Rink, 2015), the effect of direct and indirect experience on the creation of new knowledge (Gino et al., 2010), and the effect of member turnover on the cognitive processes of the team (Li & Gevers, 2018).

Finally, the links between the works of Mathieu et al. (2017); y, Mathieu et al. (2018) are a consequence of the literature reviews conducted by the same author. On the other hand, the work of Lynch (2019) builds on the review work carried out by Mathieu et al. (2017) to examine the analysis of fluid teams.

In order to analyse the contribution of the research, is presented below a comprehensive analysis of smart quotes, relationships and networks using Scite, an artificial intelligence tool consulted on 30 June 2023 (see Table 4).

Table 4
Intelligent citations

Title and Authors	Citations	Citation report: sections	Average citations/year
Team Familiarity, Role Experience, and Performance: Evidence from Indian Software Services	355 Supporting, 8 Contrasting, 0 Mentioning, 217	Introduction, 32 Discussion, 28 Theory and Hypotheses, 10 Results, 8	25,36
Huckman et al. (2009)			
A century of work teams in the Journal of Applied Psychology	286 Supporting, 7 Contrasting, 0 Mentioning, 247	Introduction, 42 Discussion, 37 Theoretical Framing, 10 A theoretical Framework for external team's contexts, 8	47,67
Mathieu et al. (2017)			
A Review and Integration of Team Composition Models	274 Supporting, 3 Contrasting, 0 Mentioning, 95	Introduction, 7 Discussion, 7 Model f Ksaos for Smt Performance, 6 Applications, 5	27,40
Mathieu et al. (2014)			

Cont... Table 4

Group cognition, membership change, and performance: Investigating the benefits and detriments of collective knowledge. Lewis et al. (2007)	250 Supporting, 6 Contrasting, 0 Mentioning, 213	Discussion, 34 Introduction, 20 Transitive memory, 11 Theoretical Framework, 10	15,63
First, get your feet wet: The effects of learning from direct and indirect experience on team creativity. Gino et al. (2010)	238 Supporting, 5 Contrasting, 0 Mentioning, 151	Introduction, 23 Discussion, 16 Theory and Hypotheses, 12 Transactive Memory Systems, 10	18,31
Old wine in a new bottle: Impact of membership change on group creativity Choi & Thompson (2005)	220 Supporting, 10 Contrasting, 0 Mentioning, 190	Discussion, 20 Introduction, 19 Hypotheses, 11 Membership change literature, 7	12,22
Unlocking Knowledge Transfer Potential: Knowledge Demonstrability and Superordinate Social Identity Kane (2009)	162 Supporting, 4 Contrasting, 0 Mentioning, 67	Introduction, 11 Discussion, 9 Theoretical Framework, 8 Result, 6	12,46
Fluid Tasks and Fluid Teams: The Impact of Diversity in Experience and Team Familiarity on Team Performance Huckman & Staats (2010)	160 Supporting, 2 Contrasting, 0 Mentioning, 64	Introduction, 16 Discussion, 9 Theory and Hypotheses, 4 Resultados,3	13,33
Team Synergies in Sport: Theory and Measures Araújo & Davids (2016)	133 Supporting, 1 Contrasting, 0 Mentioning, 174	Introduction, 72 Discussion, 14 Central tenets of ecological dynamics, 8 Conclusion and limitations, 7	19,00
Facilitating Innovation in Diverse Science Teams Through Integrative Capacity Salazar et al. (2012)	130 Supporting, 3 Contrasting, 0 Mentioning, 149	Introduction, 24 Discussion, 17 Interdisciplinary teams, 12 Lessons and Recommendations, 7	11,82
Why Turnover Matters in Self-Managing Work Teams: Learning, Social Integration, and Task Flexibility Van der Vegt, Bunderson & Kuipers (2010)	99 Supporting, 2 Contrasting, 0 Mentioning, 91	Discussion, 11 Introduction, 11 Theory and Hypotheses, 6 Result, 5	7,07
Provably Secure Constant Round Contributory Group Key Agreement in Dynamic Setting Dutta & Barua (2008)	91 Supporting, 0 Contrasting, 0 Mentioning, 74	Introduction, 20 Security model, 8 Related work, 7 Contribution, 4	6,07
Reflexivity in Teams: A Review and New Perspectives Konradt et al. (2016)	88 Supporting, 0 Contrasting, 0 Mentioning, 76	Introduction, 16 Discussion, 12 Hypotheses, 8 Development 6	11,00
Conceptual Design of a Multi-Agent System for Interconnected Power Systems Restoration Ren et al. (2012)	87 Supporting, 0 Contrasting, 0 Mentioning, 35	Introduction, 18 Local operation of protective devices, 2 Results, 1 Mocogrid central controller, 1	7,91

Cont... Table 4

Cooperative Large Area Surveillance with a Team of Aerial Mobile Robots for Long Endurance Missions	86 Supporting, 0 Contrasting, 0 Mentioning, 43	Introduction, 22 Related work, 6, Communication and task allocation, 2 Efficient solutions, 2	7,82
Acevedo et al. (2012)			
Decentralized Q-Learning for Stochastic Teams and Games	71 Supporting, 1 Contrasting, 0 Mentioning, 104	Introduction, 17 Dqn-based distributed and uncoordinated, 10. Reated work, 9 Reinforcement learning, 6	11,83
Arslan & Yüksel (2017)			
Optimal Design of Sequential Real-Time Communication Systems	71 Supporting, 0 Contrasting, 0 Mentioning, 48	Literature Review, 9 Introduction, 9 Remote Estimation, 3 Proof of theorem, 3	5,07
Mahajan & Teneketzis (2009)			
Detecting Anomalous Insiders in Collaborative Information Systems	70 Supporting, 0 Contrasting, 0 Mentioning, 40	Introduction, 6 Methods, 2 Insider Threats detection, 2 Technical approaches, 2	6,36
Chen, Nyemba & Malin (2012)			
Tracking organizations in the world: The Correlates of War IGO Version 3.0 datasets	67 Supporting, 0 Contrasting, 0 Mentioning, 59	Methods, 10 Introduction, 6 Measuring the Decline of International Organizations, 5 International relations, 4	16,75
Pevehouse et al., 2020			
The evolution of work team research since Hawthorne	64 Supporting, 0 Contrasting, 0 Mentioning, 34	Introduction, 3 Optimizing virtual team meetings: attendee and deader perspectives, 2 Methods of review, 1 Mixed methods analysis types, 1	12,80
Mathieu et al., 2018			

Source: Own elaboration, 2024.

Table 4 shows the results of the intelligent citations of the twenty most cited research studies in the study of dynamic teams. As you can see, Mathieu et al. (2017) is the paper with the second highest total number of citations and the one with the greatest impact on the study of dynamic teams, as measured by the average number of citations, as well as by the distribution of citations in the different sections of the study after its publication. Also noteworthy in the results is the work of Araújo & Davids (2016), which, with a number of citations of 133, although it is the fourth most relevant paper in terms of the average number of citations per year, its citation in the introduction section of the subsequent research stands out above all the other papers in this study (doubling and even tripling them).

Finally, although the paper by Pevehouse et al. (2020) is ranked nineteenth in terms of total number of citations, it is ranked sixth in terms of the average index per year of circulation of the research, and its impact is due in particular to its citation in the methods section.

If we look at the total number of citations received, we see that the areas which received the most attention from researchers were teams, learning in groups and changing membership. Specifically, teams received 13% of the total number of citations obtained by the keywords. Group learning is also a topic of great interest to researchers in the field of dynamic teams, who cite it frequently in papers published in 2010 or earlier (see Table 5).

Table 5
Keyword quotations

Keyword	2005	2007	2009	2010	2011	2012	2014	2015	2016	2017	2018	2019	2020	2021	2022
teams	159		248	189	13	14			69	226	39	12	3		0
group learning		194		305				14							
membership change	159		54	116		35	28	14	18		1		2	9	1
transactive memory		194		189							38		4		
turnover		194		116			28				38		9		
knowledge transfer				305			28								
groups		194		116						3					
performance			302						2						
team composition							255					6	9	0	
group creativity	159			14											1
Total	723	859	862	1641	170	472	431	111	432	428	266	141	199	71	7

Source: Own elaboration, 2024.

For its part, the topic that has received the most continuous attention from the research community is Membership Change, which has received attention for twelve years, although it has been published with an irregular trajectory since 2003, and in publications that relate to several research areas, as discussed above.

We can also see that Experiment, Access Control, Multicast Security and Team Decision Theory are the fields that arouse the least curiosity in the scientific community in terms of the number of citations received. And those that are not of interest or have not been published for five years or more, such as team theory, group learning, knowledge transfer and groups. It should be noted that topics such as group learning and knowledge transfer, which have not been published in recent years, are of great interest to researchers as they have a high number of citations and a high average number of citations received.

Based on this study, we propose suggestions for future research that would enrich the field. Using the United States as a reference, the results indicate the opportunity to extend the studies to other research teams and analytical contexts, challenging the traditional team research framework. A potential line of research could explore national cultural differences, applying Hofstede's (2015) model, and their impact on the processes and emergent states of dynamic teams. Future research could address the adaptations of dynamic teams in

collectivistic versus individual cultures, as Ryu & Moon (2011) point out.

Given the underrepresentation of Latin American countries, another avenue could explore the behavior of dynamic teams in this context. Furthermore, understanding how members of dynamic teams integrate into organizations, especially in cultural fusions, could be an interesting area of research, considering the integrative function of culture in the environment (Hofstede 2015). These results highlight the interest of Asian nations, suggesting the possibility of exploring ethical behavior in dynamic teams, especially linked to Confucian ideas related to sustainability practices and business ethics.

As mentioned above previously, nonlinear dynamic systems provide a framework to study phenomena under the concept of complex adaptive systems, thus defining teams. This permeability between different domains can be used by future research to develop new ideas based on common elements. Although this work focuses on the study of dynamic teams using keywords, the multiplicity of terms used highlights the need for greater consensus among researchers on their conceptualization. A future line of research could analyze and define "dynamic" teams to clarify their differences with traditional teams (Kerrissey, Satterstrom & Edmondson, 2020), thus facilitating discussion between researchers.

Conclusions

Research on dynamic teams has generated interest in various scientific fields, evident in journals with limited publications in psychology, management, economics, health, automation, mathematics, engineering, computer science and artificial intelligence. Although the field is young with few recurring researchers and many authors of a single article, results suggest a promising future. This is based on the evolution of publishing and new ways of working, driven by the pandemic and technological transformation.

In relation to affiliation and research, the United States leads, with the Universities of Connecticut and Michigan standing out, along with Harvard, in producing the most cited documents. In citations, publications in economics and psychology are more prominent, led by *Frontiers of Psychology* and *Siam Journal on Control and Optimization*. In topics covered, the correspondence between interest, publications and regularity is variable, indicating a topic continually explored and in definition, with evident challenges.

Analysis of the publications reveals that some themes associated with the concept of dynamic teams are specific to certain fields, while others are shared between disciplines. This finding shows the diversity of areas in which the study of dynamic teams is addressed. For example, “team” is found in journals in psychology, business, organizational behavior, and collaborative computing; “Membership change” is used in journals of psychology, group processes, organizational behavior, business, computer science, parallel and distributed systems or communication networks, and security.

On the other hand, “dynamic team” appears in journals on autonomous robots, psychology, control and optimization, information theory, and human work. Other related topics, such as “turnover”, “team composition”, “team flow”, and “team membership”, are published in business, psychology, group research, management, or daycare journals, but not in computer science

journals. and engineering. “Transactive memory” is found in psychology, business, and computer science, while “group communication” is only published in computer science, information systems, and engineering journals.

Finally, “dynamic membership change” is found in journals of information transaction theory, mobile computing, and artificial intelligence; “dynamic team building” is published in complex systems, transaction systems, and medical informatics journals; and “multicast” and “security” are found in computer communication and networking journals.

Regarding researcher interest, measured by the number of citations, there is greater continuity in some areas, such as change of members and teams, indicating development in terms of dynamic consideration of teams. Other areas, such as team theory, group cognition, or information status, have few recent publications, suggesting consolidation and decline of attention. The keywords show a lack of structure and little regularity in their use, indicative of the youth of the field. Less than 5% of the keywords have been published in a single journal, with *Frontiers of Psychology* standing out with 46 terms.

In summary, instabilities in publication regularity, keywords, and journal dispersion reflect the youth and development potential of the field. Studying diverse areas together, such as teamwork and decision making, can be an opportunity to explore common connections and advance understanding. The lack of consensus on the concept of dynamic team, reflected in the multiplicity of terms used, contributes to the perception of a fragmented field, despite the growing interest and quality of journals.

The diversity of terms used to refer to dynamic teams in different contexts and fields of research indicates a phenomenon studied from varied perspectives, sharing certain dimensions and theories, but showing limitations in other aspects. Dynamic teams are explored as distinct phenomena in different disciplines, sharing some ties in certain areas and lacking relationships in others.

Future research will benefit from diverse interdisciplinary perspectives and techniques to advance the understanding of dynamic teams. Co-word analysis, theoretical techniques such as co-citation analysis and bibliographic linking, together with the use of artificial intelligence tools, will enrich the existing literature. Although this work contributes to the understanding of teams as dynamic entities, limitations in the selection of the sample and search terms are recognized. The introduction of artificial intelligence tools will simplify future research, but it is noted that these limitations must be considered when interpreting the results.

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