The viability of cooperative societies from the anarchist-cybernetics perspective: a systematic review of the field and research opportunities

La viabilidad de las sociedades cooperativas desde la perspectiva anarquista-cibernética: una revisión sistemática del campo y las oportunidades de investigación

A Viabilidade das Sociedades Cooperativas a partir de uma Perspectiva Ciber-Anarquista: Uma Revisão Sistemática do Campo e das Oportunidades de Pesquisa

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Abstract

Introduction: This article is part of an ongoing research project that started in 2022 and investigates the viability of cooperative associations from an anarchist-cybernetics perspective at the Universidad del Valle, Department of Administrative Sciences.

Problem: Management Cybernetics and anarchism are fields with significant coincidences regarding organisational theory. From the point of view of anarchism, voluntary organisation is a form of exercising individual freedom, while in cybernetics, autonomy is the desirable state of organisation.

Objective: The article aims to identify the current state of academic development in the field of anarchist-cybernetics, specifically around the concepts of "autogestión", "self-management" and "self-control".

Methodology: The article proposes a systematic literature review of the last 10 years in nine academic databases.

Results: The field presents research on radical political groups but lacks research on voluntary organisations such as cooperatives. The predominant research methods used are qualitative for empirical research, and non-empirical research is relevant in this field. Latin America and the developing economies are interesting fields for future development. Case studies and the historical method are relevant for the study of anarchy, and Beer´s VSM is the most used tool for cybernetics in this field.

Conclusion: The field appears to be of great interest for various multi-decade old journals.

Originality: This is one of the few research projects to link the organisational side of anarchism and management cybernetics. Anarchist-cybernetics is a novel subject after almost 60 years of not having any academic publications.

Limitations: As a novel subject, not many publications fit the requirements for the review.

Keywords: autogestión, self-control, self-management, anarchism, cybernetics.

Resumen

Introducción: este artículo hace parte de una investigación en curso que estudia la viabilidad de las cooperativas desde la cibernética y su identidad política.

Problema: la cibernética de gestión y el anarquismo son campos con coincidencias significativas en cuanto a la teoría organizacional. Desde el anarquismo, la organización voluntaria propende por la libertad individual, mientras que, en cibernética, la autonomía es la forma de lograrla.

Objetivo: identificar el estado académico actual en el campo de la cibernética- anarquista, específicamente, en torno a los conceptos de "autogestión" y "autocontrol".

Metodología: revisión sistemática de la literatura, de los últimos 10 años usando 9 bases de datos académicas.

Resultados: el campo ha investigado sobre grupos políticos radicales, pero carece de investigación en organización espontánea y en organizaciones voluntarias como cooperativas. predominan los métodos cualitativos para la investigación empírica, y la investigación no empírica es relevante. Las economías latinoamericanas y en desarrollo son interesantes para el desarrollo futuro. Los estudios de caso y el método histórico son relevantes para lo estudiado en anarquía y el VSM de Beer es el más utilizado para la cibernética.

Conclusión: El campo es de gran interés para varias revistas académicas.

Originalidad: esta es la primera investigación en el lado organizativo del anarquismo y la cibernética de gestión. La cibernética anarquista es un tema novedoso después de casi 60 años de no tener ninguna publicación académica.

Limitaciones: no hay muchas publicaciones que se ajusten a los requisitos para la revisión de la literatura.

Keywords: autogestión, autocontrol, anarquismo, cibernética.

Resumo

Introdução: este artigo faz parte de uma pesquisa em andamento que estuda a viabilidade das cooperativas a partir da cibernética e sua identidade política.

Problema: A cibernética de gestão e o anarquismo são campos com sobreposições significativas em termos de teoria organizacional. Do anarquismo, a organização voluntária luta pela liberdade individual, enquanto, na cibernética, a autonomia é o caminho para alcançá-la.

Objetivo: identificar o estado acadêmico atual no campo da cibernética-anarquista, especificamente, em torno dos conceitos de "autogestão" e "autocontrole".

Metodologia: revisão sistemática da literatura, dos últimos 10 anos, utilizando 9 bases de dados acadêmicas.

Resultados: a área tem pesquisado grupos políticos radicais, mas carece de pesquisas sobre organização espontânea e organizações voluntárias, como cooperativas. Os métodos qualitativos predominam na pesquisa empírica, e a pesquisa não empírica é relevante. As economias latino-americanas e em desenvolvimento são interessantes para o desenvolvimento futuro. Os estudos de caso e o método histórico são relevantes para o que se estuda na anarquia e o VSM de Beer é o mais utilizado para a cibernética.

Conclusão: A área é de grande interesse para diversas revistas acadêmicas.

Originalidade: Esta é a primeira pesquisa sobre o lado organizacional do anarquismo e da cibernética de gestão. A cibernética anarquista é um tema novo depois de quase 60 anos sem nenhuma publicação acadêmica.

Limitações: Não existem muitas publicações que atendam aos requisitos da revisão de literatura.

Palavras-chave: autogestão, autocontrole, anarquismo, cibernética.

1. INTRODUCTION

By the mid-twentieth century, some prominent figures in cybernetics started thinking about the ideal organisation, and noticed a significant coincidence between the organisation envisioned by anarchists and the ideal organisation envisioned by them.

Anarchism has traditionally been used to describe chaos, a lack of order, or the transition between several types of administration. However, anarchists in the late nineteenth and early twentieth centuries adopted the phrase to refer to free, autonomous, and voluntary organisations [1], which often take the form of cooperatives, mutual organisations, tradesman unions, cantons, and so on.

Conversely, a central part of management cybernetics is to design organisations that enhance autonomy and freedom. In fact, Stafford Beer developed the Viable Systems Model (VSM) as a cybernetic approach to the study of organisations based on the idea of maximising autonomy [2]. The central idea in VSM is to identify the appropriate relational structure in an organisation to enhance the possibilities of surviving based on the study of the human anatomy.

These are some authors who found common ground between cybernetics and anarchism. Cybernetician William Grey Walter [3], citing Ampere, classified cybernetics

as "la cybernetique: the science of government." The author equates feed-back with reflexive action. He thinks freedom of action depends on internal stability, which is attained by contrasting forces in the organism that detect changes in the environment and tend to counterbalance them. These forces in social systems can be understood in democratic societies through election periods, which eliminate drastic changes in politics. He extends the bionic analogy to social systems by pointing out that there is no boss in the brain and that human anatomical systems depend on versatility and free communication; this way, minorities could lead, much in the same way as an anarcho-syndicalist society.

Later, J.D. McEwan [4] expanded on these ideas. He presented the notion that in cybernetics there is a difference between anatomical and functional hierarchy; he speculates this difference would be attractive for anarchists, especially because he equates this to "desalinated decision-making". For anatomical hierarchy, this equates to different levels of decision-making in an organisation. Perhaps the most relevant concept McEwan introduces is the notion of "redundancy of potential command, which alludes to the impossibility of identifying a critical decision-making element.

Beer, in turn, in an essay named The Laws of Anarchy, published posthumously in the compendium Think Before You Think [5], talks about different ideas, among them, redundancy of potential command, the idea of an autopoietic system, requisite variety, and agency of change. He also presented the concept of relaxation time. The idea that every disturbance in the system will demand that the system take some time to adjust to the new conditions.

Cooperative enterprises offer a unique alternative to traditional capitalist structures as they prioritise collective decision-making and shared ownership. By promoting equality and mutual aid, these firms embody the core values of anarchism. Anarchist cybernetics can offer valuable insights into how these challenges can be overcome through decentralised networks and technological innovation. Unfortunately, this research only found one academic publication on cybernetics and cooperative organisations, and all fields of anarchist cybernetics have focused on studying the organisation of social movements. Therefore, a significant contribution to the field can be made by studying cooperative organisations through anarchist cybernetics.

1.1 Theoretical background

In this section we will present some of the most relevant theoretical contributions in management cybernetics.

1.1.1 The law of requisite variety

Beer, Pask, and Ashby systematised the models and concepts of cybernetics. The most relevant contribution of W. Ross Ashby (1903–1972) to the study of cybernetics is the law of requisite variety, which states that only variety can control variety [1]. For Ashby, cybernetics is the study of "all possible machines", clarifying that in Ashby's terminology "machine" is a synonym of "system". For Ashby, cybernetics was a subset of general systems theory, with the restriction that cybernetics systems studies are open to energy but closed to information and control. In Ashby´s concepts, there is also a reference to "regulation," which is the achievement of a goal against a set of disturbances. Control, in the eyes of Ashby, is the maintenance of some variables within certain limits or holding some variables constant. Regarding Requisite Variety, Ashby's law states that only "variety can absorb variety" and he presents it and his arguments using matrix algebra in [2, 3]. Rose Ashby´s variety requirement law [4] states that the variety and complexity of the regulator should be equivalent to the relevant variety of the situation being regulated or controlled. According to Ashby, this suggests at least three conditions: a) a filtering capacity of information by the operator; b) a capacity to reduce complexity to an operational level; and c) a capacity to act and transmit decisions to those who can act upon the decision made. In synthesis, there are two alternatives: to reduce the complexity of the situation and to amplify the complexity of the capabilities of the operators. Some other concepts of interest to Ashby are adaptation, organisation, reproduction, stability, energy, signalling, etc. Behavioural sciences were his primary source for cybernetic study and modelling, and psychology and psychiatry were his main applications.

1.1.2 The Viable Systems Model

Stafford Beer (1926-2002) was a British operational research, management, and cybernetics professor. Among Beer's many contributions to cybernetics, probably the most significant is the Viable Systems Model (VSM), which characterises a system with the goal of surviving in a changing environment [5, 6]. The concept was created and implemented in organisations. Cybernetics is the study of systems and their laws [7], as well as how a system reacts to environmental actions, allowing adaptation [8]. Cybernetics investigates the various layers of complexity that exist between systems and their environments. According to Beer (2002), anthropologists and psychologists have addressed issues with system cohesion such as "the spirit of the hive" or the crowd. Although there are instances of cybernetics in physiology, such as the potassium-sodium pump, ecology, and hunter-prey balances, cybernetics is an

interdisciplinary field. The interdisciplinary aspect of control, according to Beer (2002), is what makes cybernetics a bridge between disciplines. Control has a scanning process, a cycle time for its periodic sweep, and an associated rhythm by definition. In the managerial setting, cybernetics converts the cause-and-effect paradigm into the idea of governance. Control is heavily reliant on communication and reaction time. The process has intrinsic control. Systems that are viable are self-sustaining and worthy of survival. Beer believes that every management level should have an operations room [7], as shown in Figure 1.

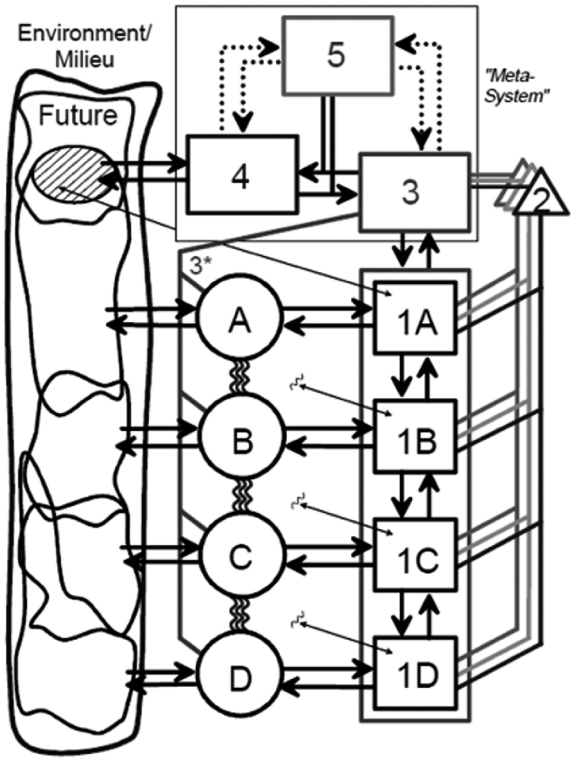

Figure 1. Viable System Model.
Source: Schwaninger [9] adapted from Beer [5].

System 1 is the management of every operational unit in a company; System 2 is the coordination function, which dampens oscillations and enhances regulation; System 3 is the operative management of the organisation as a whole; System 4 is the long-term orientation towards the future and in respect of the environment; and System 5 establishes an equilibrium between present and future orientation.

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1.1.3 VSM, cooperatives and federations

Jon Walker's book on VSM for co-operatives [79] provides a complete guide for utilising VSM to diagnose and develop co-operatives with autonomy as a guiding value. Walker discusses specific issues such as resource allocation, policy generation, information systems, and so on; internal and external exchanges of information, transactions, resources, and so on; organisation in small groups; and VSM applications to federations. The book's focus, as the title suggests, is on the diagnosis and treatment of organisational difficulties in cooperatives. Although this text is the most relevant for our study in general, its most important aspect is that it includes empirical cases from cooperative groups of all sizes.

1.1.4 Anarchism and cooperatives

According to Kropotkin (1842-1921), the essence of a cooperative coalition is mutual aid. This instinct has given men the power to dominate their surroundings. Vieta [81] provided several instances of co-operative associations in Kropotkin's readings, including the Russian artel and mir, Swiss cantons, the Paris Commune of 1871, general professional guilds, friendly societies and social clubs, and other types of federated organisations. Woodcock [14] envisioned a cooperative economy for nation-building. Under the notion of *mutuellisme*, Pierre-Joseph Proudhon (1809-1865) offered several arrangements equivalent to cooperatives, but he also goes beyond that to propose a categorization of property, such as personal, private, and collective; the former is reserved for cooperatives [10]. Proudhon predicted that society would evolve into a federated aggregation of industry, with places becoming autonomous in their management by local government. In this regard, education within cooperatives would be an inevitable requirement [16]. Bakhunin also considered the structuring of a nation into federations, and he even imagined associations of consumers, producers, bankers, and so on [17]. Workers, in his vision, would participate in the decisions of a democratic society in which they would enjoy their liberty. Emma Goldman (1869-1940) considered anarchism as the total of organisation and rejected the notion that the state was synonymous with order. She envisioned an organisation where freedom may be manifested via voluntary grouping and where humanity's condition can be improved. Anarchist organisations, including trade unions, are free of fear, punishment, and poverty [18].

Anarchist thinking in organisations and cybernetics has emerged as a new field of research that requires careful consideration of academic sources. To this end, it is essential to identify the most important academic databases and journals for the

field, which will serve as a valuable resource for consultation and future publication. Additionally, a comprehensive overview of the literature on control, autogestión, anarchy, cooperativism, cybernetics, research methods, and suggested future research is necessary to gain a deeper understanding of the subject matter. By examining these topics in detail and synthesising the insights gleaned from various sources, we can develop a more nuanced understanding of anarchist thinking in organisations and cybernetics. This will enable us to make informed decisions about how best to approach these complex issues in both theory and practise. Ultimately, our goal is to contribute to the ongoing conversation about anarchism and cybernetics in ways that promote greater social justice and equity for all.

2. METHODS

In this section, we aim to advance on the literature review of our research, probing the last ten years of academic publications in the fields of knowledge of our study. We will present the most relevant recent information that will guide our investigation. In this section, we will follow this structure: 1) we will propose a series of research questions, 2) we will craft and present a procedure to answer the proposed questions in this method section, and 3) we will offer a concise description of the key ideas that will be investigated. 4) We will design the research equation systematically in order to maintain constant monitoring of our research notions in the disciplines of study of our interest. 4.a) We will identify the most important databases and journals for subsequent publication and will publish our research in our fields of study. 4.b) identify synonyms for our research themes to construct our research equation; 4.c) construct our final research equation. 5) We will search for and pick articles for our literature review, as well as determine the most important databases and journals to publish our findings in. 6) We will present the findings of our literature review. 6.a) We shall present the articles chosen for our cutting-edge literature evaluation as well as the relevance of each piece to our study. 6.b) We shall offer a summary of our cutting-edge review's findings. All the foregoing is made explicit in terms of our research principles, fields of study, research techniques, empirical study sites, and a reference for empirical and non-empirical research publications.

In this section, we intend to craft a systematic procedure to perform our documentary research and answer the proposed guiding questions. In Figure 2 we graph the research procedure we will follow to achieve this objective.

A systematic literature review is appropriate for the objective presented in the introduction section because we aim to have a general idea of the behaviour of the

field. In consequence, we applied a systematic literature review [80], [81]. A narrative review would not have been adequate, because we aimed for a broad scope and not an in-depth one. For the same reasons, a conceptual review would not have been appropriate either, because the concepts used in our research are only used to identify the characteristics of the organizations we aimed to research.

Denyer and Tranfield [82] state that systematic literature reviews are organised around four main themes, including the formulation of the research question, identification of studies, selection and evaluation of studies, analysis, and synthesis, and reporting of findings and discussion.

a) Formulation of the research question: We hope to address the following issues with our literature review: First, what are the most and least studied topics in the areas of our study? What are the most significant journals and databases that have published research in fields similar to our own? What stage of development are our research concepts at right now? Fourth, which research methods are most pertinent to our fields of study and what are the most common types of publications in relation to empirical/non-empirical research?
b) Identification of the studies: We found the studies for our research in seven academic databases: Gale, Jstor, Proquest, Google Scholar, Science Direct, Scopus, and Wiley based on two criteria: their agreement with a process epistemology centred around two concepts and their derivatives: autogestión and intrinsic control, and their coincidence with the three epistemological fields of study, which are organisational cybernetics and organisation in anarchism.
c) We chose articles that had been published within the previous ten years and that directly addressed the study fields as our selection criteria.
d) Finally, the papers will be analysed and synthesised from two perspectives: first, determining the field of study's suitability for publication in academic journals and databases; and second, expanding the field of research in terms of themes, methodologies, subjects of study, geographical areas where the research is conducted, etc.

We specify the development of our article in Figure 2.

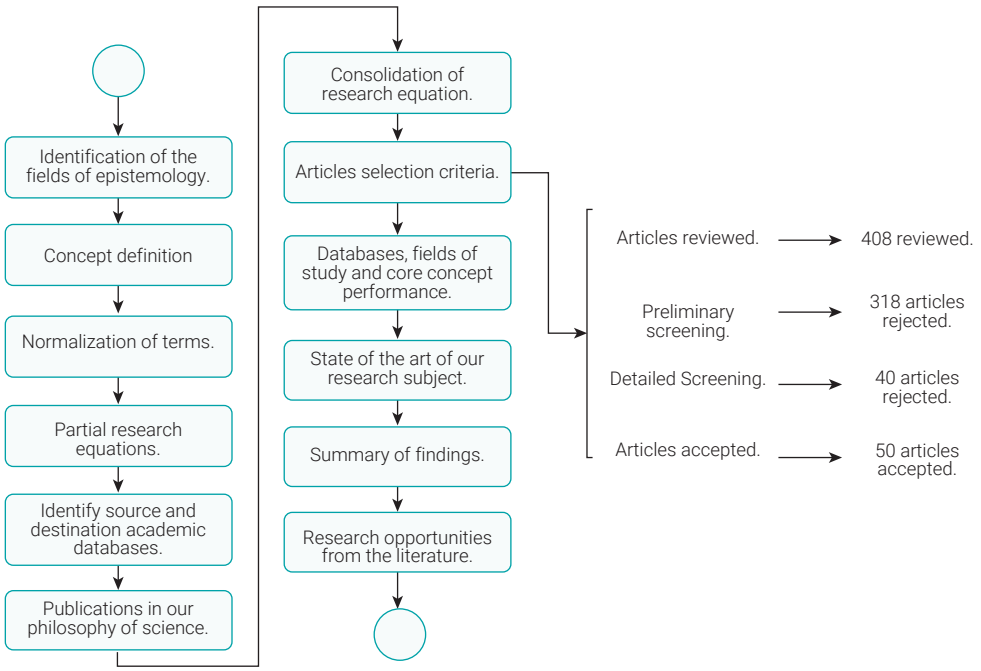

Figure 2. Research procedure.
Source: own work.

We present our procedure as follows: a) Identify the fields of study among our philosophy of science, b) Normalise the search terms used in the search equation, c) Identify the journals and databases where products related to the authors of our theoretical framework are published more often, d) Identify the frequency of publication of each interdisciplinary area of study and each database, e) Identify our theoretical framework to find synonyms of the core concepts of our research, f) Build our final and comprehensive search equation, g) Use our search equation to systematically identify the state-of-the-art publications about our core concepts, and h) Identify relevant recent scholarship in journals where our core concepts are more frequently published, i) Summarise our findings in a narrative manner [77], classifying our results [78], and identify further research opportunities

3. RESULTS

In the following lines, we present our results, organised in accordance with our research procedure (Figure 2).

3.1 Identification of the interdisciplinary fields' epistemology

As we have mentioned before, process philosophy and process studies present themselves as ontology [26], epistemology [27], or a set of theories [28]. Cybernetics, meanwhile, positions itself as a technique or epistemology [29, 11]. Although anarchy can be a philosophy [15], a methodology, or even a collection of tools [30], if we approach process philosophy, cybernetics, and anarchy as disciplines, we won't stray from the truth. We graph our commitment to the philosophy of science in a series of disciplinary commitments in Figure 3's Euler diagram. As a starting point, our literature review's topic intersections and interdisciplinary commitments are also located.

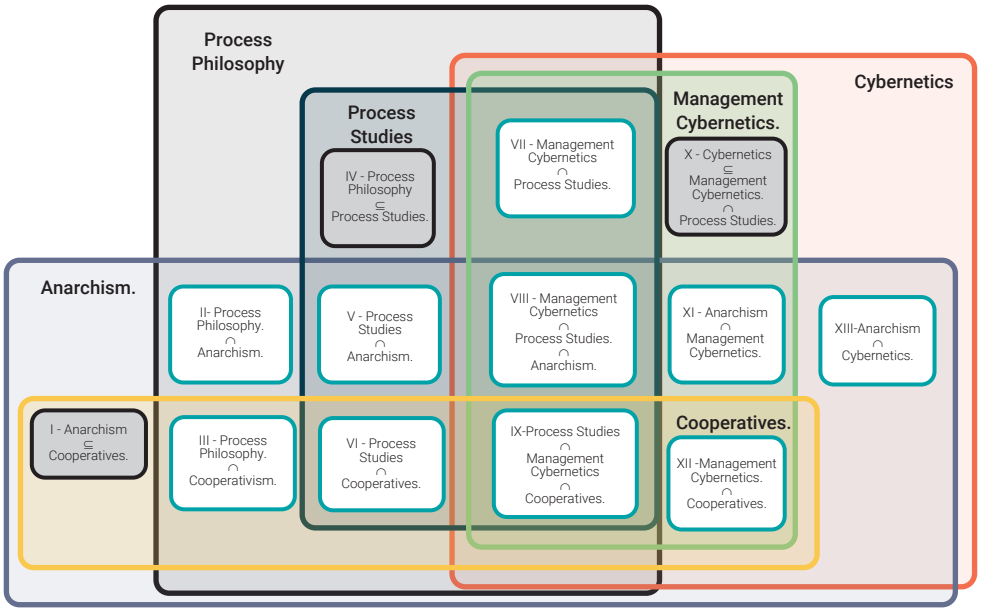

Figure 3. Interdisciplinary fields of study in our philosophy of science.
Source: own work. **Note:** the fields of study coloured in grey denote subsets of the same field of knowledge.

3.2 Concept definition

The notions we used for our research, which were drawn from the writings of classical authors, are summarised in the lines that follow.

According to Wiener [19], cybernetic control confronts contingency by incorporating it into the cybernetic calculation rather than discarding it. In management cybernetics, intrinsic control refers to "dealing with contingencies" by the element of the system that detects them rather than the complete system. Because of the necessity

for a quick response, intrinsic control is essential, particularly in management. When control is embedded into the system, response is almost always instantaneous [12]. A responsive organisation necessitates a rethinking of the concept of control. "It entails shifting from extrinsic control, information requirements, and control dilemmas to intrinsic control, communications, and mutual respect" [20].

Autogestión translates to "self-management" in English. This translation, according to Vieta [21], is inappropriate but widely accepted. Although most people associate autogestión with the Spanish language, where it is used as such — and the stress is placed on the final syllable as we express it in this text - the term originates in French. Autogestión has Greek and Latin origins in both French and Spanish. Auto means "self," and gestion means "manage," which comes from the Latin *gerere*, which means "to bear, carry, and manage." It could signify "self-gestation, self-creation, self-control, self-provision, being self-reliant and self-determining," [21]. It made its way to Latin America via French anarchist Henri Arvon's [22] book, which was translated as "La autogestión" and affected Latin American countries [23]. Autogestión is a dynamic notion based on libertarian and anarchist strands of worker self-activity; worker participation in co-managing an otherwise capitalist relationship with management based on cooperativism [21]. Autogestión, inspired by historical experiences of working-class self-activity, promotes itself as an alternative to the oppression inherent in hierarchies [21]. Autogestión is a plan to shift from centralization practises to more horizontal and democratic relationships [24]. Autogestión is based on the principle of independence as well. And there is the alternative: a world that can exist without bosses but not without employees [25].

3.3 Normalization of terms

Following that, we used a UNESCO thesaurus to normalise the terminology and three academic dictionaries to find synonyms. Except for one phrase, as shown in Table 1, no other possibilities were discovered. While developing the study equations, we investigated the usage of truncated words to handle variances and inflections in the terms.

Table 1. Table of normalized terms. Source: this research.

Concept.	Terms covered.	Truncated word selected.
Anarchism	Anarchism, Anarchic	Anarch
Process philosophy	Process philosophy	Process philosophy
Cybernetics	Cybernetics, cybernetic,	Cybernet
Cooperatives	Co-operatives, cooperative, cooperativism, cooperation, coops	Co-operat, "mutual enterprise", cooperativeness
Process studies	Process studies, process, processual	Process studies.
Intrinsic control	Intrinsic control	"Intrinsic control"
Autogestión	Self-management, self-organization, self-organisation, autogestión.	Autogestión, self-manag, self-organi

Source: own work.

3.4 Preliminary research equations

The interdisciplinary fields of study in the Euler's diagram (Figure 3) are transformed in research equations using natural language, then in preliminary research equations using Boolean connectors (first column Table 2). As previously stated, three of the discovered search equations do not generate relevant results, as expected, because one of the concepts was a subset of the other. The "union" logical connector (OR) was used to update and understand these equations.

3.4.1 Identification of the interdisciplinary fields of study among our philosophy of science

Table 2. Boolean equations to preliminary search equations. Source: this research.

Boolean operations.	Research equations in natural language.	Preliminary Research equations.
I – Anarchism $\subseteq$ Co-operatives.	States the relationships of our research axiology.	Did not produce meaningful results. (anarch* OR cooperat*)
II- Process Philosophy $\cap$ Anarchism.	Locates published studies of our research axiology or political theory interpreted through our research ontology.	("Process philosophy" OR "Process studies") AND (anarch* OR cooperat*)
III - Process Philosophy $\cap$ Cooperativism.	Locates published studies of our research subject interpreted through our research ontology.	Ibid.
IV - Process Philosophy $\subseteq$ Process Studies.	States the relationships of our research epistemologies.	Did not produce meaningful results. "process philosophy" OR "process studies"

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Boolean operations.	Research equations in natural language.	Preliminary Research equations.
V - Process Studies ∩ Anarchism.	Locates published studies of our research axiology interpreted through our research ontology.	Ibid.
VI - Process Studies ∩ Cooperatives.	our research subject thorough our ontological position.	Ibid.
VII - Management Cybernetics ∩ Process Studies.	Locates the intersections of our process and cybernetics epistemologies.	("Process philosophy" OR "Process studies") AND cybernetic*
VIII - Management Cybernetics ∩ Process Studies ∩ Anarchism.	Locates published studies of our axiology or political theory through our epistemology.	("Process philosophy" OR "Process studies") AND Cybernetic* AND (anarch* OR cooperat*)
IX-Process Studies ∩ Management Cybernetics ∩ Cooperatives.	Locates published studies of our research subject through our epistemology.	ibid
X – Cybernetics ⊆ Management Cybernetics.	States the relationships of our research epistemologies.	Did not produce meaningful results. "Cybernetic*"
XI – Anarchism ∩ Management Cybernetics.	Locates published studies of epistemological interpretations of our axiological position or political theory.	Cybernetic* AND (anarch* OR cooperat*)
XII -Management Cybernetics ∩ Cooperatives.	Locates published studies of the epistemological interpretations of our research subject.	ibid
XIII-Anarchism ∩ Cybernetics.	Locates published studies of epistemological interpretations of our axiological position or political theory.	ibid

Source: Own work.

During database search, we adjusted the search equations according to each database given that some search engines didn´t accept Boolean connectors written in the same way or didn´t accept wildcards such as "*".

3.5 Identify source and destination academic databases

After visiting all of the authors' Google Scholar pages in our theoretical framework, we went through the first 100 publications for each author and found the databases that housed such works. The databases listed in Table 3 will be a source for retrieving seminal papers as well as a destination for the chapters created in this study.

Table 3. Popular academic databases according to each discipline. Source: this research.

Origin	Destination.
Cybernetics	Wiley
	Gale. (One file).
	Science Direct.
	ProQuest (former emerald management)
	Scholar.
Anarchy	Scopus
	Jstor
	Scholar.
Process Philosophy	Scopus
	Jstor
	Scholar.

Source: own work.

We will perform further work to identify the most relevant scholarship.

3.6 Publication results for our philosophy of science

Table 4 shows the quantitative results for the research equations according to each database. The table also shows the subjects with the most contribution of academic literature to this review in a green heatmap. In total, only 70 articles were deemed to be directly related to our epistemology.

Table 4. Independent quantitative results. Publications in interdisciplinary fields of study. Source: this research.

	Wiley	Gale.	Science Direct.	Pro-quest	Scholar	Scopus	Jstor
II- Process Philosophy ∩ Anarchism.	0	0	0	0	0	0	1
III - Process Philosophy ∩ Cooperativism.	0	1	5	2	0	0	3
V - Process Studies ∩ Anarchism.	0	0	0	0	10	0	3
VI - Process Studies ∩ Cooperatives.	0	3	1	0	4	0	39
VII - Management Cybernetics ∩ Process Studies.	10	23	12	19	21	0	0

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	Wiley	Gale.	Science Direct.	Pro-quest	Scholar	Scopus	Jstor
VIII - Management Cybernetics ∩ Process Studies ∩ Anarchism.	0	0	0	0	0	0	0
IX-Process Studies ∩ Management Cybernetics ∩ Cooperatives.	0	0	0	0	0	0	0
XI – Anarchism ∩ Management Cybernetics.	0	0	0	0	21	0	0
XII -Management Cybernetics ∩ Cooperatives.	1	0	0	13	13	0	0
XIII-Anarchism ∩ Cybernetics.	0	0	0	2	23	0	2

Source: own work.

We only used peer reviewed journals, and chapters were selected for identification. This gave a solid idea of which fields of study are most populated and which are least populated. Only management-related articles were recorded in this table. We only used articles published in the last 10 years. Articles in English, Spanish, Italian, Portuguese, and French were included due to their accessibility by the researcher. In the case of Scholar, given the fact that the database doesn´t allow filtration by business/management field, only the first 5 pages (50 results) were examined to select the number of articles that apply. Scholar also returns a wide variety of documents, although some books might be important for the query, we will only include academic, peer-reviewed articles.

The number of articles recorded does not necessarily fit the exact conditions; for example, when using the keyword "cooperat" we intended to find studies in cooperative enterprises. But being a field of study with very low production, and the articles found showing "cooperation" in enterprises, we decided to include them. In an analogous fashion, when we meant "anarchism", we intended to find the political theory of anarchism, yet articles that researched practises that the author deemed "anarchic" were displayed. We also included these results.

3.7 Consolidation of the research equation

In this section we built a unified search equation, containing the preliminary research equations.

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(("autogestion" OR "self-management") OR ("intrinsic control" OR "self-control")) AND (("process philosophy" OR "process studies") OR cybernetic OR (anarchy OR cooperative))

With this search equation, we intend to locate autogestión (or one synonym) within process studies, cybernetics, or anarchy. We did the same with intrinsic control. Unfortunately, most databases can only accept up to eight Boolean connectors; therefore, a more comprehensive research equation was not possible to use. Note that this search equation will be used only for building the short state of the art presented in this research proposal. In our research, we will need to include every synonym for our core concepts and search iteratively in the proposed databases.

3.8 Articles selection criteria

We applied the research equation to the selected databases. Then we reviewed the first 50 most relevant articles found by each search engine using our research equation. We only extracted articles published in the last 10 years in the areas of management, business, and organisational sciences. The reader must bear in mind that political science performs organisational studies in Europe, while in America it tends to be studied in management or business [31]. We only included peer reviewed articles in our study; some databases allow the possibility to include magazine articles, theses, proceedings, etc. Table 5 shows the preliminary screening, where most of the articles were discarded due to a lack of thematic coincidence, despite the coincidence with our research equation. Articles were then categorised into database-related folders.

Table 5. Articles reviewed, preliminary and secondary screening per database. Source: this research.

Database.	Reviewed	Preliminary screening	Detailed screening	Articles Accepted
Wiley.	50	42	3	5
Gale.	50	42	3	5
Science direct.	58	47	3	8
ProQuest.	50	27	8	15
Scholar.	50	34	10	6
Scopus.	50	44	6	0
Jstor.	50	44	1	5
Scholar.	50	38	6	6

Source: own work.

We identified the first fifty articles in every academic database in order of relevance. The abstracts of the first fifty articles were read carefully to select articles that fit the criteria of our study, in analogy with similar studies [76]. The number of articles rejected in the preliminary screening appears in the second column. Then, the remaining articles were read in full to build Table 7. During this revision, some articles were rejected again, as shown in column three. The state-of-the-art report presented further ahead was built with the remaining articles; the number of articles accepted for study is presented in the fourth column "articles accepted".

3.9 Databases, fields of study and core concepts performance

Table 6 helps us identify the relationship between databases, fields of study, and the core concepts of our search. We can also identify that the most frequently identified subject is cybernetics in relation to autogestión and intrinsic control. This tendency is present in all the databases in different proportions. The subject least published in relation to the others is process studies, and we also identify that ProQuest and Gale are the preferred databases for cybernetics, and Jstor and ProQuest for Anarchism.

Table 6. Database, and Journal performance in respect to concepts and subjects of study.

Journals.	Process Studies.	Cybernetics	Anarchism	Intrinsic Control	autogestión	Cooperatives.	Total.
kybemetes		6		5	4	3	
Systems Research and Behavioral Science		3		3			
Emergence: Complexity and Organization.		2		2			
Anarchist studies.			4		3	2	
Theory in Action			2				
Databases/Areas, subjects and topic.							
ProQuest	3	11	7	10	10	6	47
ScienceDirect	1	2	1	3	5	4	16
Wiley.		3	2	3	4	2	14
Jstor		1	3		5	4	13
gale	1	4	2	3	1	1	12
Scholar		2	3	3	3	1	12

Source: own work.

3.10 State-of-the-art of our research subject

For our study, we separated the relevant scholarship in databases, classified its content, registered its purpose, methods, results, and suggested further research. Table 7 shows the list of relevant scholarship and its classification according to its contribution to this study. We present a summary of findings and a discussion right after the table.

Table 7. List of relevant scholarship studied. Source: this research.

Database.	Authors	year	Empirical research	No Empirical research	Process Phylosophy.	Cybernetics	Anarchism	Intrinsic Control	Autogestión.	Cooperatives.	Latin-America
Gale	Bielecki, Nieszporska	2019	✓			✓		✓			
	Peters	2019		✓	✓	✓					✓
	Goldstein, J.	2017		✓		✓		✓	✓		
	Maldonado, Mezza-Garcia	2016		✓		✓	✓	✓			
	van de walt, L	2016		✓			✓			✓	✓
Jstor	Bower,R.	2016					✓		✓	✓	✓
	Ince, A.	2015	✓				✓		✓	✓	
	Hammond. J.	2015	✓				✓		✓	✓	
	Aime-, Humphrey, Derue, Paul	2014	✓			✓			✓		
	Piñeiro Hamecker	2013		✓					✓	✓	✓
ProQuest	Asimakopoulos	2020		✓			✓			✓	
	Lundström,M	2020		✓			✓				✓
	Štrukelj, T., Zlatanović, D., Nikolić	2021	✓			✓		✓		✓	
	Yap	2019	✓		✓				✓	✓	
	Graham	2018		✓			✓		✓		
	Swann, T.	2018		✓		✓	✓	✓	✓		

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(viene)

Database.	Authors	year	Empirical research	No Empirical research	Process Phylosophy.	Cybernetics	Anarchism	Intrinsic Control	Autogestión.	Cooperatives.	Latin-America
ProQuest	Wilkowski, Ferguson	2016	✓			✓		✓			
	Ferretti	2016		✓		✓	✓		✓	✓	✓
	Duda, J	2013		✓		✓	✓		✓		
	Yolles, Fink	2013		✓		✓		✓			
	Wang, Mukhopadhyay	2012	✓		✓	✓		✓			
	Espejo,R.	2011	✓			✓		✓	✓		
	Petrov, V.	2010		✓	✓	✓		✓			
	Dupuis-deri	2010	✓				✓	✓	✓	✓	✓
	Rodrigues, CA.	2007	✓			✓		✓	✓		
	A. Espinosa	2007		✓		✓		✓	✓	✓	
Scholar	Berry, D.	2019		✓			✓		✓		
	Wigger	2016	✓				✓		✓	✓	
	Plys	2016		✓			✓		✓	✓	✓
	Moellera, Troop-Gordonb, Robins	2015	✓			✓		✓			
	lnzlincht, M.	2014	✓			✓		✓			
	Lalande, D.R.	2011	✓					✓			
Science Direct	Espelt, R.	2020	✓						✓	✓	
	Girbés-Peco, S., Foraster, M. J., M	2020	✓				✓		✓	✓	
	Balk Brandao, Breitenbach	2019	✓						✓	✓	✓
	Llowe, Rod.	2018		✓	✓	✓					
	Fishwick, Selwyn	2016		✓					✓		✓
	O' Grady, W.; Morlidge, S; Rouse	2016	✓			✓		✓			

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(viene)

Database.	Authors	year	Empirical research	No Empirical research	Process Phylosophy.	Cybernetics	Anarchism	Intrinsic Control	Autogestión.	Cooperatives.	Latin-America
Science Direct	Sang-hyun, K.	2015	✓					✓			
	Caker, M.; Siverbo, S.	2014		✓				✓	✓		
Wiley.	Pires, A.S.	2017	✓				✓		✓	✓	✓
	Schwaninger, M.	2013		✓		✓		✓	✓		
	Azadeh, Darivandi, Fathi	2012				✓		✓			
	Schwaninger	2011		✓		✓		✓	✓		
	Ovejero	2010	✓				✓		✓	✓	

Source: own work.

3.11 Summary of findings

Our analysis of the literature revealed strong interest in the study of control in organisations, both from the perspective of anarchy and from the perspective of organisational cybernetics, with 21 publications published in total. Control is examined explicitly from the psychological perspective using the Viable System Model, network models, and experiments. This study discovered that control, as an intriguing subject in cybernetics and anarchism, has been studied utilising complexity epistemology. The link between dynamics and the study of control was an unexpected discovery in our literature survey. We discovered four distinct publications addressing the dynamic study of control in various areas of knowledge. The literature demonstrates interest in the study of control from the following perspectives: 1) the dynamics of psychology in the organisation; 2) descriptive and prescriptive organisational practises; 3) the political and philosophical implications of control in an organisation; and 4) the implementation of policies, strategies, and decision-making.

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The examined literature indicated a strong interest in autogestión; 27/49 findings indicated a curiosity in the issue. According to the literature, studying autogestión is crucial for anarchy since numerous streams of thought in anarchy regard autogestión and cooperativism to be the best ways to implement anarchy. Anarchist studies in Latin America and Spain have revealed an interest in various forms of autogestion association. It was a surprising discovery that the interest in autogestión differed little between cybernetics and anarchism. Autogestión is important in anarchism for several reasons: 1) factory management, 2) rural associations for the assurance of a dignifying standard of living, 3) the contributions of anarchist political theorists to the prefiguration of an anarchic system, 4) the forms of decision-making in autogestión, both descriptive and prescriptive, and 5) as a form of resistance. While in cybernetics, interest in autogestión manifests itself in 1) alternative forms of organisation, 2) alternative modes of decision-making other than hierarchies, and 3) the significant political link between political action and cybernetics in autogestión.

Many of the studies on anarchy questioned how to operationalize anarchy in new kinds of free association. The concept of prefiguration became relevant in our research because it appears in numerous anarchist publications. Scholars in the field appear to be interested in the transition between political beliefs and practical organisation. One significant initiative we discovered in the literature is the desire to put classical anarchist writers' ideas into practice; we interpret this as another sort of prefiguration that suggests new study themes.

Our research on cooperatives revealed an interest in how to organise them, how to perform and educate self-management, how to professionalize self-management, how to operationalize self-management, and how to exercise cooperative political power. There is an explicit need in the literature to improve theory and technique on decision-making in both cooperatives and anarchism. Our literature is rife with references to democracy as a mechanism of decision-making.

Our research on cybernetics identified an absence in new organisational research. Because cybernetics is a meta-discipline, it has been widely utilised in biology, psychology, computer programming, artificial intelligence, and other fields, but management-cybernetics has received less attention [83]. We also identified the use of behavioural experiments in conjunction with the study of cybernetics, implying a new area of research for organisations, similar to behavioural economics in management. The theme of control is explicit in cybernetics literature, and our review reveals little or no progress in intrinsic control.

In terms of methodologies, in the case of empirical investigations, the use of systems theory and cybernetics sparked intense interest in our literature, moving

the basic concept of thinking about cybernetics as epistemology to thinking about cybernetics as methodology. Our research found interest in theory generation in the academic literature in Anarchy, Process Philosophy, and Cybernetics. Ontologies, epistemologies and research techniques have all been proposed using process philosophy.

We also discovered that action-research was commonly used in cybernetics, anarchists, and cooperatives, strengthening the idea of the engaged scholarship approach. Our investigation also discovered a significant proportion of studies conducted to investigate control. And the majority of the empirical study was conducted using case studies or multi-case studies in conjunction with qualitative and cybernetic methodologies. In terms of cybernetic approaches, our research discovered that cybernetic modelling, viable system modelling, and variety engineering, among other less common types of mathematical modelling, are preferred.

In terms of non-empirical research approaches, our study discovered that argumentative analysis and other philosophical methods were commonly used. We also discovered that in cybernetics, argumentative analysis was employed for empirical investigations, strengthening the field's "mixed-methods" nature. In process philosophy, our research discovered a great interest in building its own methodologies that are consistent with process ontology. Our research discovered that historiography was widely used in the subject of anarchy for its research, demonstrating the necessity of assembling the experience and arguments of the literature.

Publications on cooperativism and anarchism reveal an interest in the Argentine and Brazilian workers' takeover of workplaces in the 1990s. In Spain, there is also a considerable interest in cooperativism, which is likely due to the prevalence of various types of collaboration in that nation. In addition to anarchism, the study of non-hierarchical forms of association was prevalent in cybernetics. This study also discovered an interest in the study of anarchic movements via cybernetics.

The documentary research revealed that it was significantly less important to conduct empirical research than non-empirical research in our circumstance. Only 18/44 of the studies had empirical data. The majority of the empirical studies were conducted in the last five years, and just two of the studies were conducted in Latin-America areas. Approximately half of the projects were in cybernetics, emphasising the importance of cybernetics as a technique and epistemology for organisational research. 10/18 and 11/18 initiatives were on intrinsic control and autogestión, respectively, demonstrating academic outlets' interest in our possible empirical study. We also discovered that *Kybernetes Journal* and *Anarchist Studies* were the most appropriate journals for our empirical research.

On the non-empirical research side, four journals appear to show interest in publications about our research subject: Systems Research and Behavioural Science, Anarchist Studies, Industrial Marketing Management, and Kybernetes. We present a more detailed list of desired journals in our suggested chapter structure.

We also found that process philosophy is a subject of interest, but it has failed to intersect with horizontalism, cooperativism, and non-hierarchical organisations that show potential for publication.

3.12 Research opportunities derived from the literature review

In the literature review, the authors specifically suggested some additional research: We could present it in four categories: research in Latin America, research on management cybernetics, research on cooperatives, and process research.

Regarding research in Latin-America, we found that many authors suggested either doing research in Latin-America or we found a lack of presence of Latin-American countries in our sample. One explicit invitation is to identify why, in the third world, self-management has generally diminished in its application [32]. And in a more general sense, Lowe & Rod [33] suggest framing research problems related to context. Kim [34] also suggests that researching inequality and agency problems, corruption, and bureaucracy is important for the Latin-American environment.

With respect to management cybernetics and VSM, we found that process-related research is needed. Many authors in cybernetics and anarchism suggest studying enterprise survivability and the identification of its factors. We translated this finding as the need to identify factors of viability. A general suggestion is to use the VSM as a diagnostic tool [35]. In an intersection between anarchism and cybernetics, it has been suggested to study the practical influence of governance styles in cooperatives.

Operations of cooperatives was a particularly arid subject, so performing research, particularly in this kind of enterprise, was paramount for our research. From Lowe & Rod [33], we find the suggestion to study networks instead of hierarchies. The study of professionalising management as a strategy for cooperatives is suggested in Balk & Breitenbach [36], as well as the study of the balance between decision-making and democracy. This last idea is also important in anarchism.

On process studies, we found in Lowe & Rod [33] the suggestion to study time-oriented research, and the emergence of networks.

4. CONCLUDING REMARKS

4.1 Conclusions

This study confirmed the assumption it started with, that cooperativism, being a part of anarchist studies, is scarcely studied in that field, and discovered the total absence of studies in cooperativism in anarchist cybernetics.

Our research also discovered an opportunity to work specifically on cooperatives in Latin America. Cooperative associations are extremely relevant economic agents, and studies on cooperatives in Latin America have, comparatively, been scarce.

Regarding theories, our research discovered that the viability theories of management cybernetics are relevant to solidary economies, and management cybernetics can greatly contribute to their organisation because of the shared principles among both.

On methods, our research suggests continuing to develop process methods for management. It also suggests developing non-empirical research on management as well as theoretically-oriented research. The empirical research on management cybernetics is preferred by the academic literature outputs, but because of the nature of management cybernetics, there is an important opportunity to develop non-empirical research.

Perhaps the most important finding of our research is the fact that we discovered an important coincidence that needs to be developed further among cooperativism, anarchist theory, and management cybernetics.

4.2 Discussion.

Management cybernetics has received most of its attention in the last 10 years, despite being a field of knowledge developed over fifty years ago. The ideas proposed by Stafford Beer have received a lot of attention but although there are numerous applications of his theories, not many scholars are dedicated to developing his theories further. New links have been discovered between management-cybernetics and other fields of knowledge; anarchist-cybernetics is one of them.

To some scholars, to think about the political role of management might be unusual, especially when talking about anarchism. Nevertheless, political identity in organizations from management-cybernetics was considered in Stafford Beer´s theories. Anarchist-cybernetics is a recent sub-field of anarchist studies, and research in anarchism has been focused on activist groups instead of anarchist organizations.

This could have significant implications for worker´s associations and cooperativism, especially in developing countries.

There is a tangible link between process philosophy and cybernetics. Unfortunately process philosophy in management has not been studied in decades. Despite this fact, process studies in management have seen a resurgence in the focus of academics. We detected an important opportunity to study the process ontology of management-cybernetics, opening a window to continue developing process thought on management research.

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