Digital Commons and Management towards Sustainability, Equity and Resilience

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Introduction

The initial goal of this study is to make a systematic literature review on different kinds of management activities and processes that take place within the digital commons. In order to advance theories around governing digital commons, the analysis of the literature is held through the lenses of ecological sustainability, equity and resilience. This analysis could be of interest to structures and organisations working on topics related to digital commons, as well as to policy makers that are interested in developing the subject. This exploration is inspired by Elinor Ostrom's works in managing the commons and could be placed within the disciplines of IS, MIS and Management literature.

Discussions around commons are being held more and more often these days. In economics, a common good is defined as non-excludable (you cannot exclude anyone from its use), like a public good, and rivalrous in consumption (its consumption prevents simultaneous consumption by other actors), like a private good. One of the authors that popularised this term was the Nobel prize winning political economist Elinor Ostrom, who described the commons as "long-enduring, self-organised and self governed" (Ostrom, 1990, p. 143) goods. She analysed how people can manage shared resources, such as forests, fisheries, oil fields, irrigation systems in order to solve the tragedy of the commons.

Beyond natural resources and human infrastructures, shared resources are increasing in the digital world. Digital commons are information and communication technologies and information that are accessible to the members of a society, as well as managed and controlled by the community that develops these resources. Yochai Benkler sees "digital commons" through the lens of information production environment, social relationships and collaboration that is capable of producing a common field of action (Benkler, 2008). Some evident examples are Wikipedia and Creative Commons. Digital commons are recognised as contributing to several sustainable development goals, hence they merit to be protected, developed and disseminated (Bradley & Pargman, 2017)(Pouri & Hilty, 2018, p. 14). However, the scientific knowledge accumulated on traditional commons is not immediately applicable to digital commons as digital commons have special characteristics that require a dedicated research effort (Rozas et al., 2021). The main difference between traditional commons and digital commons is seen in terms of the fact that "the former are an existing scarce resource that could be destroyed by over-exploitation, the latter are created and improved through contributions from a community, but they are virtual assets that cannot be over-harvested" (Isabel Alonso de Magdaleno & Garcia-Garcia, 2015). For example a digital common good like Wikipedia is not consumed by its users, as a fishery can be by overfishing.

Hence, the scientific community could play an important role in improving the understanding of the key success factors of the digital commons. These theories and guidelines should include ecological and social issues. The analysis around the term "common good", each in its own way, appeals to the concept of ecological sustainability, as it's directly related to natural resources. Ecological sustainability is defined as "the ability of one or more entities, either individually or collectively, to exist and thrive (either unchanged or in evolved forms) for lengthy timeframes, in such a manner that the existence and flourishing of other collectivities of entities is permitted at related levels and in related systems" (Chen et al., 2008). Given the negative environmental consequences all over the information and communication technology life cycle, different measures are needed to ensure the digital commons' ecological viability. In this context, in order to exist and develop, it's supposed that "digital commons" should be ecologically sustainable as well. With an important increase in use of all types of digital technologies, it's crucial to guarantee that this use is not coming up with negative environmental consequences. At the same time, social equity should be pursued

to assure that the good remains a common, hence not excluding anyone from a fair part of it. Equity is analysed in terms of values, "as the basis of distributive justice", alongside "equality" and "need" (Deutsch, 1975, p. 137). "In cooperative relations in which economic productivity is a primary goal, equity rather than equality or need will be the dominant principle of distributive justice" (Deutsch, 1975, p. 143). Finally, actual turbulence and shocks should be taken into consideration to improve common good resilience. Resilience is seen as "the ability to withstand and survive shocks and disturbances [...] related to the way societies adapt to externally imposed change" (Joseph, 2013, p. 39).

In this manner, the aim of this paper is to examine previous studies regarding the actions and processes that occur in the digital commons, in order to be able to answer the following question: how can the environmental sustainability, equity and resilience of digital commons be improved ?

Research methodology

This systematic literature review is a qualitative analysis of the papers on digital commons and concepts related to their ecological sustainability, equity and resilience. When drafting the systematic review, the main purpose kept in mind was to provide a succinct, but trustworthy, reliable and useful digression into the subject, in order to assist colleagues in navigating the current developments in this field. Three principles guided the data retrieval. Firstly, the search for relevant papers should be as complete as possible. Secondly, it is essential to explicitly set criteria for inclusion and exclusion of articles. Third, we consider critical that the chosen criteria are both accurate and replicable. In order to find articles that could correspond to the proposed research topic, the Web of Science platform was used as the main resource that could provide the database. The initial search query included the main keyword: "digital common" AND "digital commons" (with quotation marks in the search field). Complementary, we retrieved articles citing Elinor Ostrom, with the same combination of "digital common" AND "digital commons" (with quotation marks in the search field), as well as searching separately for 'digital' 'common' and 'digital' 'commons' (without quotation marks in the search field).

We explicitly search for singulars and plurals terms, as preliminary exploratory tentative returns two different types of results between singulars and plurals of words. Papers from different fields are using different words. The singular of the words "digital common" are mostly used by the "Engineering, Electrical and Electronic" field, as well as by the "Computer Science Hardware Architecture", the plural of words "digital commons" is more specific to "Information Science, Library Science" and "Communication" fields. In the case of the use of singular words, the "Communication" field is the least active and "Engineering, Electrical and Electronic" is not even known for using the plural of words "digital commons". When it comes to "Management" or "Information Systems", the fields of our interest, it's mostly using the combination "digital commons".

Considering the fact that the number of articles gathered via this search totaled 260, an analysis of each article's title, abstract and keywords was made in order to retain only those that could be useful for the literature review and closely related to concepts of ecological sustainability, equity and/ or resilience. Consequently, 40 articles were selected for further study and analysis, which were subjected to the chosen criteria.

The inclusion criteria were:
Does the article talk about "digital common" (or any other relevant synonyms, for example: open source common) AND "sustainability" OR "equity" OR "resilience"?
Do the authors mean "ecological" (or any other relevant synonyms, for example: environmental) when talking about "sustainability"?

The exclusion criteria:
Any other types of sustainability (economic, human, social, etc.), but "ecological" (or any other relevant synonyms, for example: environmental).
Any other types of commons (for example, natural resources), but "digital" (or any other relevant synonyms, for example: open source common).

Finally, 6 articles were satisfying all the criteria.
An inductive reasoning was made, arriving at conclusions, through the analysis from the particular to the general. Backward citation searching was made as well in order to analyse one author's previous works and conclusions made.

Findings

5 articles respond directly to the searching criteria related to the topic of ecological sustainability and the concept of digital commons. Nonetheless, the authors of these 5 articles write about sustainability, sometimes clearly referring to ecological sustainability, while sometimes the discourse is more vague and ambiguous and sustainability could be interpreted as an umbrella term including ecological as well as economic sustainability, without any clear-cut way to distinguish between the two intentions.

For example, when it comes to the definition of sustainability in information systems (IS), it "has been looked at in three principal ways: sustaining competitive advantage through the deployment of IS, creating (online) communities and inclusive collaborative efforts, and green IS (that urges us to consider environmental and social concerns alongside economic ones and the role that IS have in increasing, mitigating, or even reducing environmental harm)" (Curto-Millet & Corsin Jimenez, 2022, p. 2).

Nonetheless, a tension emerges from the 5 articles covering digital common goods sustainability. On one side, reasons are advanced insisting on the similarity and proximity between digital common goods and traditional common goods in terms of sustainability (Curto-Millet & Corsin Jimenez, 2022). A parallel between traditional commons through the lenses of Elinor Ostrom's work and digital commons was made by Curto-Millet & Corsin Jimenez (Curto-Millet & Corsin Jimenez, 2022). Consumers of a certain resource, either traditional or digital, can form a group in order to manage a common good in accordance with a set of rules shared by them. Resources are distributed in a more predictable and efficient manner, the conflict between actors is minimised, and the resource system itself may exist for a long period of time, remaining sustainable. As long as actors are disorganised, they will not be able to achieve the tangible gains that would be available if they worked together (Curto-Millet & Corsin Jimenez, 2022). Also the 8 Ostrom's principles or factors that assure the long-term usage of shared resources that make it feasible to secure the long-term usage of shared natural resources, are considered applicable to the sustainability of digital common goods (Curto-Millet & Corsin Jimenez, 2022).

On the opposite side, sustainability of digital commons is considered as a much more complex notion and different from sustainability related to traditional commons, theorised by Elinor Ostrom (Curto-Millet & Corsin Jimenez, 2022)(Rozas et al., 2021). First of all, a continuous effort seems necessary but not sufficient as far as sustainability may not be achieved (Curto-Millet & Corsin Jimenez, 2022, p. 13). This continuous effort requires assemblages of varied actors (technologies, democracy, quality through diffusion and adoption), unexpected alliances (publishing world), collective efforts, and values"(Curto- Millet, 2013, p. 45). They are considered crucial to the sustainable governing of open source. The efforts and the enactions of these actors are supported by their specific values, regularly questioning the reasons and purposes of the digital commons and the adequateness of its processes, conducting to an never ending evolution of the digital commons and at the end their sustainability (Curto-Millet, 2013, p. 45).

Moreover, the digital commons sustainability can be structured in a typology. Three types of sustainability are distinguished, which can nonetheless coexist: resource-based, infrastructural and interactional (Curto-Millet & Corsin Jimenez, 2022), but ecological sustainability is not explicitly described. Complementary, five themes are proposed that contribute to sustainability of digital commons (Curto-Millet & Corsin Jimenez, 2022): participation, focus on certain actors, time, dimensions and logic.

A solution in order to reinforce the sustainability and the management of digital commons is considered to be the blockchain technology, that could be of help in different ways: "distribute power, facilitate coordination, scale up governance, visibilise traditionally invisible work, monitor and track compliance with rules, define collective arrangements, and enable cooperation across communities" (Rozas et al., 2021).

If a scientific debate is open about sustainability of digital common goods, when it comes to digital commons and management activities towards equity and resilience, very poor results were found. One article vaguely analysed the topic of equity when related to digital commons. In this one, digital commons are seen as a new model and a new paradigm that, by default, is seen as a new sense of fairness and justice compared to existing digital content models (Ciesielska & Jemielniak, 2022, p. 908). While zero articles analyse the topic of resilience of digital commons.

Discussion

Out of these 260 articles, only 6 papers comply with our criteria: 5 approaching the topic of ecological sustainability and one article the resilience. In fact, the terms "digital common" or "digital commons" are not extensively used in the academic sphere, given the little volume of results retrieved by Web of Science. Still, the research made is showing poor results in terms of managerial actions that could be applied towards ecological sustainability of digital commons. We are even more surprised to discover that social equity is completely neglected and resilience only superficially evoked once. We conclude that, by one side, little research exists around the topic of ecological sustainability of digital commons and all kinds of related managerial actions.

The mentioned papers have a common reference to Elinor Ostrom's works on the natural resource commons, as well as a clear parallel and applicability of some of Ostrom's principles to the digital commons, which is the basis for their sustainability analysis. Beyond sustainability, it seems that when it comes to digital commons, notions of equity and resilience can be conceptually close (Lew et al., 2016, p. 5) or even equity and resilience can be implied in the notion of sustainability or the very concept and existence of digital commons. Indeed, equity and resilience are becoming fundamental principles for actions. For example, one of the main sustainable development goals of UNICEF is to achieve a more equitable and just world (UNICEF and the Sustainable Development Goals, 2022).

Overall, more than answers, our literature review highlights three avenues of research. The first one is around the extent of applicability of the sustainability principles identified for traditional commons when it comes to sustainability of digital commons. Some similarities exist justifying the replicability of traditional commons knowledge to digital commons. But some differences justify special treatments and hence new theories and models when approaching the sustainability of digital commons. Further exploration seems necessary to clarify the boundary conditions of traditional common knowledge and the specific rules applicable for digital common sustainability.

The second avenue of research concerns the contribution of the blockchain in enhancing digital commons and their sustainability. Blockchain is mentioned as a possible key success factor, but research should more extensively explore conditions and methods to substantiate its potential.

The third avenue of research questions the inextricable inclusion, or not, in the concept of digital commons of sustainability, equity and resilience. Said otherwise, when we talk about digital commons, we inevitably include sustainability, equity and resilience in the concept of common goods, hence making impossible any independent and separate analysis of each concept. This proposition requires further investigation to be able to better understand to what extent the terms of sustainability, equity and resilience are implied to the terms of digital commons.

The lack of research in these directions does not mean that these 3 issues are irrelevant. The lack of attention around these 3 issues opens the ways to new tragedies of the commons, and of the digital commons in particular. If professionals and researchers do not invest this unexplored domain, we will assist to new tragedies. New because they are not related to the overexploitation of the commons it-self, but more on the overexploitation of what is around the digital commons: like the natural resources necessary to produce the digital technologies, the energy sources to run the digital services, the human race lost while fighting for access to these last natural resources and energy sources.

We hypothesize that this inattention could originate in some disputable assumptions. The first assumption is that common goods are ecologically sustainable. If common goods include the issue of ecological

sustainability, the ecological sustainability is multidimensional. Maybe the common goods are sustainable only on certain dimensions and not on all dimensions of the ecological sustainability. Neglecting the sustainability for each dimension would make at risk the commons. We invite to unpack the ecological sustainability to make it more comprehensive. In particular, for the digital commons the issue of the exploitation and depletion of the natural resources on which the digital technologies are build and run.

The second assumption is that common goods are resilient. If common goods include the issue of resilience, the resilience can be effective in front of some shocks but less effective in front of some disturbances. The actual uncertainties around the electric provision seems a shock not taken into account so far by digital common goods. Hence, as for ecological sustainability, the resilience should be unpacked and digital common good resilience should be assessed and managed in a more comprehensive matter.

The third assumption is that common goods are socially equitable. If common goods are socially equitable among the members of the community, digital commons restrict the community to the people with a certain access to the digital world and excluding hence large pans of the human population because they lack the instruments (like a mobile phone) and infrastructure (like high speed internet) to access the digital commons. This barrier approaches the digital commons toward digital clubs. An outward looking could be fruitful to explore way to include ever larger pans of the population and in particular the most in need of each digital common good.

Limitations

Our results should be interpreted cautiously given the some limitations of our review. The main one is about the limited set of retrieved and pertinent articles. We suspect that this small retrieved sample could be related to the choice of terms in the queries. Some synonyms of "digital commons" could've been searched as well in order to enrich the sample, such as open source, open data, open access, free software. Similarly, sustainability, equity and resilience could be debated but using other terms as synonyms. Hence searching for their synonyms could be a way to extend the review. More than academic literature, we think that an effort could be directed toward grey literature by the communities leading the digital commons.

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