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Why Researchers Publish in Non-Mainstream Journals: Training, Knowledge Bridging, and Gap Filling

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Why researchers publish in non-mainstream journals: Training, knowledge bridging, and gap filling

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Abstract

In many countries research evaluations confer high importance to mainstream journals, which are considered to publish excellent research. Accordingly, research evaluation policies discourage publications in non-mainstream journals under the assumption that they publish low quality research. This approach has prompted a policy debate in low and middle income countries with financial and linguistic barriers to access mainstream journals. A common criticism of the current evaluation practices is that they can hinder the development of certain topics that are not published in mainstream journals – although some of them might be of high local relevance. In this article we examine this issue by exploring the role of non-mainstream journals in scientific communication. We asked researchers from agricultural sciences, business and management, and chemistry in Colombia about their reasons to publish in non-mainstream journals. We found that researchers publish in non-mainstream journals because they: 1) offer a space for initiation into publishing (*training*); 2) provide a link between articles in mainstream journals and articles read by communities with limited access to them (*knowledge-bridging*); 3) publish topics that are not well covered by mainstream journals (*knowledge gap-filling*). Therefore, publication of 'low scientific quality' articles does not sufficiently explain the role of non-mainstream journals. The results suggest that research evaluation policy in low and middle income countries should consider assigning greater value to non-mainstream journals given their role in disseminating potentially useful knowledge, in particular regarding local or regional issues.

Keywords: research evaluation; science communication system; universalism; mainstream journals; non-mainstream journals; publication patterns

1. Introduction

In many countries, there is an increasing pressure to prove the value of publicly funded research in order to respond to policy demands for accountability (Whitley and Gläser 2007). Quantitative forms of research monitoring or assessment are often used as a means to convey to policy-makers, stakeholders, and the wider public the relative performance of researchers, laboratories, universities, and national science systems (Hicks, et al., 2015; Wilsdon et al. 2015; Rafols, Molas-Gallart et al. 2016). Many of these assessments use indicators based on data of publications in *mainstream journals*, i.e. journals perceived to publish excellent research typically indexed by the citation databases Web of Science (WoS) and Scopus (Vessuri, Guédon, & Cetto 2014). In contrast, articles published in other journals receive less recognition in research assessments under the assumption that they publish poor quality articles. We refer to them as *non-mainstream journals*.

The higher rank attributed to research published in mainstream in comparison to non-mainstream journals has motivated a long standing debate on the validity of such appraisal. In Latin America, which serves as the geographical focus of this article, it is often assumed that non-mainstream journals do not have satisfactory editorial standards and scientific impact, which renders them unsuitable for the publication of quality research (Vessuri 1995; Meneghini & Packer 2007; Aguado-López et al. 2014). An influential blogger, for instance, has called them ‘publication favelas’ (Beall, 2015). However, some scholars have argued that non-mainstream journals offer a valuable and more comprehensive view of research production that is neglected in mainstream journals (see debates of Velho & Kriege 1984 vs. Moravcsick 1987; Spinak 1996 vs. Garfield 1997; and Beall 2015 vs. Scielo 2015). The relevance of this debate to research policy is that it reveals a concern of the potential underestimation of the knowledge contained in non-mainstream journals by conventional research assessments and agendas (Bianco, Gras, & Sutz 2016). This article addresses such a concern by examining the role of non-mainstream journals in scientific communication in light of an increasing policy support to publishing in mainstream journals (Vessuri, Guédon, & Cetto 2014).

The research question studied in this article is *why do researchers publish in non-mainstream journals?* The main insights were obtained from in-depth interviews with 30 Colombian researchers from agricultural sciences, business and management, and chemistry. Colombia is an interesting case because it exhibits both a trend of increasing number of articles in mainstream journals, and an important production of nationally edited journals. Explanations drawn from the sociology of science about research evaluation and their critique serve as a framework to discuss the findings. Our work contributes to existing research on scientific communication systems by identifying three functions fulfilled by non-mainstream journals: training, knowledge bridging, and knowledge-gap filling. These functions provide a richer understanding of the role of non-mainstream journals in a global environment that demands policy support of more relevant and responsible research (Bortagaray & Ordóñez-Matamoros 2012).

2. Universalistic research evaluation and non-mainstream journals

This research is framed within a policy debate about the role of non-mainstream journals for scientific communication in low and middle income countries. The question is whether non-mainstream journals serve communication functions that are not accomplished by mainstream journals, or if they are venues for research of insufficient quality (Vessuri 1995). Specifically, non-mainstream journals in Latin America have had very low public policy support under the assumption that they publish low quality research. On many occasions, measures have been implemented to encourage publication in 'top' journals thus discouraging the publication in non-mainstream journals (Vessuri 1995), which are considered by some as 'adding noise' to scientific communication (Garfield 1995). However, these journals have continued to develop in Latin America, one of the regions with a greater production of papers in non-mainstream journals in the world (Cybermetrics Lab 2016). In this section we link this debate to a broader discussion on the universalistic use of research evaluation so as to understand the two different perspectives on the role of non-mainstream journals.

The first perspective is reflected in the significant use of mainstream journals in research evaluation, which implicitly acknowledges them as authorities that can

judge the production and 'quality' of scientific contributions. Therefore, mainstream journals are seen as defining mainstream science (Guédon, 2001; 2007); in practice, they are perceived as setting quality standards for all research. This use of mainstream journals for research evaluation implies a universalistic notion of research quality (Merton 1973a) according to which research can be objectively assessed regardless of who produces the knowledge or the context in which knowledge is produced.

The use of mainstream journals to produce universalistic research evaluations has put pressure on researchers to publish in those journals. Mainstream journals are frequently identified as those covered by WoS (Davis and Eisemon, 1989; Nagpaul, 1995; Guédon, 2001; Meneghini, Mugnaini, & Packer 2006) and Scopus (Lemarchand 2010; Aguado-López et al. 2014). In other words, indexing in these databases has become a source for global reputation and recognition for journals – and thus indirectly for researchers publishing in those journals. In Central and Southern Europe, for instance, publishing in journals covered by WoS has become a requirement to show the quality of research papers in formal evaluation (Lillis & Curry 2010; Rafols, Molas-Gallart et al., 2016). This is also the case in regions such as Latin America in which publishing in journals covered by WoS and Scopus has become an indication of scientific excellence (Vessuri, Guédon, & Cetto 2014). Therefore, universalistic evaluation promotes publications in mainstream journals (especially in those indexed by WoS), because it is perceived that these journals ensure the quality of scientific contributions and endow high recognition to scientists.

However, the universalistic view that dominates in research evaluation has been challenged because it does not recognise the importance of context in research production (Bianco, Grass & Sutz 2016). Researchers have expressed concern that the majority of mainstream journals are English language journals from the natural sciences produced in the US, the UK, and the Netherlands (Gibbs 1995; van Leeuwen et al. 2001; Klein & Chiang 2004; Larivière & Macaluso 2011; Rafols, Ciarli & Chavarro, 2016; Larivière, Haustein, & Mongeon 2015). This implies that research evaluations based on mainstream journals may underestimate the knowledge produced in other regions, languages, and disciplines. The consequence of this underestimation is that certain research

topics may be abandoned by researchers. Moreover, there is also a concern that important issues may not even be studied because of the lack of reputational and financial incentives derived from conventional research evaluations and agendas (Hess 2007; Vessuri, Guédon & Cetto 2014; Bianco, Grass & Sutz 2016). Hess (2007) has referred to this as 'undone science'.

This alternative perspective implies that mainstream journals are linked to the research interests of specific research communities. If this is the case, research evaluation based on mainstream journals provides a partial view of scientific research. Non-mainstream journals, then, may be fulfilling communication demands from research communities that are under-represented by mainstream journals (Rafols, Ciarli & Chavarro 2016). This provides an alternative understanding of non-mainstream journals to the one offered by universalism.

To recap, from a universalistic perspective, non-mainstream journals are seen as venues for poor quality research. From a more 'contextualised' view, non-mainstream journals are seen as communication venues that are important for certain, often local, research communities. The contrasting views offer a starting point to further understand the role of non-mainstream journals in scientific communication (Estrada-Mejía & Forero-Pineda) at a time in which research evaluation is becoming more formalised (Whitley & Gläser 2007; 2012) and questioned (Stirling, 2015).

3. Methodology

We examined the publishing practice of researchers from agricultural sciences, business and management, and chemistry in Colombia. This country shows a growing number of publications in mainstream (Lemarchand, 2012) and non-mainstream journals (OCyT, 2015). Colombia is classified as an upper-middle income country by the OECD and an S&T developing country (Ordóñez-Matamoros et al, 2010). It produces a substantive quantity of academic journals, comparable to Brazil, Mexico, Chile, Peru, Venezuela, and Cuba. As in other countries in Latin America, most of its academic publishing houses are higher education institutions.

In order to collect information from mainstream and non-mainstream journals and corroborate publishing patterns we used bibliographic databases. The most well-known are WoS (until recently part of the information corporation Thomson-Reuters, now run by Clarivate Analytics) and Scopus (part of Elsevier's publishing group). These databases have an extended recognition as authoritative data sources for mainstream journals. Additionally, we used Scielo and RedALyC as the leading examples of databases for non-mainstream journals in Latin America. These systems are regional databases that index journals mainly from Latin America, Spain, and Portugal that are not covered or partially covered by WoS and Scopus.

We applied the following procedures to inquire why researchers publish in non-mainstream journals: (1) identified and analysed the publication patterns of selected researchers; (2) conducted an interview program; (3) codified interview data; and (4) contrasted interview data with publication patterns. Researchers were identified and selected using CvLAC. This is a Curriculum Vitae database of Colombian researchers managed by Colciencias, the main public funding agency for science in Colombia. The criteria to select researchers were: those (1) participating in a research group endorsed by a Colombian organisation certified by Colciencias (2) with a PhD, and (3) with an individual production of at least five papers in the last 10 years. A subset of 60 researchers were contacted, and 30 formal interviews were conducted –10 for each discipline.

The publication patterns of each of the 30 researchers from CvLAC were analysed in terms of the number of papers produced in journals indexed by RedALyC, Scielo, Scopus, or WoS. This information was contrasted and complemented with the researchers' web profiles and other publicly available CVs. An updated CV was asked from the researchers themselves, which was then compared to Colciencia's CvLAC. The comparison showed that CvLAC only provided a complete list of publications for the sample until 2012¹. A few publications were lacking from some researchers, but they were updated using Scielo, RedALyC, WoS, Scopus, and the CVs provided by the researchers. In other cases CvLAC was more up to date than the researchers' own CVs. Finally, the list of publications was organised into tables and aggregated for each

¹ The interviews took place in 2013.

researcher. This allowed an understanding of their publication patterns from matching the journals with databases covering them (WoS, Scopus, RedALyC, and Scielo), producing a list of mainstream and non-mainstream journals.

Thirty interviews were then conducted from May to September 2013 in Colombia. The reasons for the choice of researchers from agricultural sciences, business and management, and chemistry are 1) the differences in the journal coverage of these disciplines by WoS and Scopus; and 2) the degree to which the research findings of these disciplines are affected by the research context. Regarding coverage, chemistry is generally well covered by journals in WoS and Scopus, which implies a lesser need for non-mainstream journals in chemistry as compared to the other two disciplines (agricultural sciences, and business and management). Regarding the research context, chemistry is usually assumed to be independent of socio-cultural and geographical environments (Cole 1983). In contrast, knowledge in agriculture is considered highly localised; therefore it may influence and be influenced by the local context of production (Velho 1985). As a result of competition for reputation among business and management schools, lecturers in these fields face pressure to publish in specific journals to perform well in journal rankings (Rafols et al. 2012). Top business and management journals are usually covered by WoS and Scopus – what is likely to shape researchers' views on publication choices. Table 1 below illustrates the diversity of backgrounds of researchers in the sample. Table 2 shows their number of publications.

Table 1. Distribution of researchers interviewed

Sector*	Private university	19
	Public university	11
Experience**	Senior	17
	Junior	13
Gender***	Women	9
	Men	21
Nationality	Colombian	26
	Other (one German, one Cuban, two Venezuelan)	4

* Based on the year of the interviews (2013); researchers may have worked in different sectors previously.

** Senior researchers were considered as those with publishing experience before 1995 and within the age bracket of 50 and 70.

*** The lack of gender balance was due to availability of respondents.

Table 2. Number of publications by the interviewees

Number of publications	Number of respondents
5 to 10	5
11 to 20	6
21 to 30	5
31 to 40	1
41 to 50	6
61 to 70	2
71 to 80	2
91 to 100	1
> 100	2

The interview program was designed to answer why researchers publish in non-mainstream journals, with an emphasis on journals covered by Scielo and RedALyC. It also explored their views on Scielo, RedALyC, and associated non-mainstream journals. Researchers were encouraged to talk freely to identify if there was any mention of mainstream journals, journal indexing databases or related subjects such as impact factors or journal rankings, how they search for relevant literature and how they decide to publish in different journals. The interviews followed a semi-structured, open-ended questionnaire. This

questionnaire is available in the supplementary material file 1 (questions 1 to 6 and 10 to 13 especially).

Twenty-eight of the interviews were recorded. We used the method known as thematic analysis (Braun & Clarke 2006), which consists of taking notes while interviewing and journalising them after the interview. This was then followed by listening to the audio files, identifying categories, and validating the categories found through a second review of them (Braun & Clarke 2006). The categories helped with the identification of publishing patterns, discovery of themes, and a comparison of responses. These responses were complemented with secondary data sources as noted above.

4. Findings: the training, knowledge-gap filling, and knowledge bridging functions of non-mainstream journals

The findings below are descriptions of publishing patterns found in the interviews. We corroborated and expanded the information gathered from the interviews – as suggested by Yin (2009, pp. 114-119) –, using (1) the CVs of the researchers in the sample; (2) data from Scielo, RedALyC, WoS, and Scopus; and (3) the analysis of specific papers mentioned by the researchers.

Two main perceptions of non-mainstream journals emerged from the interviews. One group of researchers considered them as training mechanisms in order to publish in mainstream journals, thereby conferring a low importance to them. The other group considered that non-mainstream journals have the same importance as mainstream journals in terms of the knowledge covered. Here we provide the distillation of the insights in terms of three main motivations or reasons. We refer to them as *training*, *knowledge bridging*, and *knowledge gap-filling*. Training is the use of non-mainstream journals for initiation into publishing. Knowledge bridging is the incorporation of knowledge published in mainstream journals in non-mainstream journals that reach readers with limited access to mainstream journals. Knowledge-gap filling is the publication of topics that are not well covered by mainstream journals.

4.1 Training

The responses of a group of researchers suggest that publishing in non-mainstream journals is a useful step for building capacity for publishing in mainstream journals. This is based on the idea, expressed by a senior chemist, that 'WoS is a synonym for quality'. For this respondent, although non-mainstream journals are training mechanisms for new researchers, 'the problem is that many researchers get stuck in that stage and never evolve towards the good journals'. Similarly, a researcher from agricultural sciences said: 'For me, when I publish in a journal indexed by Web of Science, it is the best that I can achieve'. Even an editor of a journal on agricultural sciences indexed by Scielo said that 'the role of this journal is to train researchers in order to publish in international journals [meaning WoS-indexed journals]'.

In total, 13 researchers (46%) considered non-mainstream journals as a step towards publishing in mainstream journals. They used metaphors that implied a chronologically linear sequence for building publishing capacity. These researchers suggested that non-mainstream journals give a 'kick start' to their careers. For instance, a junior researcher from business and management in a private university compared the progression from publishing non-mainstream journals to mainstream journals to advancement of one's education level: 'as when you go from primary school, to high school, to university, you have to go through that process to publish in the big leagues'. Another researcher from chemistry referred to non-mainstream journals as a 'staircase'. Yet another researcher from agronomy called them a 'pathway' to WoS. In all cases, there is an implication of a start and an end in terms of qualitative change. The start is represented by non-mainstream journals and the end by mainstream journals.

The idea of training is also expressed in the answers of eight researchers from the three disciplines. They said that they use non-mainstream journals to introduce PhD students to academic publications. For instance, a senior researcher in chemistry said that lately he had started publishing in non-mainstream journals to initiate his doctoral students into academic publishing. The advantage is that they can write and communicate with editors and peer reviewers in Spanish. Publishing in these journals also acquaint doctoral students

with the peer review system as well as introduce them to the process of literature search. .

To summarise, researchers argued that they publish in non-mainstream journals because:

Reason 1. Non-mainstream journals are useful as training for researchers to publish in mainstream journals. The papers they publish in non-mainstream journals incorporate feedback from peer reviewers, which contributes to improving the robustness of other papers that will be submitted to mainstream journals.

Reason 2. Non-mainstream journals are also useful to introduce PhD students to academic publishing in their own language and how to search for relevant literature.

However, other researchers considered that publishing in non-mainstream journals should not be regarded only as a step towards publishing in mainstream journals but as relevant communication media for scientific research. For instance, a researcher from chemistry thought that being a mature scientist meant one had to decide on the type of readership one wanted, and then to choose journals to reach that readership. He, however, admitted that he chose the journals in which he publishes from the set covered by WoS or Scopus. He expressed this dilemma in the following way:

I feel that researchers, based on God knows what, have prostituted ourselves. By prostitution I mean that researchers are guided by the score in rankings, by career improvement, and by the economic benefits of that. In that sense, if you see my CV, since 2006 I have made every effort to publish in WoS or Scopus-indexed journals. It may sound bad, but I only target ISI [WoS] or Scopus. ... Going against the mainstream can be meaningless.

Similarly, a researcher who is also an editor of a business and management journal indexed by Scielo thought that the pressure to publish in mainstream-indexed journals discourages the formation of a distinctive scientific community in Latin America. For him, non-mainstream journals would find it difficult to become something else other than 'transit stations' to WoS: 'If we are all going towards the same point, I don't think journals here will be able to make progress

in those indexing systems. I have doubts that there is real dialogue between the journals from here and the ones from there'. The two comments suggest that some researchers may exhibit a different publication pattern from the sequential pattern as expressed by the researchers towards publishing in mainstream journals.

To corroborate the interview data on publication patterns, we looked at the CVs of all researchers in the sample. Firstly, we examined the chronology of their publications, and identified the databases covering the journals in which they had published. We then classified every journal article in their CVs as *not indexed* when we could not find them in Scielo, RedALyC, WoS, or Scopus; *indexed in Scielo or RedALyC*; and *indexed in WoS or Scopus*. Finally, we compared their first year of publication to their latest one to identify any changes. Table 3 shows the publication patterns of researchers. In this table, to reiterate, mainstream refers to publications covered by WoS or Scopus, and non-mainstream to publications not covered by them. When a researcher had both types of publications in the same year we identified them with the label 'non- and mainstream'. We classified the patterns into three main publication 'pathways' to understand how the patterns support the training hypothesis.

Table 3. Publication patterns of researchers interviewed, based on initial and latest publications

Pathways	Start	End	Agr	B&M	Chem	total
1. Towards mainstream	Non-mainstream	Mainstream	2	3	2	7
	Non-Mainstream	Non- and mainstream	4	1	0	5
	Subtotal		6	4	2	12
2. Constant	Start	End				
	Mainstream	Mainstream	0	0	3	3
	Non- and mainstream	Non- and mainstream	1	0	1	2
	Non-mainstream	Non-mainstream	2	5	3	10
	Subtotal		3	5	7	15
3. Towards non-mainstream	Start	End				
	Mainstream	Non- and mainstream	0	0	1	1
	Mainstream	Non-mainstream	1	1	0	2
	Subtotal		1	1	1	3
Total			10	10	10	30

Note: Agr = agricultural sciences, B&M = business and management, Chem = chemistry; numbers refer to number of researchers; 'start' is their initial publication; 'end' is their latest publication.

Source: Own elaboration based on researchers' CVs and Scielo, RedALyC, Latindex, Scopus, and WoS databases. Dates of publications are between 1968 and 2014.

The table shows three main pathways. The first was followed by 12 researchers who started publishing in non-mainstream journals and made a transition to mainstream journals in their latest publications. The majority were from agricultural sciences, followed by business and management and chemistry. This publication pattern supports the notion that non-mainstream journals are used as training arenas to publish in mainstream journals.

However, the other two pathways in table 3 do not support the sequential pattern from non-mainstream to mainstream journals. The second pathway shows that some researchers have not made any change in their publication pattern. This does not support the training hypothesis. The third pathway is composed of researchers who started publishing in mainstream journals and transitioned to non-mainstream journals. This is the opposite pattern to the training hypothesis. Therefore, the diverging patterns support the idea that for some researchers non-mainstream journals may be more than a training arena for publishing in mainstream journals. This is explored in the next two sections.

4.2 Knowledge bridging

By knowledge bridging we mean that publishing in non-mainstream journals provides a link between articles covered by mainstream journals and communities with limited or no access to them. Mainstream articles are published in journals based in the UK, the USA or the Netherlands, written in English, and generally require payment for access. Here we present how researchers described their use of non-mainstream journals to overcome these barriers. Through their publications in non-mainstream journals they introduce and adapt concepts found in mainstream journals, and in some cases these adaptations can stimulate new areas of research.

Accessibility: open access, publication in non-English language, and teaching

Some researchers expressed concern about the lack of access to mainstream journals and other barriers for the diffusion and construction of knowledge. A junior researcher on agricultural sciences said: 'How is a paper of much relevance going to be used in the country if not many people read in English and students may not even have access to those databases?'. This researcher's view suggests that language and the subscription price of mainstream journals pose a reason for publishing in non-mainstream journals. These subscriptions are not affordable for many organisations, even in upper-middle income countries such as Colombia. Besides, having access to paid databases does not guarantee their use because of the language (English) barrier. For instance, a senior researcher in business and management recalled that in her university 'faculties that had access to databases did not use them because nobody reads in English'.

In contrast to subscribed databases, Scielo and RedALyC are open access and most of their journals are published in non-English languages. The papers in non-mainstream journals accessed through Scielo and RedALyC are also used in the classroom. They are used for teaching both at the undergraduate and postgraduate levels. A junior researcher from agronomy highlighted that 'there is no point in having ten papers in *Nature*, if that research is not even known by students in universities'. The words of a senior researcher in business and management confirm the perception that research published in non-mainstream journals is relevant for education: 'I didn't want to publish in the best journals, but

[in] something that could be useful to Colombian teachers'. A junior researcher from the same discipline expanded on how his research published in non-mainstream journals is used in his lectures: 'I tell my students: look, you can download my publications from this website'. The common point in these cases is that, given that the papers are published in Spanish or Portuguese, and that they are open access, non-mainstream journals become useful mechanisms to reach non-English speakers in countries that cannot always afford expensive databases and journals. Also, they allow researchers to use their articles in their roles as lecturers and supervisors. Therefore, these researchers publish in non-mainstream journals because they:

Reason 3. Help to provide additional material for teaching.

Reason 4. Make available open access papers. This was pointed out specifically in relation to journals indexed by Scielo and RedALyC.

Reason 5. Diffuse knowledge written in English to other languages, in this case to a Spanish and Portuguese readership.

Introduction of methodologies and concepts, and emergence of new areas of research

Eleven researchers attested that they use non-mainstream journals to introduce subjects, concepts, or methods published in mainstream journals to a community that is not well acquainted with them. These papers can motivate others to start areas of research new to the region. For instance, a researcher in agricultural sciences explained that she published the first paper in Colombia to use 16S ribosomal RNA sequencing in a non-mainstream journal. It is a method to compare and identify bacteria, usually to produce phylogenies and is important for medical microbiology and biotechnology. The aim of the interviewee was to introduce the method to the country and to show that researchers in Colombia are capable of studying ground-breaking issues. She said that after the publication of the paper other Colombian researchers adopted the method, thereby reinforcing the view that publishing in a non-mainstream journal can stimulate researchers to adopt methodologies hitherto unknown to them.

Six researchers also said that new areas can emerge from publications in non-mainstream journals. An interviewee provided an example of the nascent field of

Latin American business history, which emerged as a sub-discipline of business history. Latin American business history has emerged as a sub-discipline in which the main scholars are Latin American researchers (Davila 2013, p. 109) who publish in non-mainstream journals. Of the 35 papers on Latin American business history, only ten (29%) appeared in mainstream journals in special issues. The interviewee said that Latin American researchers learned business history from the British and American pioneers. However, the process of adaptation and modification of business history concepts yielded an assimilation of knowledge that facilitated the formation of a distinctive field visible through journals covered by Scielo and RedALyC.

Similarly, the case of a researcher from business and management shows that knowledge published in non-mainstream journals can be a starting point for research programmes. During this researcher's PhD she developed a framework based on sociobiology (Wilson 2000) to study organisations by applying the concept of production chains²: 'When I did my PhD there was only one study using this approach. When we started publishing and going to congresses, people started to become interested in the topic in other countries, despite [being] written in Spanish'. She has published her papers only in non-mainstream journals. When asked why, she said:

Most Colombian journals [on business and management] are multidisciplinary. For instance, *Innovar* has different topics within business and management, whereas international journals are much more specific in the topics addressed. We sent a paper to a [WoS-indexed] journal and the journal was clear in saying that they don't publish on our topic. They do not disregard what we do, but it is more difficult to get accepted in those journals.

The research that she has published in non-mainstream journals has been used to start a research programme in her university. A product of this research programme was a book published in 2012 in which she compiled her studies and the work of some of her students.

A senior researcher in business and management explained why he thought that non-mainstream journals can facilitate the emergence of new areas of study. For

² All the stages of making a product considered together (*Cambridge dictionaries online 2016*)

him, the value of non-mainstream journals is that they are more open to new questions and ways of presenting results. He thought that although some of the questions can be very intuitive, at least they generate new ideas that cannot always be published in mainstream journals. For instance, the interviewee referred to strict guidelines on the methodology as a barrier to the publication of these ideas in mainstream journals. Besides, he thought that non-mainstream journals allow for more flexibility in the structure of the papers:

You know the standards: hypothesis, model, variables, all the conventions that are an international standard in most papers, which are OK, but one could treat the topics in a different way... for instance in the *Journal of Arts Management*, in which I have already published some things. Also in national journals, like the journal *Innovar*, that has opened certain topics. Or in a journal from the Philippines, which allows diversity of perspectives. When you want to publish in the journals with the highest impact factor, the methodologies are much stricter.

From the examples above, it can be concluded that these researchers publish in non-mainstream journals because these journals:

Reason 6. Serve as vehicles to introduce concepts, methods, etc. to the local community;

Reason 7. Stimulate new areas of research.

With regards to the knowledge bridging function of non-mainstream journals, reasons 6 and 7 are especially relevant. They illustrate the links between knowledge published in non-mainstream journals and knowledge published in mainstream journals. Additionally, they show that new research can emerge from these links. For this reason, introduction of methodologies and concepts and emergence of new areas of research are also related to the category of knowledge-gap filling, which the next section explains.

4.3 Knowledge gap-filling

Fifteen researchers attested that they use non-mainstream journals to publish topics that are neglected in mainstream journals. This was most noted in agricultural sciences (seven respondents), but also in business and management (five respondents), and chemistry (three respondents). Based on this finding, we define knowledge gap-filling as the publication of knowledge that is neglected or

not found in mainstream journals. Below we analyse some of the examples provided by the interviewees in each discipline.

Agricultural sciences

Possible subject differences between non-mainstream journals in Scielo and mainstream journals in WoS were pointed out by a senior researcher studying *Passiflora* plants, which is the species producing passion fruit. He said:

I searched for all articles on *Passiflora* in the world, and an important number were found in Scielo. I think that's very good, and you know passion fruit is from here. Now, if you look for apple tree, you wouldn't find anything in Scielo. In that sense Scielo is very good. And this is not done by other indexing systems.

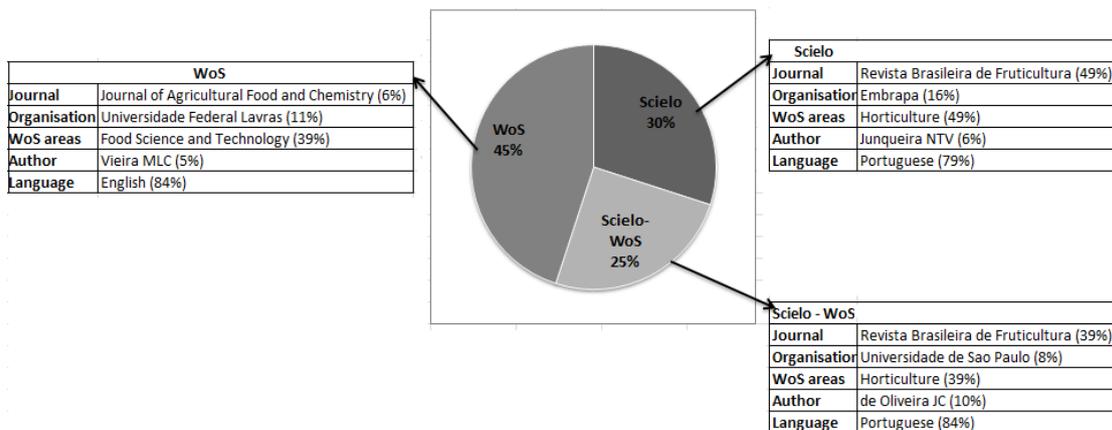
We used the passion fruit example to establish these subject differences. We compared the coverage of WoS and Scielo on passion fruit to see whether the papers covered by them differed and, if so, how. The title search we conducted for 'passion fruit or *Passiflora edulis*' from 2000 to 2010 yielded a total of 465 papers covered by WoS or Scielo. Of these 118 (25%) were covered by both databases. This means that 75% of the papers appeared only in one of them: 210 papers (45%) were exclusive to WoS and 137 (30%) to Scielo. This distribution prompted the search for indications of subject and other differences in journals covered by Scielo and WoS as pointed out by the interviewee.

In order to explore this, we analysed three sets of data (Scielo, WoS, and the Scielo–WoS journal intersection). Firstly, we listed the journals, authors, subjects, and organisations related to papers on passion fruit in each set. We then selected those with a higher frequency of papers to establish the most frequent journals, authors, subjects, and organisations. We found that WoS and Scielo have important differences on the main topics covered on passion fruit research. The majority of papers on passion fruit covered by Scielo, including Scielo–WoS, were on horticulture (49%). In contrast, the main focus of WoS was on food science technology – juice processing, pectin, and antioxidants extraction mainly. This accounted for 39% of the papers covered by it. In this sense, the foci of the databases yielded a difference in the knowledge available on passion fruit. While

Scielo-indexed journals focused on its production, WoS-indexed journals were focused on its transformation.³

The differences were also observed at the organisational, journal, authorial and linguistic levels. For instance, Scielo showed a high contribution of Embrapa's research on production of passion fruit. Embrapa is a public institute whose mission is to develop a sustainable model of tropical agriculture for Brazil. This organisation works on the production of food, fibres, and energy (Embrapa 2015). While it stands as the most productive organisation found in Scielo, Embrapa's visibility in WoS is blurred. In WoS the organisation that predominates is the Universidade Federal Lavras. This means that when searching for passion fruit in WoS, the work by Embrapa is less evident and the records returned by the search are partial. Figure 1 compares Scielo and WoS on the coverage of papers on passion fruit and shows the units with the highest frequency of papers in each set.

Figure 1. Comparison between WoS and Scielo records on passion fruit



Source: own elaboration based on the Web of Knowledge. Web of Knowledge is no longer in use, but at the time of the query (2014), this was the name of the database that included Scielo.

The analysis thus confirms that for those who work on the production of *Passiflora* plants (which is more relevant to farmers rather than to industry), Scielo is a suitable source of knowledge. The interviewee also acknowledged that around 30% of his references were from papers in journals covered by Scielo and RedALyC.

³ In a large scale study on rice research, Rafols, Ciarli & Chavarro (2016) also report a relative over-representation of Food Science and Technology in WoS and Scopus.

Research on the African oil palm offers another example. This plant is important especially for countries in the equatorial belt such as Colombia, Malaysia, Indonesia, Thailand, and Nigeria. Some organisations estimate that it generates more jobs per acre than any other large-scale crops such as soybeans (World Bank & IFC 2011, p. 15). Due to its economic importance, diseases that affect the plant have large consequences for the sector. Specifically, the plant is attacked by a disease called bud rot. It kills it completely potentially rendering a big part of the crop unproductive. A main problem is the uncertainty of the cause of the disease. In Colombia, research on the oil palm has been carried out mainly through Fedepalma, an association of oil palm growers. Fedepalma conducts research through its institute Cenipalma, which found that bud rot is caused by a mould called *Phytophthora palmivora*.

An analysis of Cenipalma's research showed that its first report on *P. palmivora* was published in non-mainstream journals. Chronologically, the findings were published by Cenipalma's researchers as communications to farmers in the magazine *Revista Palmas* (Sarria, Torres, Aya et al. 2008) and then in the Publindex-indexed⁴ journal *Revista de Fitopatología Colombiana* (Sarria, Torres, Vélez et al. 2008). Here they concluded that *Phytophthora palmivora* is directly related to bud rot. However, it was only in 2010 that the researchers published their results in the journal *Plant Disease* (Torres et al. 2010), which has been covered by WoS since 1980. When asked about the reasons why the results were published initially in non-mainstream journals, one researcher said:

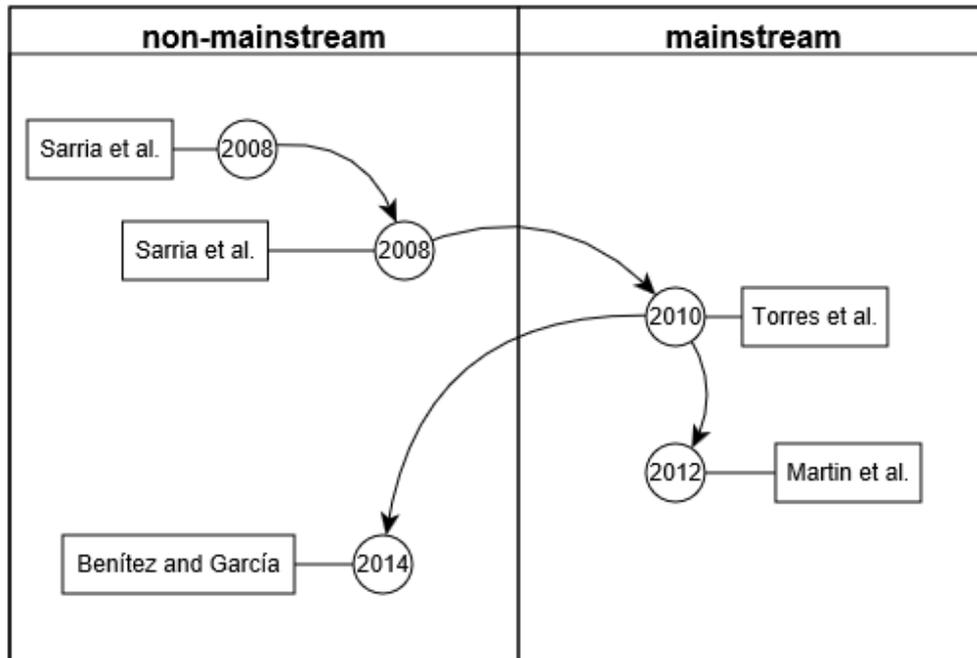
In general, we do not have the pressure to publish in high impact journals and [therefore do not need to] spend years trying to publish in [the journal] *Science*. We tend to publish results faster, thinking of the sector that we are interested in. They have very specific problems to address.

This case suggests that the researchers published in non-mainstream journals because of their proximity to the targeted readership and also because they do not have the pressure to publish in mainstream journals. As a corollary, Cenipalma's research on bud rot has been cited by other papers in mainstream journals (e.g. Martin et al. 2012) and non-mainstream journals (e.g. Benítez &

⁴ Publindex is a national JIS used by Colciencias to rank Colombian journals for assessment purposes.

García 2014). This example shows that the original research published in a non-mainstream journal has had an impact upon both non-mainstream and mainstream journals. The sequence described is shown in figure 2.

Figure 2. Flow of citations to research on bud rot*



*Arrows mean 'referenced by'. Read in the direction pointed by the tip of the arrow.

Source: own elaboration based on the papers' references.

Business and management

Five researchers from business and management supported the knowledge-gap filling function of non-mainstream journals. In business and management, the researchers interviewed observed that context dependence limits the scope of their generalisations. An interviewee said, 'I do not think that there are big administration theories. There are some generalisations, some empirical studies, but there are not many theories'. The point of this interviewee was that in business and management you need to study specific cases that seldom replicate findings in other settings. For instance, elaborating on context, he said, 'businesses in Colombia are different from businesses in the US'. For this reason, for the interviewee, applying frameworks produced in certain countries to understand phenomena in other countries ignores the contextual differences. His publications address the subject of innovation in Latin America. Given that most of his production is published in non-mainstream journals, this suggests that they

provide an alternative channel for the study of innovation in Latin American contexts.

Furthermore, the common opinion of the researchers on business and management was that the national and regional settings are determinants for their research. Consequently, they felt that this kind of research would not be of interest to mainstream journals. Additionally, a junior researcher maintained that in order to publish in mainstream journals she has had to change the focus of her research. For her, 'you have to transform regional research into international research. If I work on Sincelejo [a region in Colombia], for instance, that is not interesting for Harvard, is it?' This implies that non-mainstream journals are important for the publication of findings particularly relevant to specific regions (often in the global south).

Similarly, a senior researcher emphasised that when he started doing research he wanted to 'produce knowledge about the Colombian entrepreneurial and managerial reality. We did not want to be the reproducers of foreign models, but to produce knowledge relevant to our country'. This relevance, another senior researcher attested, is threatened when researchers try to publish all their papers in mainstream journals. In his opinion, there is an idea that only WoS-indexed journals in the top citation quartiles publish 'legitimate' knowledge. The problem, for him, is that the topics addressed in those journals are at odds with the research interests of many researchers in Colombia:

OK, knowledge is advancing there. But knowledge never, especially in the social sciences, advances abstractly. There is always a link with reality. The questions are: what reality? What issues are studied? ... Where do the questions arise from? Who poses the questions? They are questions posed by people who are concerned with society, but their society.

He provided an anecdote of a paper he had been trying to publish in a Colombian journal indexed both by Scielo and WoS. He said he had difficulties publishing it in this journal because of the question he was addressing. Although the paper had not been rejected, the comments that worried him had been about his analytical framework. Specifically, he was studying the use of patents and R&D indicators to measure innovation in Colombia. In his study, he had criticised the use of these indicators because when used in Colombia, 'you can't find anything'.

He had tried to show how companies in Colombia innovate through other means. In his opinion, 'if you want to know what happens here you have to forget that framework and assume that companies here do not innovate through R&D'. This researcher criticised the journal for expecting the application of the R&D indicators framework to innovation in Colombia to mirror those used in advanced economies. Although he felt that there was more room for his research in non-mainstream journals, he had started to submit to journals covered by WoS because of institutional pressures. This decision, he argued, may constrain his research to the use of certain theoretical frameworks that may be unsuitable for his area of interest.

A senior researcher volunteered another example of context-dependent research published in non-mainstream journals. He said that he had published a paper on equity in Colombia in a non-mainstream journal covered by Scielo, which showed some results that looked surprising to American researchers. The American researchers had contacted him and challenged one of his results about women in Colombia having more access to jobs than women in the US. 'I had to tell them that I am not making up the data. ... Colombia is a dynamic country. I tell them "Why don't you come to Colombia, and you will realise that it is like that"'. In summary, for these researchers from business and management non-mainstream journals allow them to publish research that does not fit the social and geographical contexts usually covered by mainstream journals.

Chemistry

Chemistry is commonly seen as a 'basic' science, and it is better covered by WoS than agricultural sciences and business and management. One may thus expect that in this discipline non-mainstream journals are not viewed as channels for publishing original research. An opinion of a junior chemist on Scielo illustrates this point:

Scielo and other regional systems... let's be honest that these databases are not very used globally, because researchers suppose that the quality is not going to be very good. And in a certain way they are right, especially in chemistry. Perhaps in social sciences and humanities they can be appropriate [because these journals tend to be regional or local], but not in chemistry. Basic

science is international, and international science has some clear criteria that are fulfilled by communities with tradition.

However, a senior chemistry researcher in phytochemistry (the study of chemicals derived from plants) provided a contrasting argument. This researcher focuses on the characterisation of Colombian flora. According to him, the impact factor plays an important role in his selection of journals: 'If the impact factor is 5, it is very good to publish there. But it is very difficult. If it is 3, then it is OK'. However, he explained that the WoS-indexed journals with high-impact factors in his discipline had stopped publishing 'basic' research: 'If we show applicability, then it is accepted. Otherwise it is harder. They ask for a biological applicability ... for instance, "this reduces dandruff" ...'. The applicability that the researcher referred to is found in pharmacognosy, which is the study of medicine from natural sources and its findings are patentable in countries such as the US. In fact, the American Association for Pharmacognosy publishes the *Journal of Natural Products*, one of the journals in which this researcher has published. It is a WoS-indexed journal that is in the top impact factor quartile in three WoS categories: pharmacology, medicinal chemistry, and plant sciences. In order to publish in journals with high-impact factors such as this, the researcher has to show the application of compounds to health. Unfortunately, the interviewee said that in many cases his research group does not have the expertise to carry out health tests. To conduct the tests, he has had to collaborate with a researcher in an American institution.

If the journal's impact factor is 5 or 6, then you need to associate with a star researcher. For instance, researcher Y. We publish with him because I give him my compounds and he says 'that substance might be useful to attack this disease'. He associates with us, but he demands that his institute goes first.

In this way, the interviewee increases his chances of publishing in a WoS-indexed high-impact journal. But not all investigations find a clear application in industry. For this reason, the researchers need to decide what to do with their results. According to this interviewee, 'there are some journals that still accept [chemical] structures. For instance, the *Cuban Journal of Chemistry* ... and other journals, such as *Nova* or the *Brazilian Journal of Chemistry*. As long as it is a good quality spectrometry and produces robust results'. Surprisingly, in this case it is basic

science that finds a place in non-mainstream journals. The researcher publishes in these journals research that does not have an application in the pharmaceutical industry. The value that the researcher attributes to these publications is that they increase the knowledge of Colombian biodiversity. He also asserted that 'our papers fill a cognitive gap in the country. Very few people work on the species I work on'.

In summary, the examples above show that these researchers publish in non-mainstream journals because they allow the publication of research that is not well covered or not found in mainstream journals, specifically the ones covered by WoS. The examples also reveal the significance of context in research activities, which in turn, contribute to the growing role of non-mainstream journals. Therefore, these researchers publish in non-mainstream journals because they:

Reason 8. Allow the publication of original research.

4.4 Summary of findings

The interview data yielded new insights into the reasons for researchers to publish in non-mainstream journals. Through an examination of examples suggested by the interviewees we have found that non-mainstream journals fulfil training, knowledge bridging, and knowledge gap-filling functions based on the reasons below:

Training

- (1) non-mainstream journals are used as training for researchers to publish in WoS-indexed journals;
- (2) they are also used to introduce PhD students to academic publishing in their own language and to conduct relevant literature search;

Knowledge Bridging

- (3) non-mainstream journals help to provide additional material for teaching;
- (4) they make available open access papers that incorporate bibliographic references from subscribed journals;
- (5) they diffuse knowledge written in English to Spanish and Portuguese speakers;

- (6) they serve as vehicles to introduce concepts, methods, etc. to the local community (overlaps with gap-filling);
- (7) they stimulate new areas of study (overlaps with gap-filling).

Knowledge-gap filling

- (8) non-mainstream journals allow the publication of original research;

Table 4 encapsulates the number of respondents for each reason.

Table 4. Reasons to publishing in non-mainstream journals, functions, and number of respondents

Reason	Functions			Total respondents	Discipline			Organisation		Experience		Gender	
	Training	Bridging	Gap-filling		Agricultural sciences	Business and Management	Chemistry	Public	Private	Junior	Senior	F	M
1 Training	X			13	5	4	4	9	4	6	7	2	11
2 Intro to writing	X			8	1	6	1	6	2	4	4	2	6
3 Teaching		X		8	0	5	3	6	2	5	3	5	3
4 Accessibility		X		7	4	3	0	3	4	3	4	3	4
6 Language		X		6	2	2	2	3	3	3	3	3	3
5 Intro of methodologies , etc.		X	X	11	3	5	3	5	6	3	8	6	5
7 New areas		X	X	6	1	5	0	5	1	1	5	2	4
8 New research			X	15	7	5	3	9	6	5	10	3	12

5. Discussion and Conclusions

In this article we have examined the reasons why Colombian researchers publish in non-mainstream journals, i.e. in journals not indexed by WoS and Scopus. We found that training in article writing, knowledge bridging, and knowledge gap-filling were the drivers for publishing in non-mainstream journals. The findings relate to the theoretical discussion on the publication patterns of researchers. The debate is whether 'objective' notions of research quality (universalism) or demands for contextualisation can explain the role of non-mainstream journals in scientific communication.

We have found that training toward the improvement of the scientific quality of articles partly explains the role of non-mainstream journals. According to this function, non-mainstream journals are perceived as having insufficient research competence as judged by global peers. The perceived lack of quality of non-mainstream journals responds to a universalistic perspective, which associates the highest editorial standards and scientific impact with publishing in mainstream journals (Moravcsick 1987; Garfield 1997; Testa 2014).

However, we have also shown that researchers publish in non-mainstream journals in order to fulfil knowledge bridging and gap-filling functions. This provides two main insights. The first is that non-mainstream journals do publish novel research results that escape the coverage of mainstream journals. The second, shown by knowledge bridging, is that non-mainstream journals are not isolated from mainstream science. It can be argued that there is a link between them, and it is through this link that non-mainstream journals introduce methodologies and concepts which may initiate new areas of research in some regions. Therefore, 'lack of scientific quality' of their manuscripts is insufficient to explain why researchers publish in non-mainstream journals. Thus, the role of non-mainstream journals transcends publishing low quality research.

Filling knowledge gaps of mainstream journals is particularly important in subjects related to local knowledge ('local' at various scales: from highly localised to national to regional) (Chavarro, Tang, & Rafols 2014). For instance, interview respondents have argued that agricultural sciences have a need for alternative publication venues because their research is likely to be related to local

application (Velho 1985), potentially benefitting local users of that knowledge. For instance, the research on passion fruit discussed earlier shows the existence of diverse research interests. The research published in non-mainstream journals focused on production (horticulture, of interest to farmers), whereas the 'WoS' research mainly addressed food processing technology (of interest to industry). Thus, research on the production of passion fruit would have been underestimated by taking as a point of reference only publications covered by WoS.

The case of the oil palm disease reflects a need from this primary sector of the economy that motivated the dissemination of such research to a community of oil palm's stakeholders. Although the results of that research have global relevance, the main goal of the researchers to communicate their results to local stakeholders led them to publish in non-mainstream journals. This example also shows that there are cases in which non-mainstream precede mainstream journals in diffusing content that is novel and valuable globally. This function of knowledge-gap filling by non-mainstream journals is not exclusive to agricultural sciences. The examples show that non-mainstream journals in business and management publish new insights on business history, and non-mainstream chemistry journals publish new research on botany that is relevant for biodiversity.

The bridging function of non-mainstream journals is manifest in the way they are linking their readers to topics appearing in subscribed English language journals. Mainstream journals pose linguistic and financial challenges for a readership in non-native English speaking, and low and middle income countries. As most of the non-mainstream journals in Latin America are open access, and are published in Spanish or Portuguese, they help to overcome the barriers to access knowledge in mainstream journals. Through the introduction of concepts and methodologies found in mainstream journals, non-mainstream journals connect closed access research in English to open access research in other languages.

We draw one major theoretical insight and one main policy lesson from the above insights. On the theory side, these findings challenge a universalistic explanation for publishing in non-mainstream journals. Our insights support the view that mainstream journals are located in specific contexts and produce a

representation of science from specific perspectives that emerge from those contexts. These insights reinforce the argument advanced by Hess (2007), Vessuri, Guédon & Cetto (2014), Bianco, Grass & Sutz (2016), and others, about the importance of context in research production and evaluation. Therefore, non-mainstream journals (in particular those in Scielo and RedALyC) should not be seen just as 'publication favelas' (Beall 2015). If scientific production is seen as a cumulative process of certification of new knowledge (Merton 1973b), then non-mainstream journals are a part of it.

The policy lesson that can be drawn from our study is that publication indicators based on mainstream journals do not properly and adequately represent some types of contributions. For this reason, universalistic research assessments underestimate the knowledge produced in countries, disciplines, and languages that are not the foci of mainstream journals. The consequence of this for non-mainstream journals is their appraisal as mere training for researchers to build research capability, not as valid venues for the communication of novel research.

To foster research and knowledge that can benefit society, research evaluation policies should value the communication roles of non-mainstream journals. Such policy considerations may be particularly relevant to low and middle income countries such as Colombia, regions such as Latin America, and more generally to the global south. Although the empirical results of this research are circumscribed by geography, the knowledge gap-filling and knowledge bridging functions described in this paper are not limited to it. They can help to illuminate the knowledge neglected by universalistic research evaluation in other 'peripheral' contexts (i.e. non-English speaking communities, disciplines treated as 'minor' or 'lower', socially marginalised areas), in particular when considering knowledge exchange with non-academic experts or for unconventional topics (Vessuri, Guédon, & Cetto 2014). For this reason, policy awareness and recognition of the knowledge-gap filling and knowledge bridging functions of non-mainstream journals can improve the communication, reputation, and utilisation of research that has the potential to address pressing social demands.

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Supplementary materials

1. Topic guide for interview programme

The purpose of this interview programme was to answer the research question: why do researchers publish in journals indexed by alternative journal indexing systems (JIS) such as Scielo and RedALyC? The topics addressed were 1) reasons to publish research; 2) explanation of the publication patterns of researchers in terms of JIS; 3) use of Scielo, RedALyC, WoS, and Scopus in research; 4) the 'value' of Scielo, RedALyC, WoS, and Scopus for their publications; 5) the future of JIS, and any recommendations or comments. Previous to the interview, there was a preliminary data gathering and analysis of the publication patterns of each researcher. The general profile of each researcher was built from the following information:

- Nationality
- Gender
- Age bracket
- Participation in research teams.
- Collaborative publishing: affiliations of the researcher's co-authors.
- Subjects of the researcher's publications, based on their publication records from CVLAC.
- University where the researcher obtained PhD qualification, date, and country.
- Sector of the organisation that employs the researcher: private or public.
- List of publications. For each publication, the JIS that covered the journal in which it was published (Scielo, RedALyC, WoS, Scopus).

The topic guide is presented below:

- (1) Please, briefly explain your research subject. Why is it important?
- (2) What are the reasons that motivate you to publish?
- (3) How do you define 'contribution to knowledge'?
- (4) How do you choose the journals to which you submit your papers?
- (5) What motivates you to publish in those journals?
- (6) To which journal are you planning to submit your next article? What is it about? Why this journal?
- (7) How do you search for literature for your research?
- (8) Do you know any of the following JIS?
 - a. RedALyC
 - b. Scielo
 - c. Web of Science
 - d. Scopus
- (9) How often do you use each of them? Why do you use or not use them?
- (10) Are there differences in the literature you find in the different databases? If so, what are the differences? If not, what makes you choose a paper for your bibliography?
- (11) How often do you cite literature found through Scielo and RedALyC?
- (12) Are you planning to submit papers to journals indexed by any of the Journal Indexing Systems mentioned above in the near future? Why are you submitting to any of them?
- (13) According to your definition of 'contribution to knowledge', please indicate your papers in which that contribution is more significant and the ones in which that contribution is less significant.
- (14) Do you have any ideas about the future of Scielo and RedALyC, their value for research and policy-making, and recommendations for their future development?

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