

Training for agricultural entrepreneurship: a bibliometric analysis

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Abstract

Agricultural entrepreneurship is one of the factors that influence job creation, economic income and competitiveness of the agricultural sector. Due to the relevance of the topic, it is important to explore the literature of recent years and identify the business skills that farmers can develop through training for the success of their business initiatives. The objective of this work is to present a bibliometric analysis to measure scientific production and reveal training topics for agricultural entrepreneurship. The information search was carried out in the Scopus and Web of Science databases in the period 2010-2020. The delimitation of the thematic groups was achieved by VOSviewer, based on the bibliometric technique of co-occurrence of terms. It was found that published papers increased in recent years and four thematic groups on the development of agricultural business skills were identified. The findings of this research can be used for the design of training courses or can guide the design of public policies that strengthen the agricultural sector.

Keywords: agriculture, entrepreneurial abilities, literature review.

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Introduction

The objective of this work is to present a bibliometric analysis on training for agricultural entrepreneurship. This analysis involves the integration of methods to measure the production and dissemination of scientific knowledge (Archambault, 2004). The search was done in two reliable digital repositories, Scopus and Web of Science (WoS) during the period 2010-2020. These databases were used because, in addition to integrating peer-reviewed international journals on the topic of interest, they allowed us to identify their geographical distribution at the global, regional and local levels (Cortés, 2007). Likewise, the methodological indicators suggested by Archambault and Vignola (2004), such as: papers published during the period indicated, the number of citations, as well as the cofrequency of keywords and the bibliographic association, were considered.

Despite the limitations that a bibliometric analysis may represent due to the variations in the number of papers according to the chosen databases, due to the quality of the journals, because the indicators obtained are not absolute figures, but only indicative and because of the difficulty in measuring the participation of the authors in a collaborative work (Okubo, 1997), this analysis allowed us to have an overview of the production of knowledge on the subject worldwide and locate the training of farmers beyond the dissemination of agronomic and management practices (Opolot, 2018) that they have been offered through government institutions or universities focused on production, but they have left aside their interests and business needs.

Therefore, a paradigm shift from agriculture to agribusiness education is necessary to meet the requirements of agricultural entrepreneurs (Babu, 2016). Entrepreneurship is gaining relevance as an important aspect in modern agriculture (Phelan, 2011), as entrepreneurial farmers invest with the aim of making a profit and ensuring the growth of their farm (Opolot *et al.*, 2018), which implies improving their skills in agriculture with a business mentality that guarantees sustainable agricultural development.

Training is a type of non-formal education outside educational institutions designed based on the needs of participants and specific educational objectives (Martínez, 2019) that has been used for farmer training. Studies on entrepreneurship training are vast, mainly in sectors such as manufacturing, high technology and services (Días *et al.*, 2019b), but entrepreneurship in the agricultural sector has been neglected (Dias *et al.*, 2019a), so it is considered necessary to train farmers in this area (Rezai, 2011).

Since most farmers lack formal education, training has represented an alternative for the development of their knowledge and skills (Anwarudin, 2019; Rezai *et al.*, 2011) mainly technical skills. However, little attention has been paid to the development of business skills that allow for the proper management of the agricultural company (Elwee, 2008) and that help to overcome problems related to low income, low availability of employment and low competitiveness in the agricultural sector (Opolot *et al.*, 2018).

There is no consensus on the topics of training for the development of business skills (Dias *et al.*, 2019a), so we found different alternatives. For example, for Azam (2010) these skills are classified into four groups: personal traits, entrepreneurial characteristics, business management and techniques. Other authors suggest the importance of skill development for identifying opportunities (Pindado, 2018), creating relationships (Opolot *et al.*, 2018), business models (Teklehaimanot, 2017) and using digital technology to access innovations (Martinho, 2020).

As can be seen, the preparation of entrepreneurs and training in this sector is an open possibility (Mars, 2013), so it is considered necessary to recover the interests, needs, experiences, local knowledge, environmental factors, economic, cognitive and sociocultural condition of farmers. The manuscript is divided into four sections. In the first an introduction to agricultural entrepreneurship was presented, in the second the materials and methods of the research are exposed, in the third the results and the discussion and finally, the conclusions.

Materials and methods

This bibliometric analysis was divided into two phases. In the first, information was searched in the Scopus and Web of Science (WoS) repositories due to their reliability and because they have been used in other literature reviews related to agricultural entrepreneurship (Dias *et al.*, 2019b; Martinho, 2020). Training and entrepreneurship and agricultural were used as search words, resulting in 867 papers (Table 1). Subsequently, a search was carried out for papers and reviews considered as the most up-to-date and most impactful source of knowledge (Dias *et al.*, 2019b) and at the end 711 papers remained.

Table 1. Research process.

Process	Step	Description	Papers in Scopus	Papers in WoS	Total
Search for information	1	Search words: training* and entrepreneurship* and agricultural*	816	51	867
	2	Type of document: Article and review	660	51	711
	3	Language: English	633	47	680
	4	Period: 2010-2020	573	40	613
	5	Records after deleting duplicates	573	15	588
	6	Records focused on training for agricultural entrepreneurship	33	4	37
Creation of the bibliometric map in VOSviewer	7	Counting method: Full	1 365 terms		
	8	Minimum number of occurrences: 5	62 terms		
	9	Percentage of the most relevant terms: 60%	37 terms		
	10	Debugging the most relevant terms	34 terms		

Data from Scopus, WoS and VOSviewer (2021).

The most widely disseminated scientific papers are in English (Dias *et al.*, 2019b), so the search was limited to this language and 680 papers were obtained. Because the purpose of the research was to retrieve the recent literature of the last decade 2010-2020, the number was reduced to 613. Likewise, the duplication of records was eliminated and only 588 remained. Finally, the abstracts of these 588 papers were read and those that focused on training for agricultural entrepreneurship were included exclusively. This is how a final sample of 37 scientific papers was obtained: 33 in Scopus and 4 in WoS.

In the second stage, the bibliometric map was built with the VOSviewer software, which, unlike other programs such as SPSS and Pajek, has demonstrated better results in the construction and visualization of bibliometric maps (Eck, 2010). With this program, the abstracts of these 37 papers were processed. For the extraction of terms, the bibliometric technique of co-occurrence was used to analyze the coincidence, the strength of association between them and the construction of thematic groups. The full counting method with a minimum value of five co-occurrences was used, which resulted in 62 terms (Table 1) and because the program integrated 60% of the most relevant, the quantity was reduced to 37 terms. Of these, three were eliminated (dairy farmer, farm, Kenya) because there was no relation to the subject and a definitive sample of 34 terms remained.

Results and discussion

The results are shown in two dimensions. The first is a descriptive analysis of the records found, such as: the number of papers published per year, the annual citation of papers, the publication of papers by geographical area (continent and country), the methodologies used in the papers and their thematic area. The second is the construction and analysis of thematic groups or clusters on training for agricultural entrepreneurship.

Descriptive analysis of the records found

The publication of papers related to training for agricultural entrepreneurship increased in the last years of the decade (Figure 1). While in 2010 only one paper was registered, by 2020 this figure amounted to six publications, at an average annual growth rate of 19%. For its part, the evolution of the citations showed that there is no direct relationship between the citation and the number of publications, different from what was expressed by Dias *et al.* (2019b). The works with the greatest impact on the subject were published in 2011.

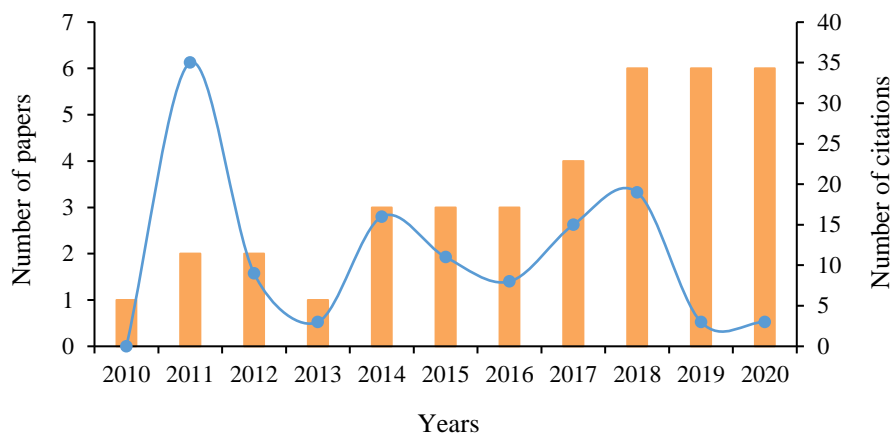


Figure 1. Evolution of publications and citations in the period 2010-2020.

Of the papers reviewed, Table 2 shows the ten most cited publications, making a total of 86 cumulative citations, 70% of the total. The topics addressed were related to the identification of training needs for the development of entrepreneurial skills in agriculture (Sandhu, 2012) and

agrotourism (Phelan, 2011), to the impact of training (Rezai *et al.*, 2011), to the importance of this for the entrepreneurship of women farmers (Lourenço *et al.*, 2014) and for the identification of economic opportunities in agriculture (Pindado *et al.*, 2018).

Table 2. The ten most cited publications.

Citations	Authors (year)	Title	Journal
29	Phelan and Sharpley (2011)	Exploring agritourism entrepreneurship in the UK	Tourism Planning and Development
12	Lourenço <i>et al.</i> (2014)	Experience of entrepreneurial training for female farmers to stimulate entrepreneurship in Uganda	Gender in Management
8	Pindado (2018)	Searching for the entrepreneurs among new entrants in European Agriculture: the role of human and social capital	Land Use Policy
7	Sandhu <i>et al.</i> (2012)	Entrepreneurship education and training needs of family businesses operating in the agricultural sector of India	Education and Training
6	Bosworth (2015)	Rural enterprise in Mexico: a case of necessity diversification	Journal of Enterprising Communities
6	Rezai <i>et al.</i> (2011)	Informal education and developing entrepreneurial skills among farmers in Malaysia	World Academy of Science, Engineering and Technology
5	Becot (2015)	Where do agri-food entrepreneurs learn their job and are there skills they wished they had learned?	International Journal of Entrepreneurship and Innovation
5	Landini (2017)	Contributions to group work and to the management of collective processes in extension and rural development	Journal of Rural Studies
4	Cieslik (2018)	Risky Business? Rural Entrepreneurship in Subsistence Markets: Evidence from Burundi	European Journal of Development Research
4	Mohammadinezhad (2017)	Agricultural entrepreneurship orientation: is academic training a missing link?	Education and Training

Data from Scopus and WoS (2021).

The analysis of publications by geographical area revealed that 15 papers were made in Asia, eleven in Africa, seven in Europe, three in America and one intercontinentally (Figure 2). Asia concentrated the largest number of papers, but not of citations, as it only represented 28% of total citations. Although Europe obtained fewer papers than Asia and Africa, it reported a higher number of citations, 35%. From this, it is inferred that there is no direct relationship between the number of papers registered by continent and the number of citations received. India gathered the most papers (seven) and 11% of citations. The most cited paper was that of the United Kingdom with 24%. Mexico contributed 5% of the papers and 5% of the citations.

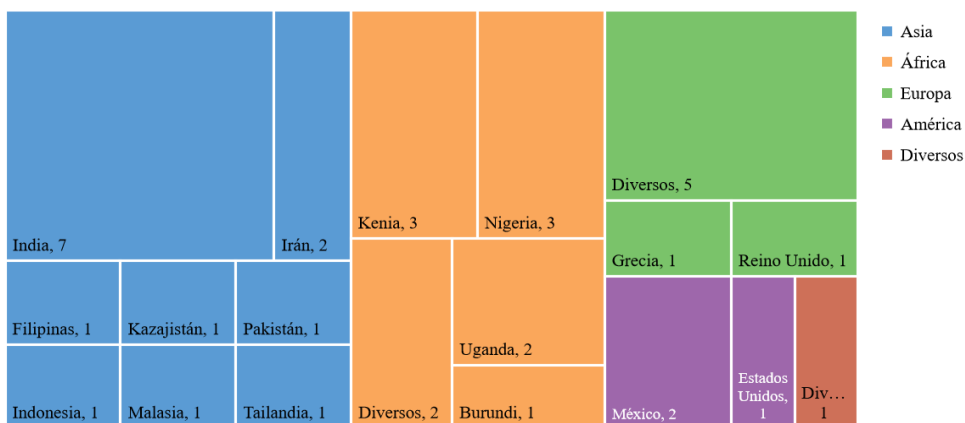


Figure 2. Number of papers published by geographical area.

Regarding the methodologies used in the 37 published papers, it is observed that more than half of the studies carried out were of an empirical-quantitative type (Figure 3). In general, the analysis of numerical information for the fulfillment of the objectives predominated. Correspondingly, these types of studies also turned out to be the most cited (62% of total citations). The breakdown of the empirical-quantitative papers, according to the continent and country, revealed that 50% were made in Asia and 20% in India.

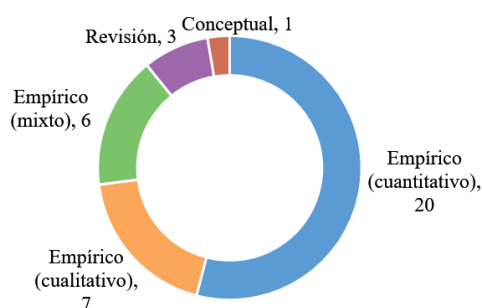


Figure 3. Methodologies used in published papers.

For their part, although only seven papers were empirical-qualitative, their importance was relevant, since on average 3.6 citations per paper were obtained in contrast to empirical-quantitative ones, with 3.8 citations per paper. Of the studies with a mixed methodology, 67% were conducted in Asia and 50% in India. The findings of this research are similar to those reported by Dias *et al.* (2019b), in the sense that the methodologies most used in the papers are quantitative, qualitative and mixed in nature, in that order of relevance.

On the analysis of the papers by thematic areas, the following distribution was found: 43% of the papers and 53% of the total citations were concentrated in social sciences, the agricultural and biological sciences grouped 32% of the papers and 25% of the citations, 11% of the papers were in the engineering area; the business, management and accounting areas had 11% and the only multidisciplinary work was developed in Kazakhstan with 3%. Of the total studies in social sciences, half was conducted on the African continent and 19% in Nigeria (Figure 4).

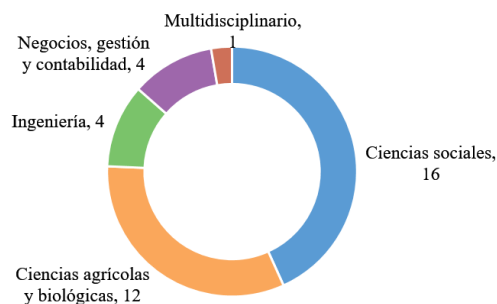


Figure 4. Thematic areas of the papers found.

Cluster analysis on training for agricultural entrepreneurship

Through the VOSviewer, 34 terms, 250 links and 4 thematic groups were identified based on the abstract of the 37 papers (Figure 5). Group 1 concentrated 32% of the concepts and was called training women farmers to overcome the barriers of female entrepreneurship; group 2 was formed by 24% of the concepts and was titled training farmers to develop business behavior; group 3 covered 29% of the concepts and was called training in business models for agricultural entrepreneurship, finally, group 4 included 15% of the concepts and was called training in digital technology for agricultural entrepreneurship.

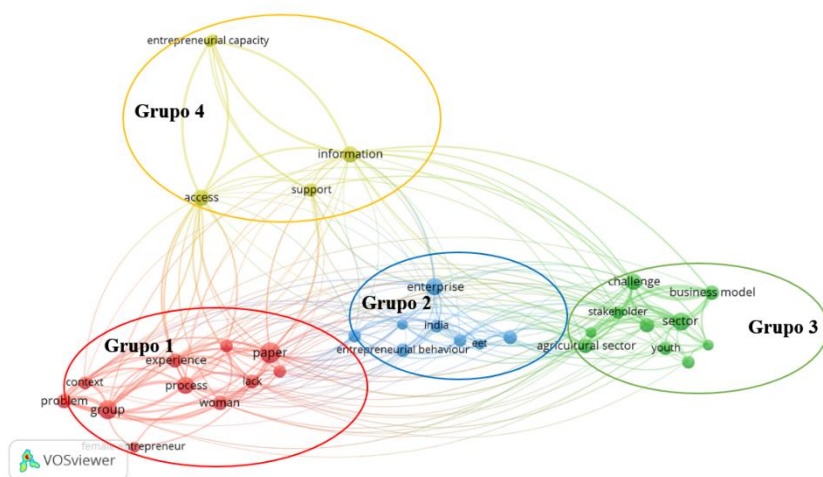


Figure 5. Bibliometric map of training for agricultural entrepreneurship.

Group 1. Training women farmers to overcome the barriers of female entrepreneurship

A barrier can be understood as a political, social, economic, technical, personal or cultural phenomenon that imposes a restriction (Bosworth *et al.*, 2015) for the entrepreneurship of women farmers. Among the main barriers, the following stand out: commercial challenges in male-dominated contexts (Azam Roomi and Harrison, 2010), pressure for women to take care of family and home, difficulty accessing financing (Lourenço *et al.*, 2014), the risk of sexual harassment (Mustapha, 2016) and limited access to information on agricultural entrepreneurship (Vivakaran, 2017).

The challenge for women grows even more when, in addition to facing the usual challenges of entrepreneurship, they have to take care of the family and the home (Lourenço *et al.*, 2014). In sum, the scenario for the entrepreneurship of women farmers is more daunting than entrepreneurship led by male farmers. Training is an alternative for women to overcome barriers and successfully start an agricultural business (Lourenço *et al.*, 2014; Bhati, 2019; Muduli, 2019).

There is no widely accepted training proposal for the development of business skills in women farmers, but there are coincidences among researchers on the importance of training them for their liberation and empowerment (Bhati, 2019; Muduli *et al.*, 2019) and on the development of skills so that they overcome the obstacles of entrepreneurship (Muduli *et al.*, 2019). In this sense (Azam, 2010) propose to train women entrepreneurs in collaborative networks, development of self-confidence, recognition of opportunities, innovation, management, planning and organization, marketing and sales.

Training in female entrepreneurship is favorable because it translates into job creation, new innovations, social welfare and economic development (Bhati, 2019; Muduli *et al.*, 2019). There is little or no difference between female and male achievements derived from entrepreneurship, so women entrepreneurs should not be considered as different or inferior to their male counterparts (Lourenço *et al.*, 2014). However, in practice this does not happen because women who venture into entrepreneurship encounter more barriers and greater risk of failure than men (Azam, 2010).

For a greater economic, political and social effect (Muduli *et al.*, 2019), training should be accompanied by initiatives that raise men's awareness of the role of female entrepreneurship (Lourenço *et al.*, 2014) and the recognition of families about the success of women entrepreneurs (Mustapha and Subramaniam, 2016). As Lourenço *et al.* (2014) point out, gender equality in agriculture and business training, in addition to being relevant, is socially beneficial.

Group 2. Training farmers to develop business behavior

According to Shirur *et al.* (2017), business behavior is defined as the combination of sociopsychological, cognitive, affective and ability attributes to operate companies successfully and obtain economic returns. From the perspective of Pongsiri *et al.* (2019), business behavior is a prerequisite to the establishment of a new company and is shaped by personal, emotional, social and experiential factors. For Muchira (2018), the origin of business behavior lies in business education, mentoring in entrepreneurship and previous business experience.

Business behavior comes from intention, and derives from the interrelationship of planned behavior, attitude, and social norms (Yaseen, 2018). When institutions, social norms and the cultural environment support entrepreneurship, individuals are more likely to increase their business intention. Training is a factor that positively and significantly influences farmers' business behavior (Shirur *et al.*, 2017; Pongsiri *et al.*, 2019).

As has already been pointed out, several authors agree on the need to develop skills for entrepreneurship and although there is no consensus in all, they highlight the importance of identifying opportunities (Pindado *et al.*, 2018), organizational and administrative capacity (Landini *et al.*, 2017), the creation of relationships (Opolot *et al.*, 2018), the formulation of business plans and the entry into new markets (Pongsiri *et al.*, 2019).

Most farmers receive training in good agronomic practices (Landini *et al.*, 2017; Opolot *et al.*, 2018). However, for comprehensive business behavior, in addition to having technical knowledge of production, it is important to develop managerial and business skills in farmers (Babu *et al.*, 2016). In fact, farmers have already expressed the need for training in topics such as marketing, organizational skills, networking and negotiation (Phelan, 2011).

While networking allows the identification of agricultural opportunities (Pindado *et al.*, 2018), organizational management makes it possible to access economies of scale and negotiate prices in the market (Landini *et al.*, 2017). Few studies have studied the effect of training on farmers' business behavior (Pongsiri *et al.*, 2019; Shirur *et al.*, 2017; Yaseen *et al.*, 2018). In this sense, it is considered pertinent to study how training influences the knowledge and cognition of farmers to put it into practice.

Group 3. Training in business models for agricultural entrepreneurship

Strategy and innovation are concepts closely related to agricultural entrepreneurship; likewise, the business model is important because it allows the farmer to define the scheme of value creation for the client and the obtaining of profits (Teklehaimanot *et al.*, 2017; AtuahJan, 2019). The ability to capture value in the business model depends on the knowledge that the farmer has of the market, and in turn, the development of market knowledge depends on marketing training (Teklehaimanot *et al.*, 2017).

Most farmers are not trained in strategic business models, so attention is required in this aspect. A good model includes long-term strategies and considers in its design the ambitions and skills of the entrepreneur, the structure, the design of the company and the environment (Beldman, 2014). It also requires the definition of the value proposition, of a strategy to create a business that is difficult to imitate and innovation so that the model impacts the market. An example is the company Farmcrowdy which uses digital technologies (Atuahene, 2019) that offer various advantages as noted in Grupo 4.

Group 4. Training in digital technology for agricultural entrepreneurship

Technological training is important in agricultural entrepreneurship because it allows access to information (Makau *et al.*, 2018). Through technology it is possible to access innovations (Martinho, 2020), new opportunities, agricultural prices, demand volumes, characteristics of buyers and consumers, among others (Anwarudin *et al.*, 2019). Therefore, the more training in technology, the greater the access to information for the development of business capacity (Anwarudin *et al.*, 2019).

It has been observed that training in technology, such as the use of applications and internet browsing (Anwarudin *et al.*, 2019), increases the business capacity of farmers, as they access more resources (Pennisi *et al.*, 2020). Among the main resources are e-books, tutorials, virtual classes and collaborative social networks (Pennisi *et al.*, 2020) that help share not only information, but also innovations (Makau *et al.*, 2018). The ICTs that farmers use most for access to information are: short messages, WhatsApp, telephone and internet browsing (Anwarudin *et al.*, 2019).

Other entrepreneurs use Viber, Skype, Facebook Messenger and more complex platforms for access to information and electronic cooperation (Osmani, 2020). Unlike non-agricultural entrepreneurs, farmers turn to more basic technologies, perhaps because their skills in this area are less developed. But young farmers are more inclined to use new technologies in contrast to older farmers (Anwarudin *et al.*, 2019). Although older farmers have accumulated experience in agricultural dynamics, they may be more reluctant to use technology, innovation and entrepreneurship (Martinho, 2020).

As Makau *et al.* (2018) point out, technology training can improve farmers' access to information and productivity, but they are not the only variables influencing profits, as other factors, such as the quality and reliability of information, perceived opportunity, farmers' skills and knowledge, as well as institutional policies and regulations, must be considered.

Conclusions

Studies on training for agricultural entrepreneurship grew in the last years of the 2010-2020 decade. However, studies on this subject are relatively scarce in contrast to those on services, high technology and manufacturing, so it is considered pertinent to conduct research to enrich this area. It is necessary that higher education institutions in Mexico contribute to strengthening this field, since in this review it was observed that the country only contributed 5% of publications and citations.

The ten most cited publications represent 70% of all citations, reflecting that few studies have a great impact on the subject. And of the topics they addressed, the United Kingdom has 24%, Uganda 10%, various countries of the European Union concentrated 7% of the citations and India 6%, while in America, only Mexico contributes 5% and the United States 4%.

Of the four thematic groups indicated, it is observed that the trend is to highlight the importance of training for agricultural entrepreneurship, the development of skills for management, marketing, business model, management of information technologies; and one that stands out is training in attention to gender, since some findings show the barriers faced by women entrepreneurs, such as sexual harassment, the double working day that involves caring for the family and the home, business challenges in male-dominated contexts and the conception of the role of women related to culture, to name a few.

The results of this research can be considered for the development of proposals for non-formal education or training based on the interests, needs, experiences, local knowledge, environmental factors, economic, cognitive and sociocultural condition of farmers.

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