

A model proposal for the technical assistance and rural extension service execution in Brazil

Uma proposta modelo para a execução do serviço de assistência técnica e extensão rural no Brasil

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ABSTRACT

This study presents a proposal for a model for execution of Technical Assistance and Rural Extension (TARE) services in Brazil, presenting a flow of actions through methodological tools. For this purpose, the study used a mixed methodological approach, that is, it used the principles of data triangulation, which comprised a survey of qualitative primary data and secondary quantitative data to prove the evidence. In other words, this study raised, from semi-structured interviews with specialists in the execution of TARE, the main methodological tools used in the execution of that service. Based on the terms most frequently cited by the interviewees, a search syntax developed to carry out a systematic review of the literature to theoretically prove the tools raised. As a result of the verification, it was possible to identify a model based on six main TARE execution tools: awareness, diagnosis, individual service, collective service, reference unit and program. This article has as its main contribution the offer of a model validated in the literature. Proposes to standardize a model for the design of TARE notices, and execution plans to contribute with the maximum efficiency in offering the service to the beneficiaries.

Keywords: technical assistance and rural extension, TARE, service execution model.

RESUMO

Este estudo apresenta uma proposta de modelo para execução de serviços de Assistência Técnica e Extensão Rural (TARE) no Brasil, apresentando um fluxo de ações através de ferramentas metodológicas. Para este fim, o estudo utilizou uma abordagem metodológica mista, ou seja, utilizou os princípios da triangulação de dados, que compreendeu um levantamento de dados primários qualitativos e dados quantitativos secundários para comprovar a evidência. Em outras palavras, este estudo levantou, a partir de entrevistas semi-estruturadas com especialistas na execução do TARE, as principais ferramentas metodológicas utilizadas na execução desse serviço. Com base nos termos mais frequentemente citados pelos entrevistados, foi desenvolvida uma sintaxe de busca para realizar uma revisão sistemática da literatura para provar teoricamente as ferramentas levantadas. Como resultado da verificação, foi possível identificar um modelo baseado em seis principais ferramentas de execução do TARE: sensibilização, diagnóstico, serviço individual, serviço coletivo, unidade de referência e programa. Este artigo tem como principal contribuição a oferta de um modelo validado na literatura. Propõe a padronização de um modelo para a concepção dos avisos TARE, e planos de execução para contribuir com a máxima eficiência na oferta do serviço aos beneficiários.

Palavras-chave: assistência técnica e extensão rural, TARE, modelo de execução de serviços.

1 INTRODUCTION

The Technical Assistance and Rural Extension service (TARE) can be conceptually defined as activities aimed at rural development, aiming to increase agricultural production and appreciation for the well-being of the families involved, with issues related to health, education, food and economic organization (Gonçalves et al., 2016; Zambra et al., 2018).

In Brazil, TARE services are present in most municipalities, constituting an important instrument of economic and social development (Alves, 2017). Furthermore, in the words of Dias (2007), rural extension is responsible for modernization in the field, as it qualifies field work in “standard” moulds, abandoning empirical techniques (Mendonça, 2010).

TARE service is also the link for many rural producers to access credit and food purchase programs, for example, as extension workers – those who perform the TARE service – are responsible for preparing and sending project proposals to public notices (Silva et al., 2014; Oliveira et al., 2017). Furthermore, through TARE services, it is

possible to contribute to the advancement of food and nutritional security for beneficiaries (Silva et al., 2014). Studies of the national policy of TARE – PNATER identified advances in assistance to family farmers based on the implementation of specific actions for this public (Pettan, 2010).

Therefore, the practice of technical assistance and rural extension, mainly aimed at the countryside, is an alternative in combating poverty and favouring sustainable development on the properties, by generating income and sharing knowledge, bringing economic advantages to the region (Dias, 2007 ; Kawai et al., 2015; Landini, 2015; Zambra et al., 2018; Rocha Junior et al., 2019).

After describing the benefits and impacts of TARE services, especially in Brazil, there is a debate about the ways of implementing TARE, also known as implementation methodologies (Mendonça, 2010). Execution methodologies include prior planning designed to guide the use of different tools, instruments, techniques, means, and procedures to achieve a certain purpose by offering the TARE service (Caporal & Costabeber, 2004).

Given the influence of the characteristics of the beneficiary location where the service is performed, which will determine the specificities and needs to be met (Baloch & Thapa, 2018), there is, consequently, a non-standardization in the use of these tools, that is, no there is a guide that determines the approach of the beneficiary, even if he is unique and has different influences and needs (Gonçalves et al., 2016; Zambra et al., 2018).

Due to this non-standardization of TARE execution and given the importance of the service in Brazilian territory, this article aims to propose a model for the execution of TARE services based on practical and theoretical evidence. In this sense, this research used a mixed-type methodology, that is, primary and qualitative data from interviews with specialists in the execution of TARE were used, together with a secondary quantitative survey that verified, through a systematic bibliometric review in the literature, the main TARE methodological tools discussed in published articles related to the studied area.

As a result, a proposed model resulting from data triangulation was obtained, which was encouraged considering the suggestions by Landini et al. (2017). Likewise,

no theoretical evidence was identified that combines tools and instruments for the execution of TARE services, characterizing a research gap.

In this scenario, the main contribution and innovation of this study is to offer a model for assembling public notices and project execution plans in TARE services, based on a selection of tools that were validated through interviews with specialists together with a theoretical survey. Furthermore, reading this manuscript allows for a greater understanding of the usual TARE service execution tools for the reader.

This article is structured in such a way as to include, in addition to this introduction, a theoretical framework that discusses the relationship between TARE services and the project management area; the methodology, which elucidates the data collection procedures in detail; the analysis and discussion of the results from the interviews and bibliometrics; the final considerations that portray the proposed model; and finally, the references used for the development of the study.

2 LITERATURE REVIEW

2.1 PROJECT MANAGEMENT IN TARE SERVICE

The first record of the implementation of the so-called Technical Assistance and Rural Extension service (TARE) dates back to the end of the 19th century and the beginning of the 20th century in Europe and the United States (Landini, 2015; Castro & Pereira, 2017). In Latin America, TARE had great North American influence and, specifically in Brazil, the service was created in 1948, in Minas Gerais (Castro & Pereira, 2017), and was marked by efforts aimed at the modernization of Brazilian agriculture (Oliveira, 1999; Milagres et al., 2018).

Still in Brazil, the implementation of TARE was also characterized by a context involving favouring the service in certain classes, harming producers with smaller productive properties (Diniz & Hespanhol, 2018). With that, based on discussions fostered given the need for democratization related to access to the service, there were mobilizations of social movements to directly benefit, with the TARE service, the public composed of family farmers (Milagres et al., 2018).

In this scenario of inequality, in the early 2000s, TARE was rethought and directed towards family farming, through the establishment of agreements between public and

private agencies to improve the quality of life in the countryside, bringing a more humanist face, as Alves points out. (2017).

Regarding Brazilian family farming, Kawai et al. (2015) elucidate that, due to the economic and social disparities experienced in the countryside, rural extension is based on educational principles, about instructions on agriculture, livestock, domestic economy and sustainability. Still, according to the authors, family farming is responsible for producing a large part of the food consumed in the country and, even so, family producers are the target of inequality in income distribution and lack public incentives aimed at their social inclusion.

In general, the provision of the TARE service in rural areas, according to Baloch and Thapa (2018), takes place according to the size of the property and the needs of the beneficiaries, as well as the inserted community and the environment lived by these farmers. Therefore, there is no single and standardized structure in the execution of the service. TARE, as known today, indicates that the actions of public rural extension services (from public, governmental or private entities) must be guided through participatory methodologies and external agents must play a role of facilitator of rural development processes. Thus, extensionist actions should prioritize endogenous potential, capturing local knowledge to encourage the use of resources that are more accessible to farmers.

Unlike conventional practice, structured to transfer technological packages, the TARE methodology requires an action that starts from the knowledge and analysis of agroecosystems and proposes alternatives based on principles that bring Agronomy closer to Ecology based on a holistic and systemic approach (Caporal & Costabeber, 2004).

In Brazil, in recent decades, there has been an unprecedented change in the way TARE is understood. It went from a concept centred on technology transfer to an approach that incorporates actions aimed at organizing farmers, managing participatory processes, supporting commercialization and inter-institutional articulation from a territorial perspective contextualized by a strong environmental concern and focus on family farming (Landini, 2015). As a result, there were changes regarding the methodologies for implementing the TARE service.

According to the agricultural census carried out in 2017 by the Brazilian Institute of Geography and Statistics (IBGE), family farming in Brazil is still responsible for

employing 10.1 million people and corresponds to 23% of the area of all agricultural establishments. For this population, rural extension applies in the scope of offering aid in the use of methods and techniques, an impacting factor for cultivation and contribution to the sustainable development of these regions (Kawai et al., 2015), since even with relevance in offering jobs, family farming has a low share in the total value of production and in the revenues of Brazilian agriculture, in addition to the fact that the lack of mechanization and low productivity make it difficult for these producers to access the market (Silva et al., 2014)

With the challenge of responding to the demands of this segment of society, it is necessary to use theories that improve the execution of TARE services. At a time when it is considered that TARE services are, conceptually, a project to be carried out together with the rural producer, it can be proposed that, to achieve greater efficiency in the execution of this service, it is necessary to have tools and methodological instruments derived from the literature that lead to the best results of the proposed service within conceptions of good project management practices (Turner & Müller, 2003). This is only possible if good project management is adopted, whether through public or private actions, which includes identifying needs, establishing clear and achievable objectives and balancing conflicting demands, considering the delivery of maximum quality, within a scope of time and cost (PMI, 2004).

Based on the concept of 'project management', the implementation of an TARE project must involve the program of knowledge, skills, tools, and techniques to the activities to be developed to meet its requirements (Kerzner, 2017). With this, the proposition of a model of execution of an TARE service fits in the theory of project management, aiming at the standardization of a structural model for the execution of its services, searching for the delivery of maximum efficiency and quality to the beneficiary, to that it develops, increases its productivity and market share and, consequently, contributes to the country's economic progress.

3 METHOD

From the objective of this work, which goes back to proposing a model for the execution of the TARE service, the methodological approach comprises a combination

of the mixed type. In other words, this research has a qualitative and a quantitative pillar, which classifies it as being descriptive.

The qualitative sphere encompassed four semi-structured interviews with Brazilian TARE specialists, who inform the implementation tools that are usually used in technical assistance and rural extension programs. From their analysis, six blocks of tools were detected. These interviews took place in October 2020 and lasted an average of thirty minutes.

According to Gil (2010), interviews are one of the ways to capture primary qualitative data, whose interviewer follows a set of structured or semi-structured questions, which are planned and applied equally to all respondents.

To verify the literary support of these six TARE service execution tools mentioned in the interviews, a systematic quantitative review of the literature was used, based on bibliometric protocols. Systematic reviews are characterized by the systematic nature of the search for the material to be analysed when establishing criteria and protocols (Prodanov & Freitas, 2013). When the systematic review uses bibliometrics, it makes use of indicators and metadata that provide depth in the analysis of scientific documents (Soares et al., 2018), from the rescue of material from large secondary databases (Prodanov & Freitas, 2013).

However, the first protocol of the systematic review advocates the establishment of research parameters, as suggested by Prodanov and Freitas (2013), such as the definition of keywords, databases, time frame, language, type of material, among other aspects described below, which allow the replication of the search and the arrival of the same result.

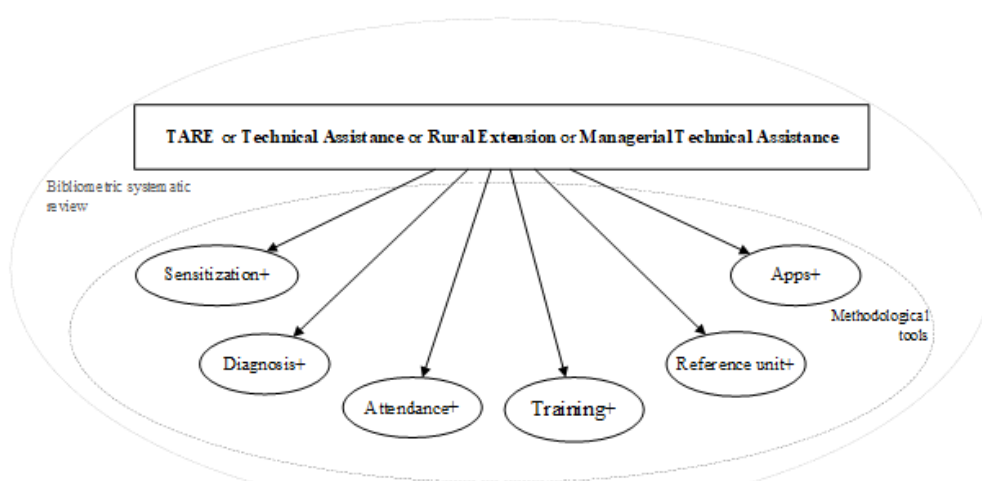
In this study, the search metrics were based on the terms mentioned by the interviewees, that is, by the TARE specialists. Thus, with the bibliometric procedure, it will be possible to identify whether the terms cited in the interviews are repeated and validated in the literature.

The interviews, in turn, allowed a more profound understanding of the terms to be sought to obtain the most considerable number of literary support possible. Furthermore, such terms were sought in the following languages: a) Portuguese (whose use of the

asterisk '*' was necessary to capture the grammatical inflection of the number of words – the plural), and b) English.

Figure 1 was created with the purpose of illustrating the process of defining the keywords, which represents the term 'TARE' as the great thematic umbrella, together with the methodological tools absorbed by the interviews. For each tool, technical synonyms were unfolded, which comprise TARE execution instruments.

Figure 1. Methodological tools and their use in systematic bibliometric review



Source: Created by the authors.

To summarize the selected keywords, the respective technical synonyms and the corresponding terms in English, Table 1 was created:

Table 1. Keywords

Methodological tools	Keywords
Sensitization	Sensitization
	Mobilization
	Call
Diagnosis	Diagnosis
	Data collect
	Protocol
	Evaluation

	Audit
	Inspection
	Systematization
Attendance	Attendance
	Technical visit*
	Advisory
Training	Training
	Multiplier unit*
	Workshop*
	Lecture*
	Course*
	Training
	Clinic
	Field day
Reference unit	Reference unit*
	Demonstrative unit*
	Pilot unit*
Apps	App or PAD
	Internet
	Digital
	Remote
	Virtual

Source: Created by the authors.

Soon after the definition of the search words, a syntax with Boolean operators was elaborated in Portuguese and English for the combination of terms. Terms in bold represent the methodological tools, and the breakdown of each tool comprises the instruments. Example in English:

((technical assistance) OR (rural extension) OR (TARE) OR (managerial technical assistance)) AND ((diagnosis) OR (data collect) OR (protocol) OR (evaluation) OR (audit*) OR (inspection) OR (systematization) OR (sensitization) OR (mobilization) OR (call) OR (reference unit*) OR (demonstrative unit*) OR (pilot unit*))*

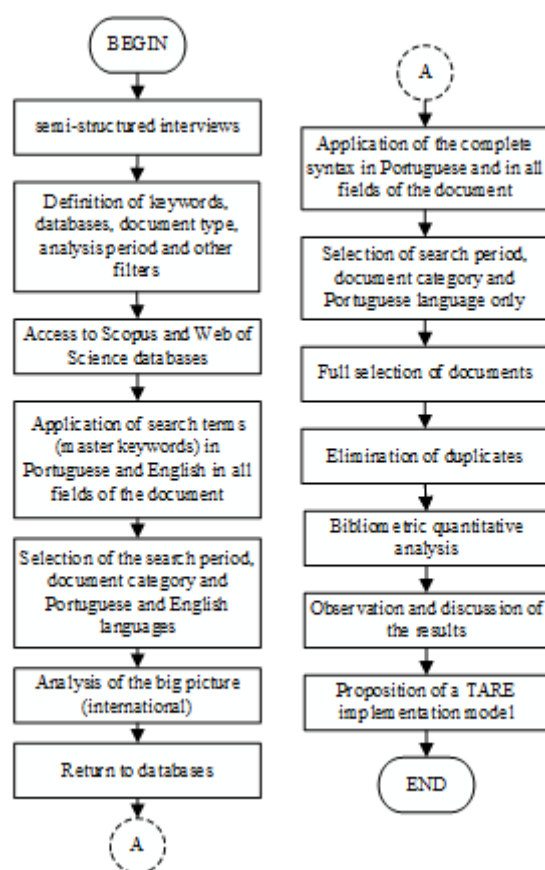
OR (attendance) OR (technical visit*) OR (advisory) OR (training) OR (multiplier unit*) OR (workshop*) OR (lecture*) OR (course*) OR (training*) OR (clinic) OR (field day) OR (app*) OR (PAD) OR (internet) OR (digital) OR (remote) OR (virtual))*

It is also noteworthy that for the analysis, only the publication of scientific articles in journals were considered, excluding, therefore, bibliographic notes, reviews, among other materials, prioritizing documents in which there is peer review. The investigations were carried out in September 2020, for convenience, and in two databases: Scopus and Web of Science. The choice of the two databases was since they are internationally known, index journals in different thematic areas and are widely used by researchers of different levels and academic backgrounds.

Furthermore, it should be noted that all areas of knowledge were used in the search, which included an investigation of all indexes in the text. In addition, the time frame covers documents published between 1990 and September 2020, since it configures the year of extinction of EMBRATER (Empresa Brasileira de Assistência Técnica e Extensão) and the migration to the former Ministry of Agriculture and Agrarian Reform.

Figure 2 displays a summary of the methodological steps for preparing the article:

Figure 2. Summary of methodological steps



Source: Created by the authors.

From the analysis of the flowchart (Figure 2), it is possible to observe that this study complies with the principles of data triangulation, as suggested by Gil (2010), since it used a combination of a qualitative and quantitative methodology to confirm evidence. The results of the interviews and the systematic review will be presented below.

4 RESULTS AND DISCUSSIONS

4.1 INTERVIEWS

As mentioned in the methodology section, this study interviewed four specialists in TARE, belonging to a renowned and private company that offers the service nationally and internationally. The main guiding question of the interview was: “What are the TARE service execution tools usually adopted in projects?”. Based on this question, an informal conversation was held to extract various information about such tools and possible

instruments for implementing the service. As a result, six main tools were identified and mentioned by the interviewees: i) awareness; ii) diagnosis; iii) individual assistance; iv) collective assistance; v) reference unit; and vi) program. All respondents have at least fifteen years of experience in performing the TARE service.

The first enforcement tool mentioned was 'awareness'. It could be understood that 'awareness' is a tool for presenting the set of activities that will be carried out within the design of the project to be executed. The creation of awareness may or may not be participatory, but its primary objective is to make the producer aware of the presence of those extension agents in the region and on his property for a period of time. It is also commonly called 'mobilization' or 'calling'.

The awareness-raising practice mentioned by the interviewees is commonly used in project management to align the interests of different stakeholders in relation to the project. In TARE projects, as well as in any process of aligning interests in a project, the sensitization phase has the principle of aligning expectations between TARE executing agents as well as the beneficiaries of this work (MAXIMILIANO, 2006).

The next step in awareness is called 'diagnosis'. By 'diagnosis' it was understood the action of collecting data to assess some information from the property and the rural producer that may or may not be correlated to some technical reference standard. From the diagnosis, the interviewees mentioned that it is possible to process data that allows evaluating and classifying the level of qualification of the diagnosed person. Other similar words include 'data collection', 'protocol', 'evaluation', 'audit', 'inspection' and 'systematization'. It was also mentioned that the diagnosis can serve as a reference for gauging the beginning of the TARE work, as well as it can be reapplied at the end of the period of the entire execution of the service for evaluating the evolution of indicators pre-established by the project.

The definition of diagnosis captured by the interviews is in parallel with the strategic planning technique used in the administration area about SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats), which establishes an analysis of the current scenario of the producer and the property to identify the internal strengths and weaknesses in the face of external opportunities and threats in the planning of a project (Daychouw,

2007). Furthermore, the diagnosis works as a kind of 'feedback' after the execution of the service.

After carrying out the survey and understanding the needs of the beneficiaries of the service, the assistance begins, which can be individual and collective. The 'individual service', as the name implies, is in loco or remote service, between the rural extension agent and the producer with his family. It is a service for and with the productive family unit, without the presence of other producers or agents outside the work. Also known as 'technical visits', 'advice' or 'training', whose service is customized according to the needs of each beneficiary.

'Collective service', on the other hand, concerns on-site or remote service with a group of producers and their families, so that there is a collective approach to subjects or themes addressed by extension workers. Furthermore, it was mentioned by one of the specialists that there are other approaches such as the multiplication of a shape or action in a property, named 'multiplying units', 'training', as well as by terms widely known in pedagogy such as 'workshop', 'lecture', 'course', 'training', 'clinic' and 'field day'.

The two shapes of assistance used in the provision of the TARE service are commonly used in marketing consultancies provided by companies that go to the client to provide advice and that also offer lectures and consultancy training (Kotler & Armstrong, 1998). In the rural environment, the practical participation of the producer during TARE is a way of promoting training and advice (Barbosa & Moura, 2013).

Parallel to the use of service tools, 'reference units', 'demonstrative units' or even 'pilot units' are elected. Through the interviews, it was understood that these are TARE tools used in specific cases in which one or more properties are chosen as a reference for some productive system or even for some technical, social or environmental activity. The choice requires pre-structuring at the beginning of the execution of field activities so that a unit is chosen that in fact represents or is a model to be followed by other producers in the region or in the work group.

The 'reference unit' tool is very similar to the benchmarking actions adopted by organizations which seek to evaluate themselves in relation to the competition, to seek the best management practices (Camp, 1989). In the field, 'benchmarking' refers to the

possibility of producers being able to improve their techniques and processes through a comparison with other producers determined as a 'reference'.

The last topic mentioned in the interviews, which also occurs in the midst of TARE service execution activities, is the 'program'. The interviewed professionals mentioned that with the growth of connectivity in the field, there is the use of digital tools, concentrated in the term 'program'. Such TARE tooling is being adopted gradually due to the direction of society with the more universal use of internet networks (Fabregas et al., 2019). With the interviews, it was also possible to list other terms used such as the 'internet' itself, 'digital', 'remote' and 'virtual'.

4.2 SYSTEMATIC BIBLIOMETRIC REVIEW

As previously mentioned, from the interviews, the search keywords for the preparation of the systematic review were listed and called in this study 'master keywords'. As illustrated in Figure 2, the bibliometric review implies a methodical search process. At first, the search was conducted in Portuguese and English using only the master keywords without association with the terms referring to the instruments of execution (as shown in Table 2) to obtain a panoramic and international view of the subject. For each search syntax (both in Portuguese and in English), it was possible to select, in both databases, the language of the documents.

Table 2. Master keyword search result summary: an overview

Master keyword	Language	Search period	Document type	Database	Result
(assistência técnica) OR (extensão rural) OR (ATER) OR (assistência técnica gerencial) OR (ATG)	Portuguese	1990 – September 2020	Article (with search in all fields)	Scopus	1.799
				Web of Science	297
	English			Scopus	25.134
				Web of Science	10.415
(technical assistance) OR (rural extension) OR (TARE) OR	Portuguese			Scopus	922
				Web of Science	235

(management technical assistance)	English			Scopus	97.741
				Web of Science	324.320
Total (in Portuguese, without elimination of duplicates)					3.253
Total (in English, without elimination of duplicates)					457.610
Grand total (without elimination of duplicates)					460.863

Source: Created by the authors.

By analysing Table 2, it is possible to conclude that there are hundreds of published articles dealing with the TARE service. In this sense, to carry out an analysis that was closer to the Brazilian context, it was subjectively chosen to choose documents arising from the search process whose syntax was in Portuguese and the language of the documents was also Portuguese. At the end of the refinement process, a total of 1,209 bibliographic records were selected for bibliometric analysis (Table 3).

Table 3. Summary of the complete results

Search syntax	Language	Database	Result	% of total
((assistência técnica) OR (extensão rural) OR (ATER) OR (assistência técnica gerencial) OR (ATG)) AND ((diagnóstico) OR (coleta de dados) OR (protocolo*) OR (avaliação) OR (auditoria*) OR (inspeção) OR (sensibilização) OR (mobilização) OR (chamamento) OR (unidade* de referência*) OR (unidade* demonstrativa*) OR (unidade* piloto) OR (atendimento*) OR (visita* técnica*) OR (assessoria) OR (capacitação) OR (unidade* multiplicadora*) OR (oficina*) OR (palestra*) OR (curso*) OR (treinamento*) OR (clínica) OR (dia de campo) OR (aplicativo*) OR (internet) OR (digital) OR (remoto) OR (virtual))	Portuguese	Scopus	1.178	65%
		Web of Science	31	10%
	English	Scopus	2.396	9%
		Web of Science	98	0,9%
((technical assistance) OR (rural extension) OR (TARE) OR (managerial technical assistance)) AND ((diagnosis) OR (data collect) OR (protocol*) OR (evaluation) OR (audit*) OR (inspection) OR (systematization) OR (sensitization) OR	Portuguese	Scopus	775	84%
		Web of Science	165	70%

(mobilization) OR (call) OR (reference unit*) OR (demonstrative unit*) OR (pilot unit*) OR (attendance*) OR (technical visit*) OR (advisory) OR (training) OR (multiplier unit*) OR (workshop*) OR (lecture*) OR (course*) OR (training*) OR (clinic) OR (field day) OR (app*) OR (internet) OR (digital) OR (remote) OR (virtual))	English	Scopus	92.388	94%
		Web of Science	185.823	57%
Grand total (without elimination of duplicates)			282.854	61%
Selected for bibliometric analysis			1.209	57%
Total after checking for duplicates			1.209	
Final sample for quantitative/bibliometric analysis			1.209	

Source: Created by the authors.

The bibliometric procedure was used to verify in the literature whether there is adherence of the published works with the procedures understood from the interviews. The systematic bibliometric review, in turn, has several indicators that assess the performance of scientific production. As an example, there is Zipf's Law, which investigates the frequency distributions of the vocabulary of texts in a given topic/area (Soares et al., 2018).

Based on Zipf's Law, the most frequent keywords were evaluated with a sample of 1,209 captured articles. This analysis was carried out with the aim of illustrating the frequency of vocabulary that appeared in the interviews and that reported in the articles. Table 4 presents the occurrence of relevant terms in the search, which were identified in the full index of the article's content thanks to the VosViewer software.

Table 4. Keywords frequency

Methodological tools	Keywords	Currency
Sensitization	Sensitization	8
	Mobilization	5
	Call	2
Diagnosis	Diagnosis	44
	Data collect	25
	Protocol	28

	Evaluation	119
	Audit	2
	Inspection	4
	Systematization	4
Attendance	Attendance	9
	Technical visit*	9
	Advisory	2
Training	Training	11
	Multiplier unit*	1
	Workshop*	4
	Lecture*	28
	Course*	24
	Training	44
	Clinic	11
	Field day	87
Reference unit	Reference unit*	20
	Demonstrative unit*	1
	Pilot unit*	3
Apps	App or PAD	4
	Internet	9
	Digital	1
	Remote	1
	Virtual	2

Source: Created by the authors.

It can be seen from Table 4 that the vast majority of the works surveyed refer to the diagnostic tools and collective care in TARE, especially regarding the synonyms proposed in the interviews for the composition of the search syntax: diagnosis, data collection, protocol, evaluation, reference unit, lecture, course, training, and field day.

To illustrate the connection between the keywords searched in the general index of the documents, a network was created using the VosViewer software (Figure 3). From the figure, “evaluation” is the term that appears most in the content of the articles, having

It was observed in the literature that the needs of the program of the TARE service vary according to the demand of the rural producer and, therefore, the methodologies of execution of the service are personalized (Caporal & Costabeber, 2004; Baloch & Thapa, 2018; Rocha Junior et al ., 2019). From the data collected by this bibliometric review, a set of methods extracted from the practical dimension of the theme was identified, given that interviews were conducted with specialists in TARE from Brazilian institutions, which are also widely studied by the Brazilian scientific sphere.

In general, it could be observed that many studies in the area raise one or more tools and/or methodological instruments pointed out in the study. In addition, it was possible to verify that 61% of the reviewed materials include such methodological tools similar to those detected by the interviews with the specialists.

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be said that this implies greater importance; b) on the other hand, the 'program' tool does not have a large volume of published works; however, this is a new concept that is still being studied by the world scientific body in TARE (Fabregas et al., 2019); and c) it can be considered that the approach methodology in technical assistance, rural extension that include tools raised in the study can be considered as a basis for the elaboration of projects in the area. Therefore, it is understood that TARE projects should comprise the following elements: a) awareness; b) diagnosis; c) individual consultations; d) collective services; e) reference units; and f) program.

5 CONCLUSIONS

Given the importance and impacts of technical assistance and rural extension, focusing on the Brazilian territory, this study aimed to start from an inductive reasoning for the proposition of a model for the execution of the TARE service. For that, a mixed methodology based on the precepts of data triangulation was used. In other words, interviews were carried out with specialists in the implementation of the TARE service and theoretical evidence was sought in the literature, through a systematic bibliometric review, that would prove the methodological tools mentioned by the interviewed professionals.

With this methodological approach, it was possible to prove and validate that there are six main tools usually used in TARE programs in the practical and theoretical sphere: i) awareness; ii) diagnosis; iii) individual assistance; iv) collective assistance; v) reference unit; and vi) program. With that, this study can contribute with the proposition of a model that configures the stages of the use of the six tools indicated as being relevant for a TARE service to be more efficient in terms of performance.

Figure 4 demonstrates a proposed model for executing services in TARE. The process starts with 'raising awareness' of the project to beneficiaries and other stakeholders. This tool can use instruments of 'mobilization' and 'calls' either via the internet through the dissemination of public notices or even in person through extension agents. Once this is done, the next step must correspond to carrying out the initial 'diagnosis' of the property. The diagnosis must rely on the use of instruments, such as questionnaires, for example, for data collection, to carry out a kind of evaluation, audit, or inspection of the beneficiary systematically. At the end of the program of these first two tools, it is

suggested to prepare a report formatted as an action plan for the implementation of the other tools.

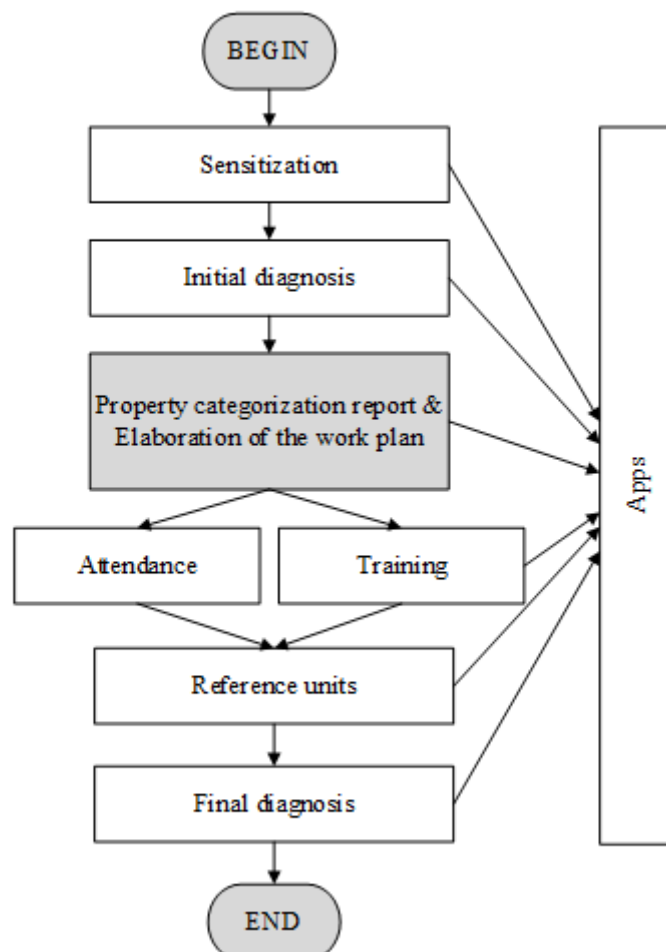
Based on the report, which should summarize the beneficiaries' needs and expectations, collective and individual service plans can be planned by extension workers and service providers within a scope that covers the skills of service providers and the implementation schedule. from the project. The assistance should take place in the shape of a technical visit to the field and promote lectures, courses and training, especially as suggested by the results of bibliometrics.

At the end of the consultations, an evaluation of the beneficiaries with the best performance during the project schedule must be carried out with the purpose of electing the 'reference units', that is, the producers that obtained the best performance, so that the other beneficiaries can base themselves on practices and strategies that generate satisfactory results.

Then, after the completion of the services, the 'diagnosis' tool must be summarized to assess the evolution of the project in each property, as a kind of feedback regarding the expectations outlined and the results achieved by the beneficiaries. This step should repeat the data collection to assess the beneficiary's development with the TARE services, as reinforced in the literature by showing that the evaluation step is one of the most significant (according to Figure 3).

As for the 'program', their use can be coupled during all stages of the execution of the TARE service, to speed up communication, service, measurement of performance and results of beneficiaries.

Figure 4. Model proposal for the execution of the TARE service



Source: Created by the authors.

Thus, it is possible to state that the objective of the study was achieved. As a result, we arrived at a model for implementing the TARE service that is supported by practical and theoretical evidence. In addition, an overview of the TARE theme related to the methodologies for implementing the service at the national and international levels was provided, as shown in Tables 2 and 3. With this, the methodological tools raised here can be used to build execution plans of TARE at national and international level, as this study provides scientificity for the construction of projects both public and private, by using the principle of data triangulation.

Furthermore, the results referring to the TARE tools do not focus on performance strictly in the rural environment and, therefore, the proposed model can be applied in

other perspectives involving technical assistance and rural extension. Likewise, the resulting model can even serve as an integral basis for planning TARE projects, since no scientific work was found in the literature review that systematizes the use of these tools as a kind of execution 'manual' of the service. It is perceived that tools must be provided to a group of professionals, in this case extension workers, to facilitate their work. Personalized models of action by extension workers with producers are not unworthy of, however, the existence of one or more models is necessary for those who seek structured models, validated in research, such as the one presented in this article.

Despite the zeal and rigour with the development of the research, this study requires limitations that must be presented. Although there is no commitment to the elaboration of the TARE execution model, the interviews carried out focused on Brazilian specialists, whose aforementioned execution tools have cultural, political and geographic influences. Regarding the bibliometric systematic review, the parameters adopted were based on interviews and, therefore, may not have encompassed all the aforementioned instruments. Likewise, the other search parameters, which involve language and time frame, were subjectively defined, as well as only two databases were used and, therefore, works published in journals not indexed in Scopus and on the Web of Science.

Based on the above limitations, future research can fill in the gaps pointed out, as well as update this work, to expand the scope of interviews with a greater volume of professionals together with rural producers benefiting from TARE to verify which tools are more efficient and effective. , consequently, search for a broader literary support to complement the proposed execution model. A suggestion for the practical use of this study would be, in addition, to apply the theoretical model and observe its efficiency in TARE projects.

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