

Theoretical attributes in research on innovation in services

Atributos teóricos em pesquisas sobre inovação em serviços

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ABSTRACT

This study aimed to perform a critical-epistemological analysis of the Brazilian scientific production on innovation in services, based on theoretical characteristics outlined in Bruyne, Herman and Schoutheete (1977) model. It was verified the adequacy of the theoretical construction, as to its ability to adequately describe the object of study in a coherent and systematized way, making possible an intelligible construction of the researched phenomenon. It was recorded that the articles are mostly flawed in presenting theoretical constructions that support the hypotheses or that make it possible to predict the consequences of the tests. There were also difficulties in articulating definitions and variables studied, given the lack of appreciation of the construction of the conceptual frameworks. However, the theoretical framework of the articles presented, in most studies, consistency and homogeneity of concepts, presenting coherent and articulated propositions. An appropriate interaction between the theoretical pole and the other research poles according to the applied critical model was noted. As for the theoretical positions, there was a tendency to use the integrative approach. Although the thematic service innovation is gaining its own space in the field of applied social sciences, it is necessary the continuity in the studies in this field in order to construct own definitions and to construct instruments adapted to the subject.

KEYWORDS: Epistemology; Innovation in Services; Theoretical Attributes in Research.

RESUMO

Este estudo tratou de realizar análise crítico-epistemológica da produção científica brasileira sobre inovação em serviços, baseando-se em características teóricas delineadas em modelo de Bruyne, Herman e Schoutheete (1977). Foi verificada adequação da construção teórica, quanto à sua capacidade de descrever adequadamente o objeto de estudo de forma coerente e sistematizada, possibilitando construção inteligível do fenômeno pesquisado. Registrou-se que os artigos, em sua maioria, são falhos em apresentar construção teórica que fundamente as hipóteses ou que possibilite predizer as consequências dos testes. Perceberam-se ainda dificuldades em articular definições e variáveis estudadas, dada a não apreciação da construção dos quadros conceituais. O arcabouço teórico dos artigos apresentou, contudo, na maior parte dos estudos, consistência e homogeneidade de conceitos, apresentando proposições coerentes e articuladas. Anotou-se adequada interação entre o polo teórico e os demais polos de pesquisa consoante o modelo crítico aplicado. Quanto às posturas teóricas, verificou-se tendência ao uso da abordagem integradora. Ainda que a temática inovação de serviços esteja ganhando espaço próprio no campo das ciências sociais aplicadas, é necessária a continuidade nos estudos nesse campo a fim de construir definições próprias e construir instrumentos adequados ao tema.

PALAVRAS-CHAVES: Epistemologia; Inovação em Serviços; Atributos Teóricos em Pesquisas.

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1 INTRODUCTION

Innovation in services is cross-cutting issue in research in the area of administration, with plural and multifaceted concept that is gaining prominence as a result of the growing role of services in economic development and in productivity (Mazza et al., 2015).

According to Mazza et al. (2015), until the early 1990s, the services have been excluded from economic analysis, being considered peripheral, marginal and unproductive. Given the current production paradigm, which consolidated the services economy, issues associated with the research of innovation in services have achieved in space science agenda, requiring the construction of indicators able to diagnose such innovation in your plurality of trajectories (Sesay, Maturan, & Amorim, 2015).

The theory is the reference point for the observation of the facts. It must be established properly, whereas the epistemological principles of economy and negligence ability, avoiding the dataism (Bunge, 1980). The theory must be drafted in such a way as to provide a framework for formulation and explanation appropriate to the phenomenon studied, enabling the construction of scientific.

In addition, the dynamics of the theory as a methodological practice, can be described as a result of the interaction between the poles of research, whereas epistemological theory view of the pole is a significant number pertaining to a problematic, for which It presents a valid solution; in the face of the morphological theory pole is a relevant and coherent set of propositions that provides an explanatory framework of the phenomenon; and in the face of technical pole theory is a set of falsified hypotheses and testable (Bruyne, Herman, & Schoutheete, 1977).

There is a need for a conceptual alignment and precise definition of the theoretical bases and analysis models, mainly with regard to constructs that make up the theme of innovation in services (Mazza et al., 2015). For these authors, the literature on the topic is in transition, and the definition of services and the innovation are unclear concepts and miscellaneous, compromising the building of appropriate measurement instruments.

Rodrigues (2001) states that a society is aware of itself when it becomes aware of your knowledge and that it is necessary for society to know what it produces in terms of knowledge, since the relations of domination and subordination are anchored in the level of knowledge that a society has.

Register this way the importance of studying the production of scientific knowledge on innovation in services, whereas reduced production and lack of conceptual alignment on the matter, despite the importance of this social phenomenon for economic development

It is also highlighted that epistemology in social sciences is a recent discipline and are under construction, whose limits are floating research field and there is no agreement as to the nature of the problems must address in the study of scientific knowledge on Administrative Sciences (Japiassu, 1992).

Japiassu (1992) points out that although such terminology etymologically sound old, only appeared in the philosophical vocabulary in the 19th century. Reinforces that same part of epistemology philosophical old speeches, she would find in its principles and philosophy in science your object, and, at the same time, look for its functions, its methods and its contents out of reflection philosophical.

Thus, the greatest dedication to epistemological studies, aiming to analyze critically the construction of scientific knowledge will contribute to clarify the ways of research on given subject, in this case, innovation in services.

Bruyne et al. (1977), offers epistemological approach model of social sciences from the definition poles of methodological practice: Theoretical, Morphological, Technical and Epistemological, emphasizing that the progress of research and theoretical elaboration are parallel and inseparable elements. To the authors, the theory, as a way of building scientific knowledge is a necessary condition for the rupture with the pre-scientific explanations of the social.

Theóphilo and Iudícibus (2009) in a research that performs critical-epistemological analysis of the scientific production in accounting in Brazil, present the model of Bruyne et al. (1977), characterizing the theoretical pole as guiding the definition of the hypotheses and the construction of the concepts,

being the place where the scientific language is elaborated, determining the movement of conceptualization

Bruyne et al. (1977, p. 106) highlight that "if the theory works, after all, it is pertinent to a particular structure of reality that can only be knowable as effect of the application of the theory". From this statement, it is revealed the importance of the foundation and elaboration of the theoretical reference on which the scientific production is made.

Faced with the importance of the theoretical pole in the construction of scientific knowledge and its articulation inseparable from other epistemological poles, this study focuses on the scientific production on the thematic innovation in services published in the scientific events EnANPAD of Symposium on Management of Technological Innovation, versions 2015 and 2016 and has the objective of **performing a critical-epistemological analysis of the scientific production on innovation in services, based on the theoretical attributes used in the research.**

For Bruyne et al. (1977) is the theoretical pole where they propose rules of interpretation of the facts, and specification of the definition provisionally given solutions to problems.

This work intends to provide a critical-methodological study, so that researchers can be attentive to the nature of the knowledge generated in this field of administrative research, through critical reflection on the knowledge produced from the theoretical formulation developed in the scientific production considered.

Thus, it is important to emphasize that the object of the analysis of this work is not of theoretical contribution to the objectified subject, but of critical epistemological evaluation of the use, appropriate or not, of concepts and theories in the construction of the objects of research on innovation in services; such as the analysis carried out by Martins (1997), whose object is the construction of the research in administration, under epistemological perspective, as well as the criticism effected by Theóphilo and Iudícibus (2009), contemplating critical-epistemological analysis on the research process in accounting in Brazil.

Such analysis will be carried out with a focus on the sections summary, introduction and theoretical articles without, of course, dispense with prior examination of the complete article, from documentary collection on national scientific production published in the events XXXIX and XL EnANPAD - Organizational Dynamics Meeting of the National Association of Graduate Studies and Research in Administration and XXIX Symposium Management of Technological Innovation.

2 SCIENTIFIC KNOWLEDGE AND FOUR-POLE MODEL IN SOCIAL SCIENCES

Sagan (2006) States that science allows us to wait for the next improvement of learning and of our understanding of reality. For this scientist science can be conceived as a way of thinking, that is, ability to understand reality critically; as an attempt to see the world, to control things, to have mastery over ourselves, and as a source of spirituality, since the Act of understanding is an act of Union, of incorporation to nature, even in the cosmic sense. By this author, science is considered democratic because it does not establish forbidden questions or sacred truths, allows the skeptical examination of all ideas and has built-in mechanisms of errors corrections.

Knowledge is validated by a scientific community, or epistemological community through intersubjectivity, which Morin (2005) defines the "rules of the game", that is, defines what is and is not scientific knowledge from the principles of objectivity (science based in scientific fact), verifiability (establishes that theories need to be verifiable, testable) and Falsifiability (theory cannot be proven forever).

Epistemology can be defined as speech about science (etymological meaning); philosophy of science and critical study of the principles, case and the results of the various sciences. And it has a objectify: the science.

According to Japiassu (1992), the objective, function or purpose of epistemology are: a) general problem resolution of the relationship between science and philosophy; b) evidencing the means of scientific knowledge; c) elucidation of the objects to which such skills apply; d) foundation of validity of this knowledge; and positive knowledge discovery; f) execution of scientific knowledge object of

judgment; g) determination of the origin of logic, your value and your achievement of objectives; h) situate the place of scientific knowledge within the domain of knowledge; I) establish the limits of scientific knowledge and j) get the nature of science. In this traditional perspective, science would be "only" a pretext for philosophizing.

According to Bruyne et al. (1977) epistemology is the field of scientific knowledge that has reached a certain degree of objectivity recognized in four states: theory, epistemological reflection, methodology, and research techniques. This field is designed with the articulation between the different poles that determine a space in which the research is presented subject to certain streams and internal requirements (Bruyne et al., 1977).

These four poles - epistemological, theoretical, morphological and technical - assure the scientificity of research practices, providing the development of the epistemic field. As support for this research, the theoretical pole is used. According to Bruyne et al. (1977), the theory is immanent to all pertinent observation, being a necessary condition for the rupture with the pre-scientific explanations of the social. Thus, for the author, the progress of research and that of theoretical elaboration are not only parallel but inseparable. The same authors (p.27) propose a general methodology "capable of establishing bridges between the various disciplines, since the methods are sufficiently general instruments to be common to all sciences or to a sufficiently important part of them." The method of quadripolar research conceived by the authors constitutes the most appropriate and recommendable method in the field of human and social sciences (Silva & Ribeiro, 2009).

2.1 Theoretical pole

The pole in the elaboration of theoretical instruments of measurement focuses on the question of theory must substantiate any scientific endeavor, in case the explanation of the theory on construct or object for which you want to develop a measuring instrument, as well as the operationalizing the construct in items (Pasquali, 1998).

The theory is understood as a set of analytical tools of reality constructed abstract giving birth several models or bodies of formalized propositions. A template consists of a heuristic form drawn up in order to offer a particular interpretation of the theory (Lenoir, 2006).

In this way, the author presents the various models, differentiated by your formal construction, must rely on theoretical bases (General laws, regulatory rules) and that have fundamental conceptual relations.

This pole explains the latent trait theory, as well as the types, categories, behaviors that constitute an adequate representation of the same trait. Theoretical procedures shall be drawn up for each instrument, depending on the existing literature about the construct which the instrument is intended to measure (Pasquali, 1998).

The notion of model can be taken as a synonym of theory, epistemological approaches traditional function, being seen as an ideal frame to achieve, translating an idealization of reality concerned by different moral values, cultural, political, economic, etc. (Lenoir, 2006).

Machado, Matos, Sanchez, and Baptista (2016) assert that there is a constant need for construction and reconstruction in the theoretical scope in the conduct of research, as the prior or isolated theorizing could prove insufficient for the justification and characterization of social phenomena.

The lack of solid theories on a construct should not be an excuse to get away from all the theoretical speculation about him. It must raise at least, all the empirical evidence about the construct and browse systemize it and thus reach a mini theory about it, which can lead to the drafting of a measuring instrument for such a construct (Pasquali, 1998).

It is relevant to highlight the importance of theoretical construction in the scientific process, avoiding producing unquestioned knowledge, through the tendency to use information that we are accustomed to use more frequently, without questioning them.

The epistemological obstacle, characterized by the culture of repetition, should be avoided. We must instead build a culture of scientific production in a state of permanent mobilization, replacing closed and static knowledge. Through a theoretical construction aimed at a dynamic and open

knowledge, the researcher can move away from the epistemological obstacles raised by Bachelard (1996).

In the theoretical pole the predominant rationality of the person that knows (relates and conforms with) the object, as well as the respective postulation of laws, formulation of operative concepts, hypotheses and theories (plan of the discovery) and subsequent verification or refutation of the elaborated "theoretical context" (test plan). This pole supports the technical and instrumental component and gives meaning to the explanation of results that consubstantiates the morphological pole (Ribeiro, 2011).

The process of theorizing leads the working hypotheses, possible theoretical solutions to scientific problems presented proposals (Johnson & Onwuegbuzie, 2004; Lenoir, 2006). According to Silva and Ribeiro (2009), the theoretical pole contributes directly to formulate hypotheses and consolidate theories, because without it, the scientific resolution of any problem is blocked or severely distorted.

Theóphilo and Iudícibus (2009, p.2), regarding the theoretical pole, emphasize that:

The theoretical pole orients the definition of hypotheses and construction of concepts. Is the place of preparation of scientific languages, determines the movement of the concept. It comprises aspects such as theoretical approaches, theoretical positions, scientific development programs etc.

As to the function of the theory, Bruyne et al. (1977) argue that it is conceived as an integral part of the methodology of the scientific research process, being the "most powerful instrument of epistemological rupture" in the face of common sense, as it allows the construction of a systematic and body as of statements and language in order to capture what we call world, since they are reference points for observation of the facts. In order to understand the connection between theory and object of research, they affirm that the theory enables the researcher to understand the placed reality, since it still has the function of formulating the object of investigation.

However the researcher should avoid what Bunge (1980) names as dataism, namely a simple accumulation of information/data, since the theory only works if it's pertinent to a particular real structure, that are only understood the effect of the application of the theory.

Reinforce that the theory does not makes this construction of what we understand of the real, but allows the researcher compiling your research question.

With regard to joint theory and hypothesis formulation, Bruyne et al. (1977) emphasize that the theory also has the function of forming the basis of the hypotheses, because it is through the theoretical construction that it is possible to better understand the object or phenomenon researched.

From this better understanding of the object or phenomenon researched, provided by the theorizing, it is possible to predict by derivation the testable consequences of a body of hypotheses (Bruyne et al., 1977).

The theory also makes it possible to make the connections between the context of the proof, that is, the context in which we raise the question of whether we accept or reject hypotheses derived from theories with the context of discovery, the one in which we ask how we construct our hypotheses and theories Bruyne et al., 1977).

The formulation of Semantics and Theoretical Syntax is ordered in terms of propositions of "systematic bodies of hypotheses" (Bruyne et al., 1977, p.110).

The theoretical system includes the conceptual aspect that refers to the phenomenon (semantic level) and the aspect related to the articulation of the concepts (syntactic level), which are considered, by Bruyne et al., (1977, p. 110), "inextricable" instead, concepts related to the understanding of the object or phenomenon of research must be presented in an articulated and logical way, allowing to give meaning to a theory and that develops through the articulation of concepts in coherent and testable hypotheses.

Then, in the Theoretical System, two fundamental aspects stand out: a) the aspect of explicitness, or semantic aspect, that includes the concepts that will be articulated in the theoretical construction to explain reality, manifesting the dependence of a theory on a problematic and, b) the aspect of

formulation, that is, a syntactic aspect, which consists of concatenation, a coalition of all propositions in an articulated and non-contradictory body (Bruyne et al., 1977, p. 110).

In this understanding, the formulation (aspect of formulation) should be consistent so that it is deleted by the researcher, as it is included, avoiding giving the trial by presenting conflicting fundamental concepts inconsistency and not concatenated to each other (Bruyne et al., 1977, p. 110).

These authors highlight that the dynamics of the theory as a methodological practice, can be described as a result of the interaction between poles of research, because: a) vis-à-vis the epistemological pole theory is relevant to issues of research, because it presents a valid solution for this; b) vis-à-vis the morphological, polo by providing a comprehensive explanatory framework, through a coherent set of propositions and c) vis-à-vis the technical polo, because the theory is a set of falsified hypotheses and testable.

The prevalent rationality of the relationship between subject and object is in theoretical pole, which deals with the application of laws, formulation of operating concepts, hypotheses and theories, pointing to subsequent verification or refutation yet of the theoretical context elaborate. In this way, the theoretical pole supports the components used in the explanation of results, underscoring the morphological pole (Silva & Ribeiro, 2009).

3 PROPOSAL OF STUDY

Bruyne et al. (1977) highlights the contribution of epistemology in the research process, in their two functions: a) the epistemology as intra-science, represented by the epistemological pole that is intrinsic to the scientific research and (b)) the epistemology as meta-science, understood as a reflection on the principles, fundamentals and validity of the science. This reflection, or "reflexive monitoring" has internal focusing on its procedures and its results, which must be held by own scientists is considered by the authors the only way to respect the character constantly open from science.

This work, by means of the function of epistemology as meta-science, focused on performing reflection on the principles, fundamentals and validity of scientific production of innovation in services, whereas the theoretical system used by researchers in search of the real object construction, the construction of the problem, hypothesis (context and context of discovery), explanatory framework reference operations on the objects of investigation.

For this, the recommendations of Bardin (2011) were followed for content analysis, since the subtlety of the method seeks to meet the objectives of overcoming the uncertainty and enrichment of reading, through the discovery of contents and structures that confirm the purpose of the messages as well as the clarification of elements of which no understanding was possible. The author argues that content analysis calls for laborious investigative tools of documents, not saying "to the illusion of the transparency of social facts," trying to remove the dangers of spontaneous understanding, corroborating from Durkheim to Bordieu and Bachelard (Bardin, 2011)

According to Bardin (2011), content analysis should be organized around three chronological poles: pre-analysis, material exploration and treatment of results, inference and interpretation. According to its recommendations, the pre-analysis covered three missions:

- Choice of documents to be submitted for analysis: scientific production on the theme of innovation in services since it became a topic of interest in national events;
- Formulation of the objective: to perform a critical analysis of the object of study based on the theoretical pole of scientific epistemology;
- Elaboration of indicators that support the final interpretation: through the analysis framework.

In order to delineate the study object of this article, we have clarified that all articles published on the theme Innovation in services at ANPAD events: EnANPAD and Symposium on Management of Technological Innovation from 2015 on, thematic was included as a priority theme of the same.

To outlining the subject of this article, we clarify that we analyzed all published articles about us events services innovation theme ANPAD: EnANPAD and Symposium Technological Innovation Management from 2015, as the theme was included as a priority theme.

The two events are organized by the National Association of Postgraduate and Research in Administration (ANPAD), an organization that develops work in the promotion of teaching, research and production of knowledge within the field of administration, accounting and related sciences. Founded in 1976, it is considered the main organ of interaction between associated programs, research groups and the international community (National Association of Postgraduate and Research in Administration [ANPAD], 2016).

The ANPAD has academic divisions that bring together various topics of scientific interest in order to incite the most diverse discussions on topics pertinent to the field of study supported by the association. The theme of Innovation in Services includes studies related to public, private, mixed or third sector organizations. Innovations in education, health, transportation, security, entertainment, financial services, among others, are addressed. Also discussed are models, processes and tools for managing innovation in services, skills and capabilities in service innovation and the expansion and diversification of emerging technologies in the services market.

The academic divisions that bring together ANPAD has various topics of scientific interest in order to incite the most diverse discussions about topics relevant to the field of study supported by the Association. The theme of Innovation in Services interest includes studies related to public, private, mixed or third sector, being covered innovations in education, health services, transport, security, entertainment, financial, between others. Also, they discussed models, processes and management tools of innovation in services, skills and capabilities in innovation in services and expansion and diversification of emerging technologies in the market of services.

The EnANPAD event was in its 40th edition in 2016, the second year in which it addresses the theme innovation in services within the area of Science, Technology and Innovation Management. The Symposium on the Management of Technological Innovation held its 29th meeting in the same year, being the first time that it specifically addresses this theme.

The database is composed of 24 articles, of which 11 are published in the 2015 edition of EnANPAD, when the subject became part of the event's interest and 8 articles were published in the annals of the event in 2016. The remaining 5 articles were published in the annals of the Technological Innovation Management Symposium.

Considering all the articles, 7 were excluded from the analysis, for the following reasons: a) one article not available in the database; b) one article that does not deal with the theme of innovation in services; c) one bibliometric article; d) four articles characterized as theoretical essay or bibliographical survey. In this way, 17 articles are the object of this research.

The events were selected, considering the possibility of contributing to the authors, regarding the epistemological revision, in the development of aspects of the construction of scientific knowledge, aiming at the perspective of subsequent definitive publications in periodicals.

With the objective of obtaining the stage of development of scientific production about innovation in services, from an epistemological analysis, more specifically focused on the theoretical pole, this article proposes the following objective: to perform a critical analysis of the scientific production on innovation in services based on the theoretical pole of the research epistemology.

After the pre-analysis stage, the material was explored through manually applied procedures, through coding and enumeration of the data. Still following the recommendations of Bardin (2011), the content analysis used in this research used the technique of analysis of answers to open questions. It was a question of examining the answers to an inquiry made by the authors in order to critically analyze the scientific production on innovation in services, based on the theoretical pole of research epistemology.

From the reading of the texts it was possible to relate articles in different categories, such as the frame of reference in which the research fits and the categorization of innovation from the perspective of Gallouj and Toivenen (2011), as well as to analyze the presence or absence of constructs necessary

to support the theory used in research to the four epistemological theorist. For this purpose, the analytical framework (Bardin, 2011, p.72) was elaborated to facilitate the assessment of the data.

The papers were analyzed in their entirety, with emphasis on the sections: abstract, introduction and theoretical reference. In order to understand the coherence with which the theoretical attributes of research were treated, a reference framework with four categories for framing the articles was drawn, based on the conceptual framework on the characteristics of the theoretical pole, as proposed by Bruyne et al. (1977), derived from his quadripolar epistemological study model, as indicated in Figure 1.

The works were analyzed in full, with an emphasis on sections: overview, introduction and theoretical framework. For understanding the consistency with which they were dealt with the theoretical attributes of research was delineated with reference to framework four categories of items, from the conceptual framework on features of Polos theoretical, in the form proposed by Bruyne et al. (1977), derived from your epistemological study four-pole model, as shown in Figure 1.

Theoretical support	Questioning drivers
Connection between theory and research object	
"The theory does not formulate only what we know, but (...) gives us the question I seek "(p. 102)	Is the theory based on the research question?
"Theories are reference points for observation of the facts" (p. 102)	Is the theory a reference for analysis of facts/phenomena analyzed?
"Rejection of the Dataism (accumulation of sparse knowledge on theoretical frameworks weakly organized)" (p. 104)	Are the theories coherent and presented in a systematized manner, seeking to comply with the epistemological principle of economics and neglect?
"If the theory works, is because, after all, it is pertinent to a particular structure of reality that can only be cognizable as effect of the application of the theory" "Theory as a formulation of the researched object"	Does the theory provides a better understanding of the object/phenomenon researched?
Articulation theory and formulation of hypothesis	
"The body of assumptions forms the basis of the theory" (p. 102)	Is the theory elaborated in order to provide justification/alignment the hypotheses presented?
"The theory must make calls between the contexts of the evidence and discovery" Proves - "context is one in which we raise the question of whether we accept or reject hypotheses and theories" Context of Discovery – "is one in which we ask how we build our assumptions and our theories "(p. 107-109)	Are identifies relationship/linkages between the contexts of evidence and discovery?
"The purpose of theorizing is "prediction for derivation of testable consequences of a chance "(p. 109)	Does the theory allow you to predict the consequences of the tests?
Theoretical syntax and semantics	
"Semantic Aspect (explanation)-significant aspect of theoretical systems involves concepts" (p. 110)	Are there semantic consistency and uniformity in the concepts presented?
"Conceptual explanation manifests itself to depend on every theory for its problematic" (p.110)	Is the semantic aspect of the theory complete as to the variables presented on problematic?
"The conceptual explication manifests in some way the material unity of theory permitting referential operations on its objects of investigation" (113)	Does the theory enable referential operations on the objects/phenomena investigated?
Synthetic Aspect (formulation) - "concatenation, coalition of all theoretical propositions an articulated and non-contradictory body" (p 111)	Does the theories present propositions concatenated, coherent and articulated, without presentation of contradiction?
Interaction between poles of research	
"Faced with the epistemological pole, theory is a set pertinent to a problematic of which it presents a valid solution" (114)	Is the theory relevant in relation to problematic? Can the theory present a valid solution to the problem of research presented?

"Faced with the morphological pole, theory is a coherent set of propositions that provides a comprehensive explanatory framework" (p.144)	Is the theory successful as an explanatory framework for understanding?
"Faced with the technical pole, theory is a set of falsifiable, testable hypotheses" (114)	Does the theory provide to research a joint of falsifiable, testable hypotheses?

Figure 1 – Theoretical Pole Category Reference
Source: Prepared by the authors based on Bruyne et al., 1977.

The third step, which deals with the interpretation of the results obtained, made it possible to meet the goal of research to analyze critically the theoretical scientific production Pole on the theme innovation in services.

For analysis of the data was used Microsoft Excel spreadsheet so that the questions to be analyzed were arranged in columns and articles reviewed online and test results obtained through filters. This procedure is intended to enable individual articles and analysis as well as the cross.

Still in the analysis of the theoretical pole, was performed an evaluation of the theoretical attitude of authors. The category theoretical posture, understands the attitude of researchers, from studies in innovation in services proposed by Gallouj and Toivonen (2011) which features from the analysis of the literature the existence of three theoretical approaches on innovation of services: technical services-based and inclusive.

In the perception of the authors (Gallouj & Toivonen, 2011), the early studies on innovation in services adopted a technical approach, which reduces innovation in services for the introduction of technical systems and focuses on technological cycles and technological trajectories. As a reaction to perceived trend of innovation under a purely technological point of view, a service-oriented approach or differentiation, which highlights that innovation in services often follows other trajectories and not just innovation through technology. The third approach, which is increasingly gaining ground, is the synthesis or integrative approach, which seeks a common framework for the analysis of innovation in goods and services, no denying, however, the existence of some differences between them.

It was also sought to identify the main references used in the articles analyzed, in order to identify the authors that are used primarily as a reference for the construction of the objects searched.

4 ANALYSIS OF THE THEORETICAL TREATMENT IN INNOVATION IN SERVICES

In Table 1 are listed the findings of the analysis, in which the adequacy of the theoretical construction of the examined production was verified as to its capacity to attend the attributes that explain the object or phenomenon researched in function of the conceptual structure chosen by the researchers.

Table 1 – Findings of the analysis

Theoretical support	Questioning drivers	Attendance construct	
		Yes	No
Panel A - Connection between theory and research object			
"The theory does not formulate only what we know, but (...) gives us the question you're looking for "	Is the theory based on the research question?	11 (65%)	6 (35%)
"Theories are reference points for observation of the facts"	Is the theory a reference for analysis of facts/phenomena analyzed?	11 (65%)	6 (35%)
Rejection of the Dataism (expression created by Bunge)	Are the theories consistent and presented in a systematic way, seeking epistemological principle of service economy and negligencialism?	10 (59%)	7 (41%)
"If the theory works, it is because, after all, it is pertinent to a certain structure of the real that can only be knowable as an effect of the application of the theory"	Does the theory provide a better understanding of the object/phenomenon researched?	9 (53%)	8 (47%)

Panel B-Articulation theory and formulation of hypothesis			
"The body of hypotheses forms the basis of the theory"	Is the theory elaborated in order to provide justification/alignment the hypotheses presented?	4 (24%)	13 (76%)
"The theory must make connections between the contexts of proof and discovery"	Is the relationship/link between the contexts of proof and discovery identified?	5 (29%)	12 (71%)
"The purpose of theorizing is "prediction by derivation of the testable consequences of a body of hypotheses"	Does the theory allow you to predict the consequences of the tests?	5 (29%)	12 (71%)
Panel C - Theoretical syntax and semantics			
"Semantic Aspect (explanation)-significant aspect of theoretical systems involves concepts"	Is there semantic consistency and homogeneity in the concepts presented?	16 (94%)	1 (6%)
"Conceptual Explanation is relying on any theory for the problem"	Is the semantic aspect of the theory complete in terms of the variables presented in the problem?	9 (53%)	8 (47%)
The conceptual clarification expresses somehow the unit theory material enabling referential operations on its research objects"	Does the theory allow referential operations on the investigated objects / phenomena?	9 (53%)	8 (47%)
"Concatenation and coalition of all theoretical propositions in an articulated and non-contradictory body"	Do the presented theories showed concatenated, coherent and articulated propositions without contradictory presentation?	15 (88%)	2 (12%)
Panel D - Interaction between poles of research			
"In the face of epistemological polo, theory is a relevant to a set of problems which he presents a valid solution"	A teoria é pertinente em relação a problemática? Is the theory relevant in relation to problematic?	16 (94%)	1 (6%)
"In the face of the morphological pole, theory is a coherent set of propositions that provides a comprehensive explanatory framework"	Is the theory successful in presenting a comprehensive explanatory framework?	8 (47%)	9 (53%)
"Faced with the technical pole, theory is a set of falsifiable, testable hypotheses"	Does the theory provide the joint research of falsifiable, testable hypotheses?	5 (29%)	12 (71%)

Source: Research Data.

Panel A, which deals with the connection between theory and research object, encompassing the theoretical formulation of what is understood as real; the formulation of the research object; and the elaboration of the research question, it is noted that in 65% of the articles the theory was constructed in order to allow the foundation of the research question and be a reference point for analyzing reality.

Moreover, it was possible to show that in 59% of the analyzed articles the theorizing is coherent and presented in a systematized way, taking into account the epistemological principle of economics and negligencialism, avoiding the use of unnecessary information to construct the object of research and the analysis of reality.

Still, allowed evidence that in 59% of the articles analyzed theorizing is consistent and presented in a systematic way, in view of the epistemological principle of Economics and negligencialism, avoiding use of unnecessary information to the construction of the object of investigation and analysis of the reality

On the other hand, it was not detected that the theoretical construction was constructed in order to allow a better understanding of the research object; being only a reference for its analysis, since 47% of the articles were not successful in the theoretical construction in order to allow the understanding of the reality researched, according to the proposed analysis.

As regards the articulation between theory and hypothesis formulation (panel B), it was verified that the theoretical construction presented in about 75% of the articles did not succeed in providing a connection between the context of the proof and the context of the discovery and in enabling that the researcher obtained prediction of the results of the tests.

As for the semantics (conceptual aspect that refers to the phenomenon) and the syntax (articulation of the concepts related to the phenomenon) of the applied theories, discussed in panel C, it was found

that in 47% of the analyzed articles they were not successful in enabling operations referring to the problematic, since one or another construct was not met, evidencing also that not all the variables used by the researcher were discussed in the theoretical reference.

However, 94% of the articles were presented with consistency and homogeneity of concepts to construct the research object; in 88% of the articles the theory presented concatenated, coherent and articulated propositions, without exposing contradictory, showing adequate syntax.

In Panel D was possible to analyze the interaction of theoretical pole compared to other poles of research. With regard to the interaction with the epistemological pole, that is, if the theory is relevant to the issue, 94% presented theoretical construction relevant to the understanding of the troubled proposal.

The interaction between theoretical and morphological poles, 53% of articles did not succeed in showing how the theory was consistent with propositions that provided a comprehensive explanatory framework from the point of view of methodological approach.

As for the interaction between the theoretical and technical poles, it was verified that in 71% of the sample, the theoretical reference was unable to justify the set of falsifiable and testable hypotheses around the expected results.

In addition to the conducting model of the research, we observed a balance between the references frames used to guide the research, with greater convergence to the positivist picture. Thus the scientific making, in researches of innovation in services, in the events and period studied, is made markedly through the empirical observation and the general laws related to the phenomenon; from this confrontation, the researches tend to generalize and formulate positive laws from the constancy and regularity of the phenomena.

It should be noted that several studies have been found that seek to establish the state of the art and the creation of concepts appropriate to the theme, in order to separate it from the concept of industrial innovation.

It is also possible to comment on the theoretical postures adopted in the surveys sampled, that there was a tendency to use an integrative approach, involving generic characteristics, where the emphasis falls on peculiarities of the product or service provided and according to the intensity of the user relationship -producer verified in the analyzed object and population. This model consists of vector sets of competences and of tangible and intangible technical characteristics, as well as the characteristics of the service itself (Gallouj & Weinstein, 1997).

Although the relative temporal overshoot between approaches demonstrates that research tends to position itself in the integrating context, it has been realized that technical-oriented and service-oriented approaches are still dominant in some sectors. It is possible that this is occasioned by the historical tradition of the sector, as well as by its approximation or distancing from the industrial sphere.

Research in a hospital context tends to adopt the technician approach, exposing that the implantation of an innovation in the medical area starts from technological modifications gradually extended to other departments or functional areas, often deriving from their interaction with the industry.

On the other hand, part of the public service studies adopts the services-based approach, where innovation is presented as a form of expression shaped by the sociocultural and socioeconomic context, independent of existing technological innovation. The works used in the construction of the theoretical frameworks of the articles were:

- Oslo Manual (2005), 16 reference citations between articles analyzed, i.e. referred to in 2/3 of the research;
- Schumpeter (1982), cited in 09 of 24 works. Seminal work of economic nature, whose focus is the presentation of the importance of innovation to economic activity of Nations;
- Gallouj and Weinstein (1997), also quoted in articles 09 studied; highlight that Faiz Gallouj is the most cited author on individual works or co-authored.

It is verified the importance of these works for the construction of the theoretical framework of the articles whose themes focus on innovation in services, being an important reference both for the construction of the conceptual structures and for the construction of the research object in the area under study. Thus, it can be seen that the works listed stand out as the main responsible for the theoretical basis on innovation in services, considering the articles and events of the scope of the research. As for the references related to works on scientific methodology, they were quoted more frequently:

- Bardin (2011), with 5 citations;
- Hair, Anderson, Tatham e Black (2009), with 4 citations;
- Flick (2009), Field (2009) e Yin (2005), with 3 citations each.
- Bardin (2011), with 5 citations;
- Hair, Anderson, Tatham and Black (2009), with 4 citations;
- Flick (2009), Field (2009) and Yin (2005), with 3 citations each.

When analyzing the References section, in order to identify the authors and main publications used in the construction of the theoretical support of the articles, it was verified that some articles did not present any citations of works on methodology. Still analyzing the bibliographical references presented in the articles, it is recorded that no work was cited that subsidized the author on the "construction of scientific knowledge" (epistemology) in any of the works.

5 CONCLUSIONS

This study tried to perform critical analysis of scientific production on innovation in services, based on the theoretical model proposed by polo Bruyne et al. (1977), which proposes to make scientific study, a study in social sciences the epistemological from four foci: epistemological, theoretical, technical and morphological, aims to ensure science research practices.

The adequacy of the theoretical construct was examined as to its ability to adequately describe the object or phenomenon being investigated and to the way in which such construction becomes testable and falsifiable hypotheses; we also interpret the semantics and syntax with which they specify such interactions, continuing with the analysis between the theoretical pole and the other attributes of the model, which must be harmonized in a coherent and systematized way.

It was evidenced that the model of analysis identified three aspects respected in the almost unanimity of the articles, that is, articulated propositions of the theoretical body; semantic consistency in the presented concepts; and pertinence between the theoretical and epistemological attributes (concepts explaining the problematic).

This can be explained by the homogeneous theme looked at in the analysis (innovation in services), which does not allow deviations between the observed object and the constructed object, even though the subject is recent in innovation research.

The other requirements evaluated, as presented in Table 1, were not observed by most of the articles, and it may be interpreted that the epistemological articulation, intrinsic to the scientific process, is not supported by the researchers of the subject in the sample considered; such evidence leads to the inference that epistemological treatment is not complete among such researchers.

It is considered that this is a consequence of the authors making a strong effort in definitions of innovation in services and contextualization of their importance and they have little in the theoretical construction of the variables that will be used in the treatment and analysis of the data.

The lack of appreciation of the construction of conceptual frameworks, highlighting what the literature exposes about them, as to definitions and articulations with the other variables studied, makes it impossible to elaborate valid and testable hypotheses, as well as connections between the contexts of proof and discovery.

Adequate theorizing enables the researcher to present his hypotheses, or probable results of his research, in a connection between the context of the proof and the context of the discovery.

It was also difficult to articulate definitions and variables studied, given the non-valuation of the conceptual frameworks. However, the theoretical system of the articles presents consistency and homogeneity of concepts, presenting coherent and articulated propositions.

In General, the articles analyzed present adequate interaction between theoretical pole and the other poles of research, especially with regard to epistemological and methodological poles as the congruence between them ensures the scientific theories of research, providing the development of epistemic field.

Although the theme innovation is gaining space in the field of applied social sciences, there is a need for continuity in studies in this field in order to build definitions and build appropriate instruments to the theme that align the theoretical stances to research methods and techniques, as well as the problems treated.

It should be noted that the research is limited to access more bases common to Brazilian researchers, and reduced the number of articles analyzed. This is due to the restriction of the search object and your field of study.

Other research, that seek to analyze other epistemological, or poles using a variety of databases used in this research, covering events and international journals can corroborate with the study, bringing more validity and deepening in the epistemological field covering the theme innovation in services.

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