# THE QUALITATIVE PROCESS DATA APPROACH AS AN OPPORTUNITY TO IMPROVE INNOVATION MANAGEMENT STUDIES

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## ABSTRACT

**Objective:** This article presents the process data research approach as an opportunity to improve management studies and to create a roadmap for beginners. Process research is a sidelined way to conduct qualitative studies. The fundamental concern of the process approach is to capture and apprehend the meanings attributed to organizational phenomena directly in the field of research, aiming to understand and answer the questions of 'how' and 'why' events change over time. **Method:** This study reviews selected recent research on innovation management that used process research criteria (temporal orientation, units of analysis, sample, data, analytical strategies, and conceptual products) as the backdrop. **Main Results:** The main result of this paper is the creation of a roadmap for applying the process research approach. Also, it highlights elements of improvement for management studies from the process data approach. **Relevance / Originality:** This study provides several examples of qualitative process research in innovation. The proposed roadmap helps increase the rigor and uses of this research approach. **Theoretical / Methodological Contributions:** We offer an academic discussion on process research's role in improving (innovation) management studies.

## INTRODUCTION

The methodological choices to conduct a research are fundamental to achieving its objectives and presenting the pursued theoretical contribution effectively (Gehman et al., 2018). Qualitative studies in management, despite an absence of a standard for analyzing and presenting data (Pratt, 2009), outline two major currents for conducting research and, therefore, offering a theoretical contribution (Langley & Abdallah, 2011). One is based on a positivist epistemology, which aims to develop nomothetic theoretical propositions. The other is interpretive and more concerned with capturing and gaining the meanings given to the organizational phenomenon.

The first provides for the development of testable hypotheses to generalize the theory. The method's logic emphasizes the commonalities among the compared cases rather than what is idiosyncratic, based on the dimensions predetermined by the constructs and

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variables of analysis. According to this approach, study cases are selected by comparing extremes, which allows distinguishing high and low performance, for example (Yin, 2004). These are the studies most found in the organizational literature. Conference proceedings and abstracts from renowned management journals demonstrate that this model is expanding since these studies build theory in search of contrasts with previous research findings.

The second current being outlined is more connected to understanding and detailing a process than to establishing a contradiction in previous studies. The main idea is that theory-building occurs from interpretations, revelations of the facts, and richness of details (Langley & Abdallah, 2011). Here resides a methodological opportunity for researchers in the management area since this approach seeks to reveal insights with a substantial contribution. The focus is on how "things" — strategies, plans, actions — are produced and reproduced during the ongoing flow of the processes (Chia & MacKay, 2007). This qualitative study model can produce research with a high degree of originality and is still sidelined (Langley & Tsoukas, 2017).

This article aims to present a process data research approach as an opportunity to improve management studies. There is a shortage of empirical research that uses the processual approach in organizational studies (Abdallah, Lusiani & Langley, 2019; Jagd & Fuglsang, 2016; Lerman, Mmbaga e Smith, 2022; Poppo, Zhou & Li, 2016). Specifically, in this area, it is often overlooked that temporariness requires a processual perspective that captures the development of the systems over time and gives value to the fact that they do not start from scratch. These studies build relationships over the past, and this construction has implications for the future (Abbott, 2001).

This analysis presents a set of tips, strategies, and a roadmap to applying the process data approach. To demonstrate the possibilities of this approach to the management field, we have chosen a specific field — innovation management. The proposal is not limited to it, but based on it.

Our primary motivations for choosing the innovation field as an example to present our tips for using the process data approach are anchored in the fact that:
- innovation is an essential way for organizations to survive and thrive;

- as a source of results, innovation must be managed and understood as a process (Dodgson, Gann, MacAulay, & Davies, 2015);
- the innovation field has moved beyond a narrow group of economic and sociological researchers to become one of the main subjects of interest in several academic areas, such as social psychology, economy, sociology, and management (Salter & Alexy, 2014);
- a variety of quantitative innovation management studies are based on positivist approaches (see, Damanpour & Schneider, 2006; Kassie, Teklewold, Jaleta, Marenya, & Erenstein, 2015; Meng, Guo, Peng, Lai, & Zhao, 2019), but while these efforts provide valuable findings for the academic debate and practitioners, the studies on this topic have more recently been concerned with a finer-grained understanding of the phenomena measured (Volkmer, Faccin, Motta, Bernardes, & Balestrin, 2019);
- finally, there is a growing number of qualitative innovation management studies being published that seek to provide deeper details of the phenomena under analysis (see, Faccin & Balestrin, 2018; Silva, Venâncio, Silva, & Gonçalves, 2020; Urbinati, Chiaroni, Chiesa, & Frattini, 2020).

These qualitative studies analyze the complexity of phenomena (not with the purpose of generalization), involving rich details that, in many cases, are not measured by quantitative studies.

Based on these motivations, we conducted and analyzed several papers published in the Web of Science database to provide an opportunity to improve (innovation) management studies based on the process data approach.

## 1. WHAT IS THE PROCESS DATA APPROACH?

The word "process" has been used in various ways in organizations, and process views have provided relevant contributions to all sciences (Hernes, 2008). According to Hernes and Weik (2007), the process is subject to various interpretations. Hernes (2008, p. xix) also argues that process thinking seeks to shed light on the developmental nature of the world, emphasizing 'becoming' rather than static 'being.' Rather than studying how entities influence one another, it

stresses the inter-relatedness of entities, how they transform each other."

The process data approach is complex (Pettigrew, 1992) and is understood as one that "examines events, activities, and choices as they emerge and sequence themselves over time" (Bizzi & Langley, 2012, p. 225). Van de Ven (1992) and Van de Ven and Poole (1995), as well as others, refer to the process as the sequencing of events over time, which would explain how and why an organizational entity changes, develops, and terminates (Langley, Smallman, Tsoukas, & Van de Ven, 2013). For Hernes (2008), events can be understood as points on a line (real occasions) that form transitions, connecting past, present and future. So they connect things that are more durable than individual events. In addition, some events can be part of the process. In contrast, others can be decisive for the unfolding of processes, as they provide a basis and direction for the action that follows. Unlike the dominant approach (also known as variance theory) in organizational studies, the process data approach is not concerned with the causal relationship between the dependent and independent variables (Van de Ven & Poole, 1995). However, its focus is to examine and theorize the temporal patterns of variables, observing how they unfold or change over time (Bizzi & Langley, 2012). In light of the preceding, process data research helps analyze the story of how a phenomenon became what it is and not only analyze what it is (see Faccin & Balestrin, 2018; Liu, Liang, & Shi, 2018; Newey & Verreynne, 2011; Skog, 2016).
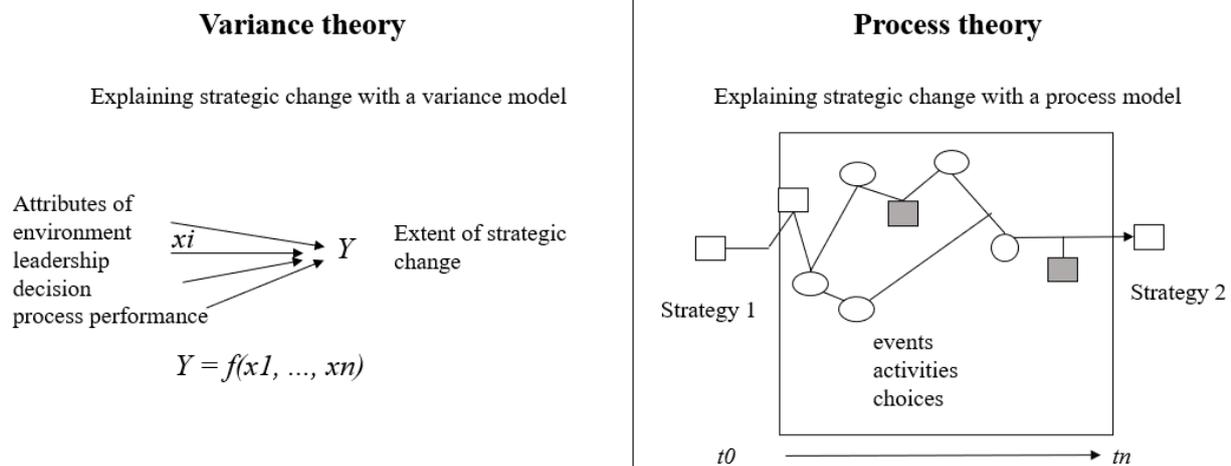
It is necessary to clarify that there are two approaches to the process, the inside and the outside. The first involves an effort to capture the evolving experience of those involved in the process (either through first-person accounts or participating in the experience), so the emphasis is on "how it feels". The second, which is the focus of this article, seeks to capture the process of a phenomenon over time so that the emphasis is on "how and why things changed". In addition, process studies can have two different focuses. Based on a specific result, they explore the operation of a process that has already occurred, that is, in retrospect, or they focus on an ongoing process (Langley & Tsoukas, 2017).

Thereby, process research consists of stories about what happened, who did what and when, events, activities, and choices ordered over time.

Furthermore, process studies must provide a close-knit link between process theory and process data (Berends & Deken, 2019). Working with this method is not easy since the data of a process are usually disorganized. Organizing and understanding them to provide a theoretical contribution to the field is an excellent challenge for researchers who adopt this philosophy (Langley, 1999). Therefore, process data consists of organizing a sequence of events. A sequence of events is a conceptual entity with which researchers must become more familiar. Events often involve many levels and units of analysis that do not have well-defined boundaries and whose time often varies in precision, duration, and relevance. Although the primary focus is on events, process data tend to be eclectic, based on phenomena such as changing relationships, thoughts, feelings, and interpretations (Langley, 1999). In other words, events are those little stories told by someone who has experienced a situation (Faccin & Martins, 2022). These little stories are full of details, actors and various elements influencing that particular moment. Therefore, an event is a very complex unit to be studied.

With an emphasis on processes, these research ideas validate Bansal and Corley's (2012) understanding of the type of concern a qualitative researcher should have. Good qualitative research should be concerned with something other than the plan, with the planning of variables and an *a priori* definition of their relationships (as quantitative research does). To the maximum, the qualitative researcher must focus on exploring the ideas that emerge from the field (Bansal & Corley, 2012; Gehman et al., 2018; Gioia et al., 2022). Figure 1 presents a visual explanation of this subject.

One of the main reasons for adopting the qualitative approach of "research in process" is that it considers the context (Langley, 1999). The right side of Figure 1 shows that, unlike variance theory, process research is non-linear. The context varies according to events, activities, and choices over time. Furthermore, this context can involve real-time data (e.g., real-time interviews) and retrospective data (e.g., retrospective interviews). Given this backdrop, the adoption of the process approach allows us to see phenomena that seem stable, such as organizations, identities, cultures, and others, as activity or event flows that are continually reconstituted (Bizzi & Lan-

**Variance theory**

Explaining strategic change with a variance model

Attributes of environment leadership decision process performance $xi$ → $Y$ Extent of strategic change

$$Y = f(x1, ..., xn)$$

**Process theory**

Explaining strategic change with a process model

Strategy 1

events
activities
choices

Strategy 2

$t0$ —————→ $tn$

Source: Mohr (1982) apud Langley (1999, p. 693).
**Figure 1.** The two 'views' on conducting organizational studies.

gley, 2012). However, it is essential to highlight the difficulty in performing process research because "the sheer volume of words to be organized and understood can create a sense of drowning in a shapeless mass of information" (Langley, 1999, p. 693). This 'drowning' is "death by data asphyxiation" (Pettigrew, 1990, p. 281).

The right side of Figure 1 reinforces some essential characteristics that the researcher must pay attention to when conducting research of this nature. First, the most practical way to delimit the study of a process is to establish its temporal limits very well. In this sense, retrospectively studying a process can be 'safer' for beginners, although we have already claimed that processes can be followed as they happen. When studying a process that has already occurred, the researcher must know and clarify the situation of the phenomenon in time zero (*t0*) (e.g., characteristics, actors involved). That is, the researcher must have a photograph of the phenomenon before and after the finished process (*tn*). Thus, it is known that the study has to explain how and why a given phenomenon passed from *t0* to *tn* from the identification of the sequence of events and their patterns over time.

To illustrate this situation, let us pay attention to the study by Faccin and Balestrin (2018). The authors elucidate how the dynamics of collaborative practices in research and development (R&D) projects occur and reveal the leading practices adopted in developing an ambidextrous R&D project. In this study, the authors analyzed a collaborative R&D project that las-

ted 15 years. In t0 (1999), the product did not exist. In *tn* (2014), the product was launched in collaboration between the companies. Instead of analyzing the data in search of properties and dimensions, the authors observed the action and changes during the 15 years, using the lens of interorganizational knowledge creation. Note that a theoretical lens is essential to analyze a process (Cloutier & Langley, 2020) and reduce the possibility of suffocation by data, as it limits the research.

Garrido, Vasconcellos, Faccin, Monticelli & Carpenedo (2021) analyzed the decision-making process of corporate entrepreneurs of a multinational steel producer throughout its internationalization trajectory (1980 to 2018). To set the time limit for the study, the authors chose to describe how decision-making took place before 1980 and how it was configured in 2018, describing events and identifying patterns adopted according to institutional characteristics. They also provided an image to highlight this change. The definitions found between 1980 and 2018 are the decision standards adopted by corporate entrepreneurs in the company's internationalization process. The strategy of "filling in the black box" or the "process target" that is between *t0* and *tn* is always very representative of process data results.

It is important to reinforce that the process research approach helps understand organizational contexts' temporal evolution. The strategies to analyze and present results in process studies can be different. It must be said that the two aforementioned ar-

ticles — Faccin and Balestrin (2018) and Garrido et al. (2021) — used narratives to present the process and divided it in phases, marked by expressive transitions in the pattern of events. They used different strategies to analyze and interpret qualitative data.

The strategies for analyzing and interpreting qualitative data are linked with the researcher's creativity because there are several ways to reach this point. For instance, Langley (1999) provides seven main types of strategies that are not mutually exclusive and are often used in combination:

- narrative (report of the reconstitution of events);
- quantification (processes are divided into micro--incidents encoded in a limited number of quantitative categories that can be analyzed using statistical methods);
- alternate templates (top-down application of theoretical *a priori* lenses for a process database);
- grounded theory (the theory is derived from the inductive bottom-up coding from the data);
- visual mapping (representation of processes using, e.g., flowcharts, tables);
- temporal bracketing (comparison of different periods);
- synthetic strategy ("the original process data are transformed from stories composed of 'events' to 'variables' that synthesize the critical components" (Langley, 1999, p. 704).

## 2. WHAT DID THE AUTHORS DO TO PROVIDE THE METHODOLOGICAL ROADMAP?

A body of qualitative innovation management studies has often used the process research perspective to understand organizational innovation dynamics.

Some of this research used case studies as a background (see Dixon, Meyer, & Day, 2014; Faccin & Balestrin, 2018; Liu et al., 2018; Lundberg, Andresen, & Törnroos, 2016; Faccin, Balestrin, Martins, & Bitencourt, 2019), emphasizing temporal evolution rather than the relationship between quantitative variables. For example, Faccin and Balestrin (2018) focus on temporal aspects to explain the dynamic of collaborative aspects in order to explain knowledge creation practices in joint R&D projects. Dixon et al. (2014) highlight the importance of considering nature's process to verify the organizational dynamic capabilities during radical changes. Liu et al. (2018) illustrate the 26 years of creating an administrative interface for R&D. Finally, Lundberg et al. (2016) build on process research to measure the reconfiguration process of a business network.

Process research studies are known for their rich empirical data (Abdallah et al., 2019), and there are several epistemological, methodological, and conceptual approaches regarding them (Langley, 1999). According to Bizzi and Langley (2012), some information needs to be provided in qualitative process research to elucidate the characteristics of data and results, including temporal orientation, unit(s) of analysis, sample, data, analytical strategies, and conceptual products (Table 1). This information is helpful for research replication and readers' engagement with the 'story described' in the paper.

Using the critical information for process research as a backdrop (Table 1), we attempt to answer the following research question: How has process research been used in innovation management studies, and what can we learn from them that applies to other researchers? A literature review was performed in

**Table 1.** Key information for process research.

| Key information | Definition |
|---|---|
| Temporal orientation | The data nature: real-time or retrospective. |
| Unit(s) of analysis | What was analyzed: a set of organizations, a whole organization, individuals, among others. |
| Sample | Who was analyzed: the number of organizations or individuals? |
| Data | How data was collected (e.g., face-to-face interviews, online questionnaires, and participant observation). |
| Analytical strategies | How data was presented (e.g., by narrative, visual mapping, and temporal bracketing). |
| Conceptual products | The conceptual findings of the research. |

Source: based on Bizzi and Langley (2012).

the innovation management field. This review sought to identify relevant examples of process research studies that used all critical information suggested by Bizzi and Langley (2012). The authors considered a relevant study that provides the data and results analyzed clearly in the innovation management field. Therefore, following Van de Ven's (1992) suggestions, the authors selected process research that provides explicit information regarding which data was collected and analyzed.

The Web of Science database searched for relevant innovation management process studies examples. The keywords used are related to the innovation and innovation management fields and qualitative studies. They are: "alternative templates," or "grounded theory" or "longitudinal case study" or narrative, or "process data" or "processual approach" or "research process" or "virtual mapping" or "temporal bracketing" and "innovation" or "innovation management."

Using the keywords and the Boolean operators, we identified 349 studies. However, many still lacked the research process method as a backdrop. To guarantee that the papers selected applied the method, we selected those that cited Langley's (1999) work and Langley and Abdallah (2011) and found 43 studies. These studies were used as a 'guide' because both are widely referred to in process research papers. Furthermore, Professor Ann Langley's studies are considered 'classical'.

The forty-three papers were carefully read, and only ten were selected as relevant examples (Table 2). However, we understood they provided adequate methodological diversity to answer this study's research question. Studies that did not provide one or more of the key information suggested by Bizzi and Langley (2012) and those that did not provide explicit information on their data and results were excluded. In this regard, Berends and Deken (2019) argue that qualitative process researchers often need help to create a practical write-up.

After evaluating each article according to the quality criteria, we elaborated a roadmap for applying this methodology in different management fields.

## 3. TEMPORAL ORIENTATION

The temporal orientation in process studies may trace past information, i.e., a retrospective temporal orientation, or may follow them forward in the present, i.e., a real-time temporal orientation (Bizzi & Langley, 2012). The real-time temporal orientation has more potential to capture the richness of the process under examination. Such studies can offer opportunities to "challenge the assumptions of variance theory" (Bizzi & Langley, 2012, p. 227). However, real-time research does not guarantee an ending result or a specific checkpoint because results can be presented gradually in many cases. On the other hand, retrospective research is already part of some results. It seeks to uncover a trajectory from the outset, which, on the one hand, limits the phenomena to be examined. On the other hand, it may give a false impression of the linearity of past events and it may be challenging to rely on trustworthy sources of events that have already occurred (Bizzi & Langley, 2012). Therefore, temporal orientation is one pivotal choice with conceptual and pragmatic implications (Langley, 2009).

The authors found interesting studies based on retrospective and real-time temporal orientation. Faccin et al. (2019) used a retrospective orientation to observe that knowledge-based dynamic capabilities change over time in joint R&D projects in the semiconductor industry. Analyzing the National Aeronautics and Space Administration (NASA), Szajnfarber and Weigel (2012) provide valuable retrospective information on the technology development structure of the last decades. Visual maps providing image information regarding the organizational changes and evolution over large windows of time (e.g., decades) are widely used in this type of study (see, Faccin & Balestrin, 2018; Faccin et al., 2019; Szajnfarber & Weigel, 2012).

Real-time designs are essential to capture value in rich details as they emerge. Medlin and Törnroos (2015) used a real-time temporal orientation between 2007 and 2014. Given their participation in the process studied, they mapped and interpreted events in a biofuel case. While valuable efforts are made through retrospective and real-time studies, Leonard-Barton (1990) argues that combining these two temporal orientation perspectives effectively handles these perspectives' tradeoffs. In his article (see Leonard-Barton, 1990), the author combined a real-time longitudinal study with nine retrospective cases about the same phenomena and showed how these two case studies provide synergistic and complementary findings.

**Table 2.** Examples of process studies in the innovation management field.

| Author(s) | Topic | Temporal orientation | Analysis Unit | Main goal | Sample/Data source | Analytical strategy | Conceptual product |
|---|---|---|---|---|---|---|---|
| Newey and Verreynne (2011) | Absorptive capacity in the development of interorganizational products (INPD) | Longitudinal retrospective case study (the process of 20 years, research lasted 18 months) | The cross-level interactions which occur at the INPD system level — development of a groundbreaking anti-influenza drug | To deepen the understanding of the role of absorptive capacity allowing the development of new INPD | 40 semi-structured face-to-face and telephone interviews with key informants/ snowball/ secondary data such as articles published in *Time and Nature* magazines, business press articles, books, documentaries, annual reports of participating companies | Chronological narrative of results — prior related knowledge, knowledge acquisition, assimilation, transformation, and exploration — formed the key constructs in the operationalization | A new theory at the INPD system of analysis level sheds new light on cross-level interactions between absorption capacities at the enterprise and alliance levels. |
| Szajnfarber and Weigel (2012) | Process of technological innovation | Retrospective (two decades) | Five projects of technological innovation at the National Aeronautics and Space Administration (NASA) | To investigate the process by which new technical concepts are matured in NASA's innovation ecosystem | 91 interviews with key participants; 150 documents produced during the "path"; relevant material and observation | Analytical chronology; narrative | Creation of a model called "epoch shock" to replace the stage-gate |
| Estensoro (2015) | Development of social innovation | Real-time action research 2011–2012 | Key actors that facilitate social innovation for territorial development, network evolution | To understand how local networks can facilitate social innovation in a territory | 1 case (creation of Industrial Forum)/ action research | Narrative | Relationship between action research and social innovation |
| Medlin and Törnroos (2015) | Theory of business networks | Real-time longitudinal case study (2007–2014) | Innovation from a dynamic network perspective, in which individuals and their understandings play an essential role in redesigning the business network | How are the unfolding processes and phases of exploring and exploiting interlinked in a network of actors developing and commercializing a new technology? | 1 longitudinal case study (biofuel sector)/ interviews (19 in different periods between 2011 and 2014 and with 07 different actors)/ sensemaking/ mapping | Narrative of results | The framework of actions to guide the work in the dynamic network market, based on: exploring the issues of ambidestry/ role of actors and change of actors in the development of networks/ time in processes |

Continue...

**Table 2.** Continuation.

| Author(s) | Topic | Temporal orientation | Analysis Unit | Main goal | Sample/Data source | Analytical strategy | Conceptual product |
|---|---|---|---|---|---|---|---|
| Petruzzelli (2015) | Railway invention | Retrospective | Railway invention | To provide a comprehensive view of the micro-processes and central dynamics influencing the emergence of breakthrough innovations | 1 case study (Fiat)/ interviews and secondary data | Narrative | Information about process standards |
| Skog (2016) | Cluster evolution | Longitudinal retrospective case study | Exploration of this ideal period and its influence on local synergy requires understanding the interaction between cluster actions, local conditions of collaboration and heterogeneity requirements over time. | How does the necessary local technological heterogeneity arise, evolve and influence vertical collaboration in the evolution of the cluster? | Case Study/ 19 local network companies in Sweden. 11 semi-structured interviews/ secondary data: project documents/ press articles/ annual reports/ corporate letters/ company sites/ interviews and recorded presentations | Temporary bracketing | Set of propositions that contribute to the evolution of cluster studies linked to local technological heterogeneity |
| Mousavi and Bossink (2017) | Dynamic capabilities for sustainable innovation | Longitudinal retrospective case study (from 1995 to April 2016) | Explanation and understanding of why and how a company can start and build a sustainable innovation system and how to play an active role in stimulating and shaping the system | What are the managerial capabilities through which companies can innovate for sustainability? | 1 case study (biofuel aviation)/ 12 Semi-structured interviews in 2015. Archive data: ten annual CSR reports 5 technical publications, 2 sustainable biofuel brochures for aviation, 33 public interviews, 156 publicly available news publications on the innovation project and 4 reports from the Dutch Sustainable Growth Coalition (210 total sources) | Theoretical contribution derived from the inductive bottom-up coding of the data | Presentation of 8 propositions about how companies can use dynamic capacities for sustainable innovation |

**Table 2.** Continuation.

| Author(s) | Topic | Temporal orientation | Analysis Unit | Main goal | Sample/Data source | Analytical strategy | Conceptual product |
|---|---|---|---|---|---|---|---|
| Liu et al. (2018) | The efficiency of the organizational interface for product modularization | Retrospective (1990–2016) | Organizational interface for product modularization | To examine the process of creating an organizational interface; the key elements; the sequence of creating them; their contributions to the effectiveness of the organizational interface for product modularization | 1 case study (Home Tech), qualitative and longitudinal/ semi-structured interview (14), complemented by on-site observation and secondary sources such as news articles, annual reports and internal documents | Narrative | Conceptual framework for creating an effective organizational interface for product modulation in Home Tech R&D |
| Faccin and Balestrin (2018) | Collaborative practices in the process of knowledge creation | Retrospective (1999–2014) | Collaborative practices to promote interorganizational innovation | To highlight the leading collaborative practices used in the R&D project and show how and why these practices change during the collaborative project | 1 case study (semiconductor industry)/ 65 semi-structured interviews; selection of snowball interviewees; secondary documents | Narrative: results presented as a narrative of the case | Set of propositions |
| Faccin et al. (2019) | Knowledge-based dynamic capabilities (KBDCs) | Retrospective case study (1999–2014) | The types of processes and KBDCs used to foster knowledge creation during the 15-year lifecycle of a joint R&D project | Case study, individual, emblematic, the French R&D project that created the 28 nm FD-SOI transistor. It is a case of the overcoming of one of the most significant European difficulties: the valley of death | 1 case study (semiconductor industry)/ retrospective interviews and secondary data | Grounded theory — inductive bottom-up coding from the data | Two micro-processes (knowing and synthetizing) of dynamic capacities |

## 4. UNITS OF ANALYSIS

The unit of analysis refers to what will be studied within the chosen case or cases. Thus, it is the focus of the research. Well-defined research questions are helpful in understanding which are the units of analysis. Qualitative research must provide relevant justification to explain 'why' the units of analysis were chosen (Yin, 1994). However, when the process is the focus of analysis, it is necessary to know what is and what is not part of the process under examination (Bizzi & Langley, 2012). Due to spatial and temporal complexity, many studies end up including multiple levels and units of analysis (Bizzi & Langley, 2012).

Considering the articles selected (Table 2), Petruzzelli (2015) deals with a higher level of complexity since the unit of analysis refers to everyday railway inventions and everything related to the complex history that begins two centuries behind. The research of Estensoro (2015), Faccin and Balestrin (2018), and Szajnfarber and Weigel (2012) also used unusual analysis units in innovation management studies — respectively, factors that facilitate social innovation, collaborative practices in joint R&D projects, innovations pathway. Liu et al. (2018) observed multinational corporations' organizational interface for product modularization development. Using the organizational interface as a unit of analysis allowed the researchers to underline how combining elements, such as architecture leaders, influences products' modularization in multinational corporations.

## 5. SAMPLING

In the research process, sampling needs to be balanced between the research's depth and breadth (Bizzi & Langley, 2012). One can choose a single case, which has a greater tendency to generate a rich understanding but is also quite characteristic of that case, making general theorizing difficult. On the other hand, multiple case studies, depending on the opportunity to compare the cases, tend to generate more generalist insights, although at the risk of superficial comprehension. In the studies analyzed (Table 2), Estensoro (2015), Faccin and Balestrin (2018), Faccin et al. (2019), and Mousavi and Bossink (2017) opted for the single case study to ensure the disclosure of a novelty.

Faccin et al. (2019) selected an emblematic individual case study, the French R&D project that created the 28 nm FD-SOI transistor. It is a case where one of Europe's most significant difficulties, the 'Death Valley', was overcome. Although the research allowed a wealth of detail, it is relevant to mention that the balance between depth and breadth was maintained, considering that the article allowed theoretical generalizations. The authors identify two microprocesses in which knowledge-based dynamic capabilities are involved in joint R&D projects. They were considered to be part of the sensing and apprehension processes. From the synthesis, a part of the apprehension process, several microfoundations of dynamic capabilities based on knowledge are established. Another example of depth and breadth sampling is the study of Szajnfarber and Weigel (2012). These authors analyzed a single case (NASA). However, they measured the five most critical technological pathways of the company. The excellent balance of this study provides rich insights into innovation management in the organization under analysis.

## 6. DATA SOURCE

In qualitative research, the data source is multiple. Observation, interviews (individual and in a group), and documentary research are among the main (Bizzi & Langley, 2012). These three primary data sources have distinct characteristics and are usually used together to eliminate their weaknesses. In the research process, specifically, the documents are relevant mainly to trace the chronology of events. The interviews allow access to people's interpretations, feelings, and beliefs about the process and bring complexity and richness to uncover possible conflicts, which documents do not usually provide. However, memory lapses and the relationship management between the interviewer and interviewee must be considered. Observations use the researcher as an instrument and help understand behaviors. It is suggested that collection techniques be triangulated using multiple sources (Bizzi & Langley, 2012). In innovation management studies which adopt a process approach, individual interviews combined with documentary research predominate. It must be stressed that the wealth of secondary data guarantees reliability and veraci-

ty and makes it easier for the reader to follow the narrative unfolding.

Faccin and Balestrin (2018) conducted 65 retrospective interviews. Faccin et al. (2019) used 92 differentiated data sources, and Szajnfarber and Weigel (2012) used 50 secondary documents, such as grant proposals, personal emails, and progress presentations. Less common data sources appear in the Estensoro (2015) study that combines action research offering its experience in the process as an essential source of data.

Faccin and Balestrin (2018), asking respondents to draw the evolution of the project, used it to reconstruct the narrative of the R&D project. Also, Faccin and Balestrin (2018) highlighted the use of photo-elicitation. The authors who studied the collaborative practices used since the beginning of the project used a representative figure of 'Death Valley', commonly used in documents of the European Union, to incite the respondents to describe the process lived by them, in addition to the diversity of data sources. Liu et al. (2018) used a validation strategy to elaborate a report detailing the process for creating an interface for product modularization and then sent it to the company studied for review and feedback. Still considering the tools of data collection and validation used in process studies in the field of innovation management, we highlight that Faccin and Balestrin (2018) held "peer debriefing", defined as the engagement of other researchers who are not involved in the study to discuss data patterns and critical issues involving the collection and analysis of data and results. In this research, there were four sessions of peer debriefing.

Mousavi and Bossink (2017) and Newey and Verreynne (2011) also perform interviews and triangulation with secondary data, which shows that these two data collection techniques are the most used in procedural research about innovation management. This finding reinforces that already pointed out by Bizzi and Langley (2012), that secondary data is relevant to process research to minimize memory lapses, such as those of the interviewees.

## 7. ANALYZING AND INTERPRETING DATA

For this stage, we drew on the seven strategies proposed by Langley (1999):
- narrative (report of the reconstitution of events);

- quantification (processes are decomposed into micro-incidents encoded in a limited number of quantitative categories that can be analyzed using statistical methods);
- alternate templates (top-down application of theoretical *a priori* lenses for a process database);
- grounded theory (the theory is derived from the inductive bottom-up coding from the data;
- visual mapping (e.g., representation of processes using flowcharts, tables);
- temporal bracketing (comparison of different periods);
- synthetic strategy.

The seven strategies are not mutually exclusive and are often used in combination.

The most common strategy for analyzing and interpreting data is narrative. Estensoro (2015) made a narrative using a "first-person perspective". Once she proposed a combination with action research, the events and context in which they emerged in summary tables presented throughout the narrative were highlighted. When the process is complex and has a series of details, strategies like this facilitate the reading and understanding of the study. Table 3 presents an example of the tables used by the author.

Faccin et al. (2019) and Mousavi and Bossink (2017) used inductive bottom-up coding from the data. In the study by Faccin et al. (2019), this strategy allowed the derivation of empirical data from two micro-processes (knowing and synthesizing) of dynamic capacities, thus allowing a theoretical contribution (Figure 2).

Table 4 presents the model Faccin et al. (2019) utilized for data analysis. It was possible to identify the dynamic capabilities that are essential for the knowledge creation process in joint R&D projects.

Szajnfarber and Weigel (2012) used visual mapping to represent NASA's innovative pathways. The visual mapping they proposed shows the process's circularity from the insight, according to the origin, to the idea's acceptance (Figure 3).

Petruzzelli (2015) was the only analyzed article that used the narrative as a single strategy for analyzing and presenting the data. In addition, Faccin et al. (2019) and Newey and Verreynne (2011) used peer review to ensure the validity of analyses. Lastly, Skog (2016) used the temporal bracketing strategy, with which he

**Table 3.** The example used as support for narratives.

| Emergence | Action research (AR) process in the facilitators' group |
|---|---|
| Event | One agency representative claims the network serves individual firms' interests rather than the whole country. |
| Sample data | "The efforts of all the country's actors must be combined if we want to support innovation in the country. If there is no shared vision between us, we are losing all the potential for generating a sustainable process for local development" (meeting minutes; 14-03-2011) |
| Analysis | Claim for the need to relate social innovation (SI) before technological innovation (TI) and the need to build a shared leadership process among local actors |
| Factors for SI | Awareness that a greater breadth of knowledge among network facilitators is required to change the focus of the network toward collective interests |
| AR element related to SI | The democratic dialogue of AR introduces an awareness of the need for innovation SI |

Source: Estensoro (2015).
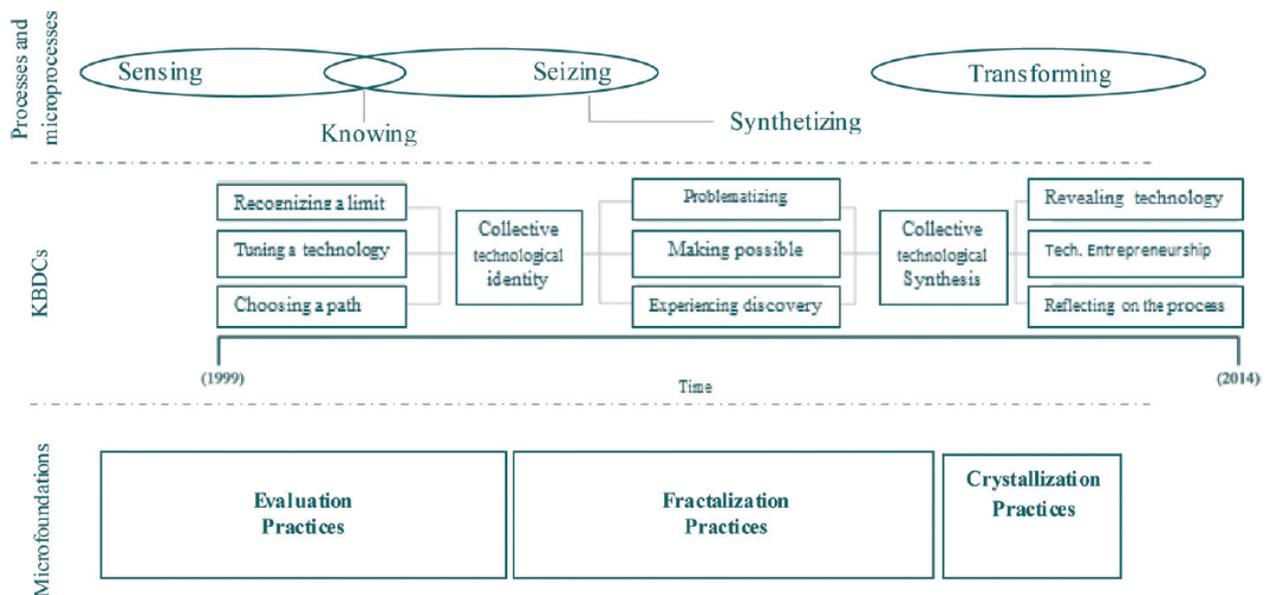


KBD: knowledge-based dynamic capabilites.
Source: Faccin et al. (2019, p. 459).
**Figure 2.** Theoretical contribution derived from inductive bottom-up coding.

compared three distinct periods and analyzed each one individually to search for emerging patterns of exploitation of the local technological heterogeneity.

## 8. CONCEPTUAL PRODUCTS

Process research needs to provide some conceptual products, i.e., it needs to result in conceptual results that can offer general lessons (Bizzi & Langley, 2012). These products can take some forms:

- information about process standards (descriptive regularities in the evolution of the phases of a process over time);
- theoretical mechanisms underlying the regularities understood from the standards;
- in a more interpretive perspective, they are oriented to capture and represent interpretations of events by the research participants;
- they develop causal predictions or models, abstracting theoretical understandings based on va-

**Table 4.** Analysis conduction model.

| First-order categories | Second-order themes | Aggregate dimension |
|---|---|---|
| "Recognize the limits of technology and foresee new solutions"<br>"Identifying the difficulty to continue"<br>"Building new future" | Recognizing the limit | Assessment of the technical and scientific environment |
| "We need to mobilize government resources"<br>"We have an ecosystem…"<br>"There was an orientation to follow the national strategy" | Tuning new technology | |
| "We were identifying opportunities"<br>"It is important to explore all available knowledge"<br>"Having comparative results of different opportunities" | Choosing a path | |

Source: based on Faccin et al. (2019).
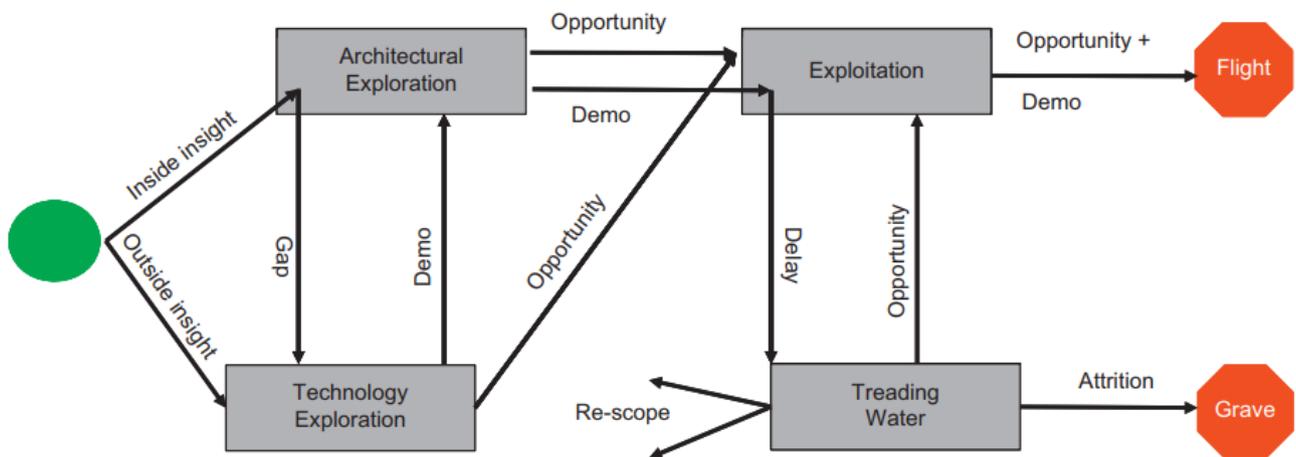


Source: Szajnfarber and Weigel (2012, p. 65).
**Figure 3.** Visual mapping model.

riance from an empirical basis based on processes (Bizzi & Langley, 2012).

In the selected innovation management studies, the authors did not find a pattern in terms of conceptual products. This is interesting because it denotes that we are creative in presenting results. Estensoro (2015) presents the process of changing a context purposely. She highlights the patterns of factors that facilitate social innovation.

Faccin and Balestrin (2018), based on understanding how and why knowledge creation practices change over time in a collaborative R&D project, offer a causal model abstracted from process study and associated with a set of propositions that explain the change in collaborative practices (Figure 4). Szajn-

farber and Weigel (2012), from the study of NASA's projects, have created a new model for maturing new technological concepts as a process study product.

Liu et al. (2018) have developed a conceptual framework for creating an effective organizational interface for product modulation in HomeTech R&D. Newey and Verreynne (2011) (Figure 5) develop a theoretical model explicating how absorptive capacity processes play a crucial role in enabling the formation and performance interorganizational of a new product development (INPD) system.

Finally, Mousavi and Bossink (2017) contributed toward the emerging theory of dynamic capabilities by focusing on identifying the components of dynamic capabilities relevant to managing innovation for sustainability.
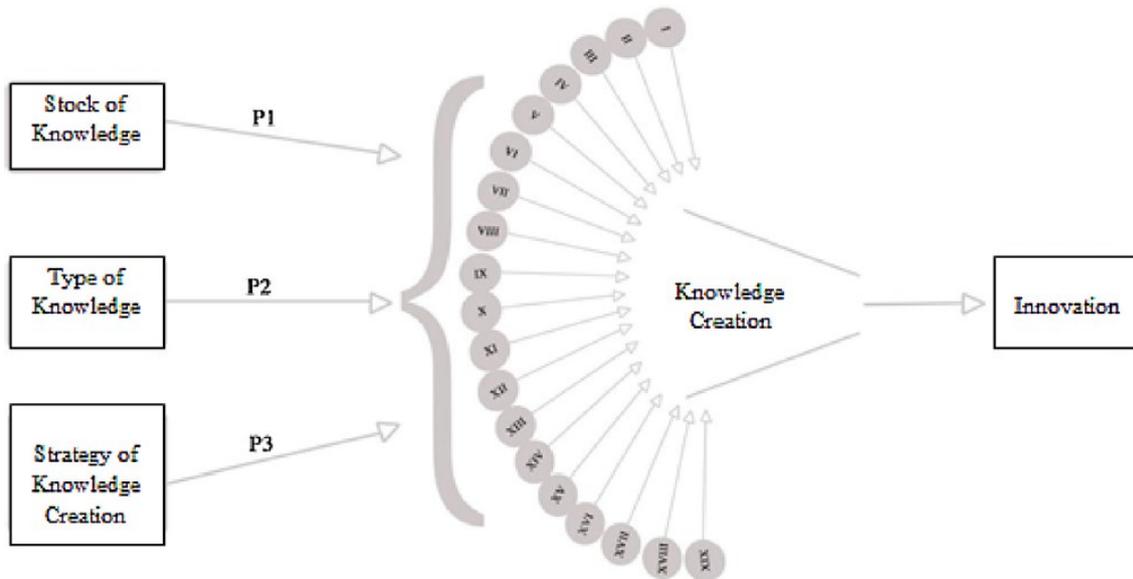
Source: Faccin and Balestrin (2018, p. 12).
**Figure 4.** Conceptual product.
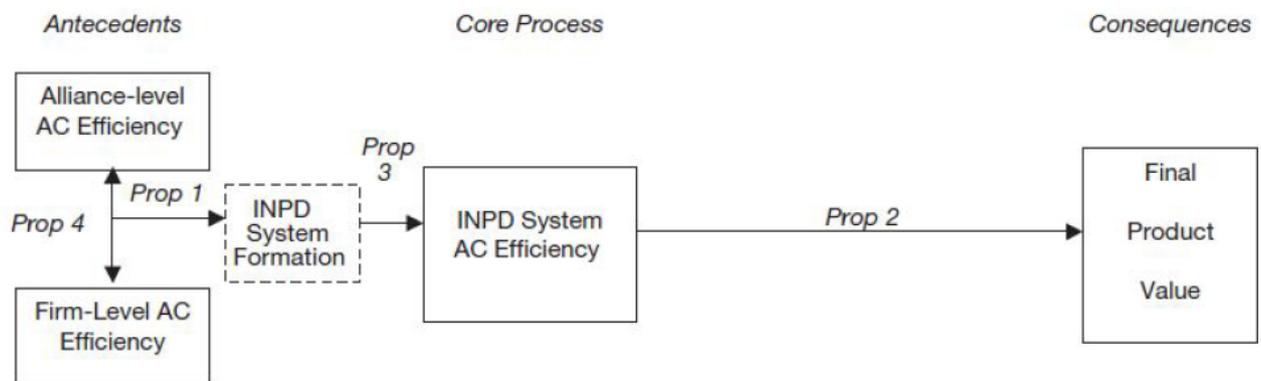


Source: Newey and Verreynne (2011, p. 12).
**Figure 5.** Example of a theoretical model.

## 9. THE ROADMAP TO APPLY THE PROCESS RESEARCH APPROACH

Considering the analysis of the articles (Table 2), we developed a roadmap and a script for researchers to conduct a reliable qualitative research process.

Table 5 shows a set of elements the researcher needs to consider when performing a process study. They range from choosing the approach, which needs to be done with caution, as it is not all research problems that can be used with this type of approach, even the advantages over more positivist studies.

Fundamental issues to qualitative research, in general, are also addressed, such as the selection of data sources, the concern with triangulation to confirm findings and reduce possible bias in the collection, the selection of informants and the validation of findings with them. More specific issues of the processual approach, such as the temporal choice and clarity in the definition of the process to be studied, stand out among essential elements for the methodological rigor of the approach.

Finally, the most crucial aspect of qualitative research is to show the data, since this allows a con-

**Table 5.** Roadmap of process data research.

| Elements of quality | Tips | Strategies | Reasons to adopt |
|---|---|---|---|
| Research problem | Have a process research problem. | See if what you want to analyze is static or dynamic. See if you want to analyze the issue now or how you got to the present moment. A simple metaphor to understand is comparing a photo and a film. The photo presents a static image of what "things" are like, whereas the film is a sequence of images in which different events occur between the first and final images. | When we study a company's ability to innovate, for example, static studies can provide us with the company's capabilities to be innovative. However, in a process study, we have the paths, the successes and the obstacles that the company had to face to reach its current capacity for innovation. We have, for example, the different capacities mobilized over time, the changes, and the events that caused these changes. |
| Process target | Be clear about the process "target," e.g., the process of interorganizational knowledge creation, internationalization process... | Create an image that demonstrates "situation x" at time zero and "situation x1" at time n — what is in the middle of these two situations is the studied target process. | It allows giving clarity about the process that will be studied. Also, different ways of the theorizing process (to being or to becoming) make actions more or less focal (Feldman, 2017). |
| Temporal orientation | Be explicit about the process orientation. | Retrospective orientation: Start the structuring of the narrative process from public secondary data available in theses, articles, newspaper, and magazine reports. Then complement it with primary data and private secondary data. Real-time: Bet on observation as your first option for data collection. | To study a process, it is essential to define the temporal orientation before beginning the study to plan the data collection. |
| Units of analysis | Emphasize event counting in the data collection process. | Use design play (lego) or ask your interviewee to design the process, for example. Always include questions in your interview script, asking "Please, tell me an example of this situation". Also, start your interview by asking "Tell me what this process has been like since". | The richness of a process study is in events. Events are those little stories that people tell or those scenes that the researcher can observe. Therefore, these strategies can assist the sensemaking process and rescue essential memories of the research process. |
| Sampling | Make sure you have data and informants who have experienced the process. | You can separate your informants and data sources according to the phases (time) of the studied process. Present the number of sources per period. Also, you will need a big number of respondents. | Achieve theoretical saturation. |
| Data source | Have a rich inventory with multiple data sources. | Search for online information, newspapers and magazines, books, theses, and articles. Also, ask respondents if any internal documents can be accessed: emails, slide shows, meeting minutes... Be creative! | Data triangulation is important for any qualitative research. In process research, however, it is especially important to check the order of events and those that generate the phase changes throughout the process. |

**Table 5.** Continuation.

| Elements of quality | Tips | Strategies | Reasons to adopt |
|---|---|---|---|
| Analysis | Understand the pattern of events. | Use "iterative theorizing," triangulation, and hermeneutic treatment of materials during analysis (Langley & Tsoukas, 2017). | This will allow us to explain the sequence of events that led to a result (for example, it is necessary to do A and B to obtain C). Thus, understanding the pattern of the event is fundamental to developing theories using processes (Langley, 1999). |
| Conceptual products | Make the process visible and provide a contribution. | You can present maps, drawings, theoretical templates. | Conceptual products are important to present the complexity of the process (that idea of what you want me to design). |
| Collective sensemaking | Confirm that you captured the collective essence of the process. | Present the results of your analysis to a sample of respondents, present the impressions in your study. | This is an interesting strategy to validate your results. |

nection between the raw data and the results of the analysis and makes it possible to visualize the emergence of theory (Bizzi & Langley, 2012). Data presentation data in qualitative research must convey a context to the reader in order to provide a personal experience of the phenomenon and support the emergence of theory. In this sense, the combination of strategies for presenting results lends conceptual wealth to the final product of qualitative research (Bizzi & Langley, 2012).

Figure 6 presents elements of quality for any researcher who decides to use a process data approach in his/her study.

**FINAL REMARKS**

Using some studies as exemplary, we examined how papers on this topic analyze temporal orientation, units of analysis, sampling, data sources, analysis methods, and conceptual products. As a theoretical guide to meet these points, we used the studies of Bizzi and Langley (2012) and Langley (1999).

Our main contributions are to present the process approach as an enriching possibility for innovation management studies and studies such as those on project development and organizational behavior; and to create a roadmap for beginners. Such contributions gain relevance in a scenario in which theories about organizational processes take two forms,

making the action more or less focal. The first, focused on rationality, prevalent in organizational research, highlights specific actions, at specific times, carried out by specific people. The second addresses the process as starting from one point and ending at another. That is, it perceives the movement (Feldman, 2017).

Thus, the process approach presented in this article has the role of making current representations of models such as boxes with words and arrows be seen from another perspective, which considers what is in them, the relationship between one box and another, and between the arrows and the boxes. It thus pays attention to the dynamics, the movement. There are numerous general opportunities for the management area. The examples in the field of innovation management were just a way to demonstrate the potential to be explored through the process approach.

Despite this process being part of an orientation that strives to receive recognition within the management mainstream, it cannot be denied that it is an evolution that we already have studies that consider dynamics, which bring the movement logic to the area.

Once we understand that organizational complexity cannot be captured statically, we also grasp that studies without a processual perspective reproduce a myopic view of organizational practices, processes and behaviors.

Although this was not the objective of this article, it is essential to highlight that there are already
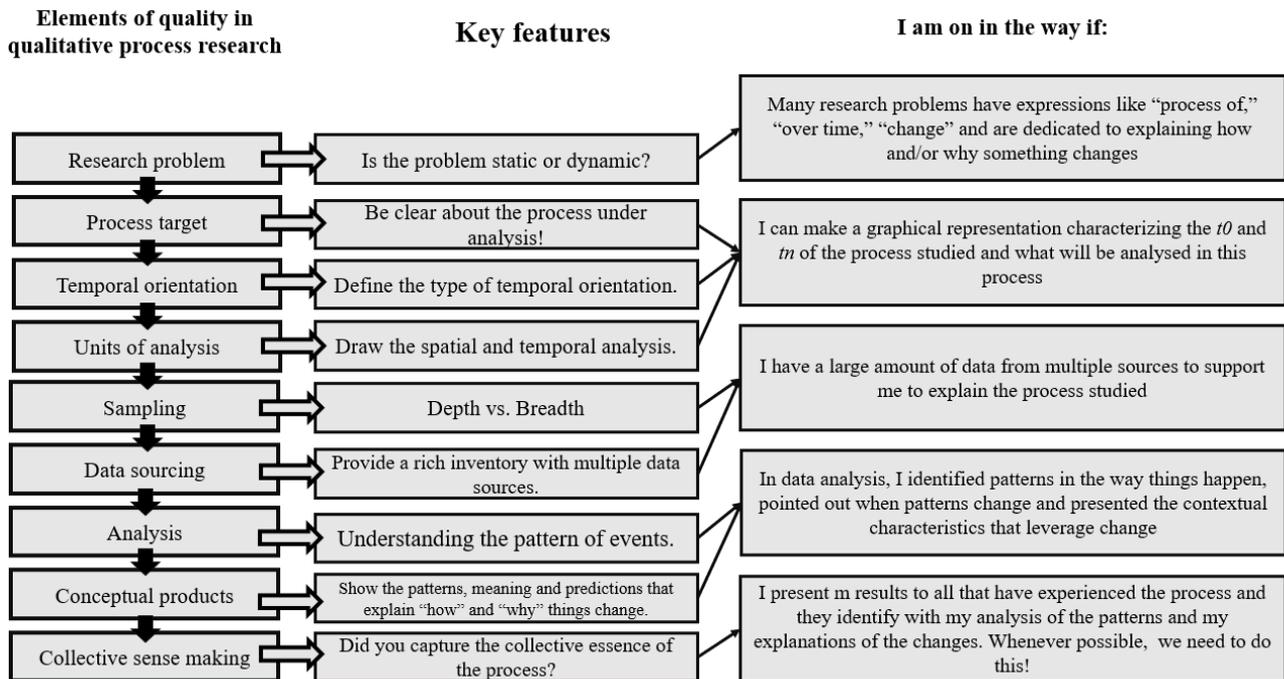
**Figure 6.** Synthesis of elements of quality to conduct process data approach.

discussions going on about how confident process studies are for theory creation (Cloutier & Langley, 2020; Fisher & Aguinis, 2017). Another critical discussion not dealt with in this article, but which should be of interest to scholars and beginners in research using the process approach, is how processes are carried out. Abdallah et al. (2019) identify four ways of carrying out process research that they label: histories of evolutionary processes, histories of performative processes, histories of narrative processes and histories of toolkit-oriented processes. There are many opportunities to use this approach for organizational studies.

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# *A ABORDAGEM PROCESSUAL COMO OPORTUNIDADE DE APRIMORAMENTO DE ESTUDOS NO CAMPOS DE GESTÃO DA INOVAÇÃO*

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## DETALHES DO ARTIGO

## RESUMO

**Objetivo:** Este artigo apresenta a abordagem processual como uma oportunidade para aprimorar os estudos de gestão e criar um roteiro para iniciantes. A pesquisa de processo é um método paralelo de conduzir estudos qualitativos. A preocupação fundamental da abordagem de processo é capturar e apreender os significados atribuídos aos fenômenos organizacionais diretamente no campo de pesquisa, visando entender e responder às questões de "como" e "por que" os eventos mudam ao longo do tempo. **Método:** Este estudo faz uma revisão em pesquisas recentes sobre gestão da inovação que usaram critérios da abordagem processual (orientação temporal, unidades de análise, amostra, dados, estratégias analíticas e produtos conceituais) como pano de fundo. **Principais Resultados:** O principal resultado deste trabalho é a criação de um roteiro para a aplicação da abordagem da abordagem processual. Além disso, destacam-se elementos de melhoria para estudos de gestão baseados na abordagem de dados de processo. **Relevância / Originalidade:** Este estudo fornece vários exemplos de pesquisa de processo qualitativo em inovação. O roteiro proposto ajuda a aumentar o rigor e os usos dessa abordagem de pesquisa. **Contribuições Teóricas / Metodológicas:** Oferecemos uma discussão acadêmica sobre o papel da pesquisa de processos na melhoria dos estudos de gestão (da inovação).

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