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An Organization- and Process-Based Framework of It Affordances for the Is Discipline

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Research full-length paper

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Abstract

A growing number of Information Systems (IS) researchers are applying the theory of affordances to study the uses and consequences of the Information Technology (IT) artifacts in organizations, necessitating an integrative view of the subject. However, the definition of IT affordance varies in the originating literature, lacking coherence.

We offer a framework for organizing the existing literature. This framework models affordances' manifestations as effects of people's actions at the organizational level. We reviewed 495 articles in IS, Organizational Studies, and Management literature, and closely examined a filtered subset of 220 articles.

Our work makes three main contributions. First, we address the concept of IT affordance at the organizational level. Second, we looked and classified existing affordance literature into four main areas: affordance existence, affordance perception, affordance actualization, and affordance effect. We provided an exploration of each element in those areas and its implications at an organizational level and for a process-based orientation. Finally, we offer an analysis of the methodologies used on the literature to signal a potential venue for future research in the use of empirical quantitative methods to address an existing gap.

Keywords: Organizational level, IT Affordances, Affordance's Theory, Literature Review

1 Introduction

Presence of theory of affordances (Gibson, 1986) in the Information Systems (IS) literature (Zammuto et al., 2007; Markus and Silver, 2008; Yoo et al., 2012; Majchrak and Markus, 2012; Volkoff and Strong, 2013; Leonardi, 2013; Seidel et al., 2013; Demir, 2015; Andersson and Robey, 2017; Jarrahi and Nelson, 2018; Stoeckli et al., 2020) materializes interest from the academic community on its potential avenues for research and practice. The direct applicability to explore the relationship between Information Technology (IT) artifact and organization where it is implemented (Markus and Silver, 2008; Majchrzak and Markus, 2012) signifies the potential relevance. Our focus on the IT artifact is consistent with the ongoing development of the affordance theme at the intersection of IS and technology (Savoli and Barki, 2013; Leonardi, 2013; Volkoff and Strong, 2013).

Originating literature is scattered across different disciplines and there is an apparent lack of consensus on its definition (Pozzi et al., 2014). Thus, with this paper, we address the following research question: *How has the existing literature addressed the use of affordance theory on IS organizational implementation?* Following the four steps from Pozzi et al. (2014), we conduct a comprehensive review and summarize the existing literature that examines the role of affordance theory in IS at the organizational level. The four steps of the theoretical framework from Pozzi et al. (2014) are (1) Cognition, where an affordance emerges from the intertwining of IT Artefact and organization; (2) Recognition, when an affordance is observed and identified by the organization; (3) Behaviour, where the organization willingness enacts (actualizes) the affordance; (4) the Effect, the result of the aforementioned actualization.

We explicitly suggest that affordance existence relationally derives from the interaction of an IT artifact, which is characterized by its features, and an organization with relevant expertise and goals. To date, the prevalent focus on affordance has been at the individual user level. Thus, in contrast, we seek a better understanding of the contribution of affordance theory at the organizational level, thereby enriching the seminal articles at this level of analysis (Strong et al., 2014) by taking a process view. To achieve this goal, we organize previous works in this area and advance an integrative framework that encompasses the most recent version of affordance theory. We identify past and current contributions and research gaps in each part of the framework. In other words, with this paper, we provide a process-based theoretical framework that can support future research on affordance theory that focuses on the organizational level.

In the following section we offer the theoretical background that sustains our research, formalizing the definition of affordance. In the methodology we describe how we have executed our literature review. The results section offers an outlook at the how this literature has approached Affordance Theory in IS and how frequently the different steps of the theoretical framework of reference emerged over time. Finally, a discussion and conclusions over findings and potential implications for further research are offered.

2 Theoretical Background

In IS, the concept of affordance (employed in more recent papers, such as Zammuto, 2007; Markus and Silver, 2008; Yoo et al., 2012; Majchrak and Markus, 2012; Volkoff and Strong, 2013; Leonardi, 2013; Seidel et al., 2013; Demir, 2015; Andersson and Robey, 2017; Jarrahi and Nelson, 2018; and Stoeckli et al., 2020) originated with Gibson (1986) in the field of ecological psychology, comprising the interactions between an actor and his or her environment, defined as the surroundings of animals. The conditions that enable these interactions include both the properties of an actor and the environment (Gibson, 1986). It is from the relation between actor and environment that affordances emerge; without an actor, they do not exist (Chemero, 2003). Thus, affordances are preconditions for an activity, but they do not imply that a specific activity will occur (Greeno, 1994). Hutchby (2001) was the first author to transfer the original concept of affordance from environment to technology, i.e., to IT artifacts. He considered the functional and relational aspects of affordance possibilities for action and acknowledged the potential of this approach for studying the complex relationships between technologies and actors.

IS literature has described affordances as possibilities for goal-oriented actions that emerge from the relation between an IT artifact, considered in terms of IT features, and actors. Actors are expected to be goal-oriented to trigger (Volkoff and Strong, 2013) or actualize (Strong et al., 2014) affordances to achieve an outcome; by themselves, affordances would be just potentials for action. Recent literature has also focused on the concept of constraints. Constraints, such as affordances, are the results of the interactions between actors and IT artifacts (Jarrahi and Nelson, 2018; Heng et al., 2019) that limit or restrict the possibility of achieving a goal.

In the seminal articles developing the concept of affordance, actors are individual persons experiencing and interacting with their surrounding environments (Gibson, 1986). In the early literature, we noted usages of the terms actor, user, person, individual, and agent as synonyms to indicate the human volition to take advantage of an affordance. Later, the spectrum of applications of the concept of affordance was extended to organization systems (Zammuto et al., 2007), groups of actors (Markus and Silver 2008), organizations in general (Strong et al., 2014), and social networks (Vaast et al., 2017). However, recent literature has pointed out that most previous research, lacking a holistic framework, focused on the individual level of affordances rather than the organizational level (Vaast et al., 2017) and in a very fragmented fashion (Karahanna et al., 2018). An example of this is the emergence of the needs-affordances-feature perspective (Karahanna et al., 2018), which draws from motivational needs theories to establish that innate psychological needs motivate people to use application features. From the relationship of such features with a user, affordances appear, and they can contribute to satisfy the user's original needs. To reduce confusion related to these terms, in this paper, we decided to use the word *individual actor* to refer to the single human who plays an active role in relation to an IT artifact. We use the word *organization* to refer to the human collective that relates to the same IT artifact. Affordances, at the individual actor level, can be juxtaposed and aggregated for the benefit of an organization. At the same time, new affordances, which were not present or perceived at the individual level, can emerge at the organizational level (Deng and Joshi, 2016). Indeed, many technological implementations result from several infrastructure elements and complex changes involving many individual actors, which are interwoven, and which generate new affordances. Moreover, a nonmaterialistic approach to the theory of affordances allows organizations to evaluate affordances and the consequences of technological implementations at the organizational level. Our concept of an organization is, hence, consistent with recent IS studies (Leonardi, 2013; Strong et al., 2014) which consider that an organization is a group of actors involved in the group's relation to a technology, who perceive affordances and perform actions to exploit the technology's potentials.

In addition, a process perspective is fruitful for assessing the organizational level, where more individual actors are expected to contribute to affordance perception and actualization and ultimately play different roles and at different points in time. However, even at the individual level, the value of a process perspective for studying affordances has already been highlighted (Bernhard et al., 2013). Affordance theory could therefore be enriched by an aggregated vision at the organizational level that may facilitate analysis of the relationship between an organization and an IT artifact from a process perspective. To provide structure to the review, the literature will be grouped according to the four steps of the process-based theoretical framework from Pozzi et al. (2014).

3 Methodology

A literature review about affordance theory requires an interdisciplinary approach. To conduct it, we followed the methodology proposed by Webster and Watson (2002) and the theoretical literature review typology of Paré et al. (2015). We used the following databases: ProQuest, Science Direct, JSTOR archive, ABI Inform, and EBSCO. To ensure that our literature was not limited to IS, we performed a search spanning IS, Organization Studies, and Management disciplines.

Following the work of Pozzi et al. (2014), we completed four fully tested electronic searches with each database via the following four alternative couples of keywords: (1) "affordances" and "theory", (2) "affordances" and "technology", (3) "affordances" and "information systems", and (4) "affordances" and "information technology". To broaden our search, we also examined works of potential interest published in IS conference proceedings, reviewing the proceedings of the ICIS, AMCIS, and ECIS conferences while employing the same sets of keywords. Finally, we reviewed citations, following a Go Forward and Go backward approach, to identify additional articles to include in the review

(Webster and Watson, 2002). We concluded our retrieval in September 2020, gathering a total of 401 articles published in journals and 94 conference papers, for an overall total of 495 articles.

List of Journals	Number of papers selected and coded for the analysis	List of Journals	Number of papers selected and coded for the analysis
Journals in IS (123 papers)			
Behaviour & Information Technology	1	International Journal of Education and Development using Information and Communication Technology	1
Electronic Markets	5	Journal of Enterprise Information Management	1
Ethics and Information Technology	1	Journal of Information Policy	2
European Journal of Information Systems	4	Journal of Information Technology	15
Information & Management	3	Journal of Management Information Systems	4
Information and Organization	14	Journal of Strategic Information Systems	3
Information Society	2	Journal of the Association for Information Science & Technology	2
Information Systems Journal	7	Journal of the Association for Information Systems	18
Information Systems Research	2	Knowledge and Information Systems	1
Information Technologies & International Development	1	MIS Quarterly	25
Information Technology & People	3	International Journal of Human-Computer Interaction	1
Information Technology for Development	3	International Journal of Information Management	2
Information, Communication & Society	1	Business & Information Systems Engineering	1
Journals in Organization Studies, Economics and General management (37 papers)			
Academy of Management Annuals	1	Knowledge Management Research & Practice	1
Academy of Management Review	1	Management Communication Quarterly	3
British Journal of Management	5	Management Revue	1
Corporate Communications	1	Management Science	1
Encyclopedia of Management Theory	1	Organization	2
International Journal of Contemporary Hospitality Management	1	Organization Science	6
Journal for East European Management Studies	1	Organization Studies	2
Journal of Business Economics & Management	1	Public Management Review	1
Journal of Change Management	1	The Journal of Applied Behavioral Science	1
Journal of Knowledge Management	6		
Other Journals (14 papers)			
BMC Health Services Research	1	New Technology, Work & Employment	1
DiGeSt. Journal of Diversity and Gender Studies	2	Psychological Review	1
Feminist Review	1	Research in Learning Technology	1
International Journal of Training & Development	1	Review of Social Economy	1
International Studies Quarterly	1	Sociology	1
ISPRS International Journal of Geo-Information	1	Sustainability	1
Journal of Engineering Design	1		
IS Conference proceedings (46)			
AMCIS Conference Proceedings	11	itAIS Conference Proceedings	1
ECIS Conference Proceedings	5	SIGCHI Conference Proceedings	1
ICIS Conference Proceedings	26	Wirtschaftsinformatik Proceedings	2

Table 1. Selected Literature: Analyzed Articles from Journals and Conference Proceedings, Analyzed 220 papers in total.

To evaluate whether the gathered journal articles and conference papers warranted inclusion in our literature review, the following additional criterion had to be satisfied: affordance theory is present in the paper and the article concerns or is relevant to affordance theory in IS, Organization Studies, and Management disciplines. We manually screened 495 articles to filter them based on this additional

criterion. A total of 220 documents, 174 journal articles and 46 conference papers, met this condition. We analyzed each article to identify the IT related, the organizational level and the process elements of the affordances. We focus our attention on affordances related to IT, whereby we limit our scope to the "IT artifact" domain rather than any object domain. We limited the actor constructs to organizations as we are interested in understanding affordance perception and actualization at the organizational level of analysis. We advanced a process perspective on affordances adapted to fit the organizational level, and the IT artifact domain. For each article in the literature review, we noted where any of the following four process-based constructs are present: Affordance existence, affordance perception, affordance actualization and affordance effect. Finally, we explore where other factors, moderators and mediators, complementary or alternative could influence affordance existence, perception and actualization and effect.

The framework we adopt for our literature review is consistent with current IS studies that adopt an affordance perspective (Hutchby, 2001), which differentiates affordance existence from perception. In their original formulation, these two phases were considered an overall cognitive process, but we prefer this distinction between a cognitive phase where affordance comes into existence and the following phase when affordance is instantiated through perception. Thus, our theorization accounts for those factors that limit, first, the reification of affordance through its intertwining with an IT artifact and, second, an organization's actual recognition of affordance as a potential action.

Our categorization of the literature is concept-driven (Webster and Watson, 2002), and the results are organized consistently in a concept matrix (Webster and Watson, 2002). Following Paré et al.'s (2015) theoretical review typology, we draw on the existing "concepts, constructs and relationships" from the reviewed literature to develop our original organization- and process-based framework of IT affordances for the IS discipline.

4 Results

The analysis of all the papers sampled via the selection criteria described in the methodology section provides three main findings. First, a concept matrix table summarizes the review of each of the 220 reviewed papers, providing a general outlook on the existing relevant literature. Second, an analysis of the main methodology used in the reviewed papers facilitates a longitudinal focus on the evolution of the methods used to investigate the adoption of affordance theory. Third, an analysis of the separate steps of affordance theory provides an internal view of the different areas of interest of researchers regarding affordances.

The concept matrix table (summarized on Figure 1 and Table 2) provides an overview of the papers on the affordance concepts with details about the methodologies applied as well as the types of affordances investigated. Based on this list of publications, since 2010, the number of articles where affordance theory appears has increased, demonstrating that the theory's relevance to IS has increased over the last ten years. However, there are peaks in 2013 and 2018, with a decrease in published papers in the nine months of 2020 that are accounted for (Figure 1).Specifically, looking at the usages of different methodologies (Figure 1) between 1991 and 2008, theoretical papers were predominant. Since 2010, articles based on affordance theory (using quantitative and qualitative methods) have mainly relied on case studies. Quantitative methodology articles appeared regularly from 2011, though they comprise a minority in the affordance research. Finally, literature reviews, starting in 2013, became more common in journals, but none of these integrated the organizational and process perspective, as we have done. In sum, we discovered an initial period with mainly theoretical articles, after which case studies became prevalent, and then, finally, affordance theory became increasingly associated with literature reviews.

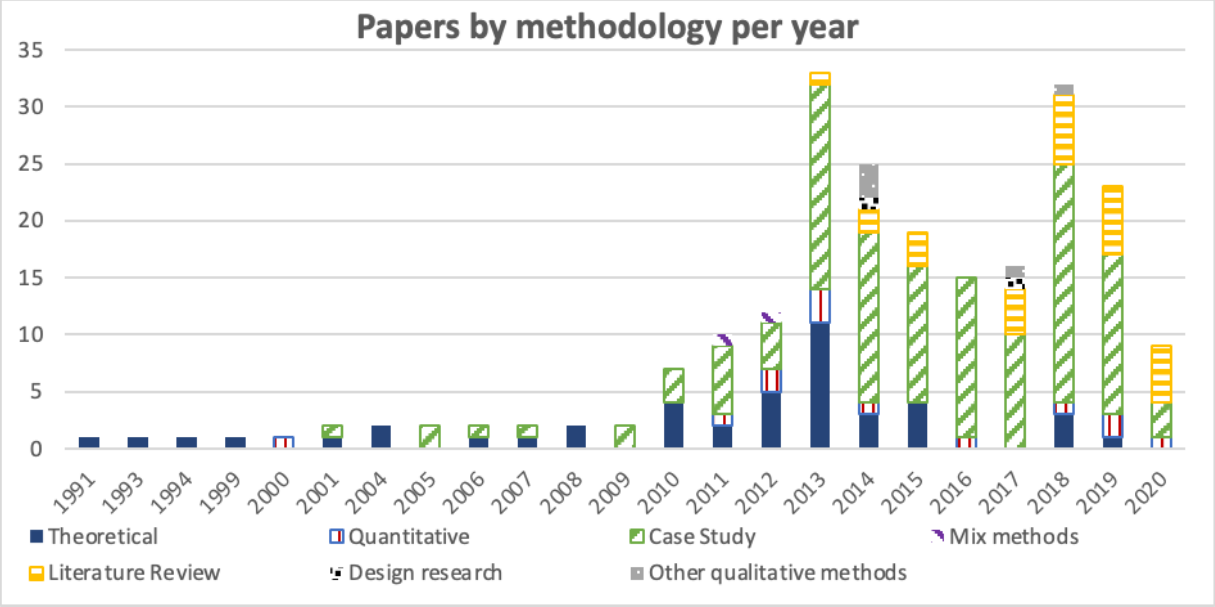

Figure 1. Papers by Methodology per Year from 1991 to 2020.

Regarding each step of the affordance process, we first account for the uninterrupted attention directed toward affordance existence in all our articles (Table 2). Moreover, researchers progressively focused on the subsequent steps of the affordance process. The affordance perception step has been regularly cited since 2004. In the third step, affordance actualization was first mentioned in 2005. Finally, the affordance effects are first taken into account in 2007.

Hence, we understand that the process perspective is increasingly accepted and studied in the research community and that researchers are taking more comprehensive approaches in their analyses of affordances, from affordance existence to affordance effects. Nonetheless, to date, affordance perception remains more cited (54%) than affordance actualization (32%), which in turn is more cited than affordance effects (21%). Specifically, Table 2 shows the number and percentage of papers that investigate each step of the process-based affordance theory framework. Remarkably, almost 60% of the affordance actualization literature is concentrated between 2009 and 2014. We can therefore trace the concept from the disruption via its introduction to its refinement and maturity (Strong et al. 2014; Leonardi 2013; Volkoff and Strong 2013; Bernhard et al. 2013).

The literature review provided a longitudinal perspective on the irruption of affordance theory and its development and consolidation as an established IS theory. This can be observed by contrasting the main exploratory papers that structured the theory (Zammuto et al., 2007, Markus and Silver, 2008; Majchrak and Markus, 2012; Volkoff and Strong, 2013) with the most recent articles from 2018 to 2020. In this recent literature, we observe how affordance theory is used as a consolidated theory that has outcomes, such as identifying affordances for specific technologies, e.g., health IS (Vos et al., 2020) or social media (Makki et al., 2018). In other words, papers use affordance theory to trigger outcomes rather than exploring the theory *per se*.

Even though the results appear to mimic a funnel, several papers skipped one or more of the intermediate conceptual steps even though we identified the posterior steps in them. For example, for several authors, the affordance actualization process was not an explicit prerequisite for the Affordance Effect (Yoo et al., 2012; Leong et al., 2016). Those papers were the exception, however, as most tended to follow a process-based approach.

Affordance theory process-based framework steps presence on analyzed papers per year								
	Affordance Existence		**Affordance Perception**		**Affordance Actualization**		**Affordance Effect**	
Year	Abs.	%	Abs.	%	Abs.	%	Abs.	%
1991	1	100%	1	100%				
1993	1	100%						
1994	1	100%	1	100%				
1999	1	100%	1	100%				
2000	1	100%						
2001	2	100%						
2004	2	100%	1	50%				
2005	2	100%	1	50%	2	100%		
2006	2	100%	1	50%	1	50%		
2007	2	100%	1	50%	1	50%	1	50%
2008	2	100%	1	50%				
2009	2	100%	2	100%	2	100%		
2010	7	100%	3	43%	4	57%		
2011	10	100%	6	60%	6	60%	1	10%
2012	12	100%	2	17%	4	33%	2	17%
2013	33	100%	17	52%	9	27%	5	15%
2014	25	100%	17	68%	16	64%	4	16%
2015	19	100%	15	79%	2	11%	2	11%
2016	15	100%	13	87%	6	40%	12	80%
2017	16	100%	9	56%	4	25%	9	56%
2018	32	100%	9	28%	4	13%	3	9%
2019	23	100%	11	48%	5	22%	2	9%
2020	9	100%	6	67%	5	56%	5	56%
Total	220	100%	118	54%	71	32%	46	21%

Table 2. Process-Based Affordance Theory Framework Steps Based on Analyzed Papers per Year. The numbers refer to absolute (Abs.) and percentage (%) value among the total number of papers in a year where the construct is found.

5 Discussion

Overall, the progressive adoption of this process perspective about affordances does not lead to the emergence of a consensus around a particular process-based model. The most recent research on affordances does not agree on a preference for any particular model and several authors develop their own model, such as the needs-affordance-feature perspective of Karahanna et al. (2018).

This fragmentation of research efforts drove our work to bridge this conceptual gap with a coherent model. Our main theoretical contribution is thus a novel revision of the existing literature, using for reference the theoretical framework from Perez and Vitari (2020), an organization- and process-based framework of IT affordances for the IS discipline that encompasses the different affordance models identified in the literature.

The process view of affordances at the organizational level (Figure 2) includes four distinct steps in the affordance process: Cognition, Recognition, Behavior and Realization. These steps conceptualize and extend and integrate the contributions of the reviewed literature.

A specific section is devoted to each step of the process, based on the temporal-causal order. For each step, we provide a definition of the step, we develop a synthesis of the reviewed literature, we draw

implications directed to the study of the affordances at the organizational level and in a process-based perspective.

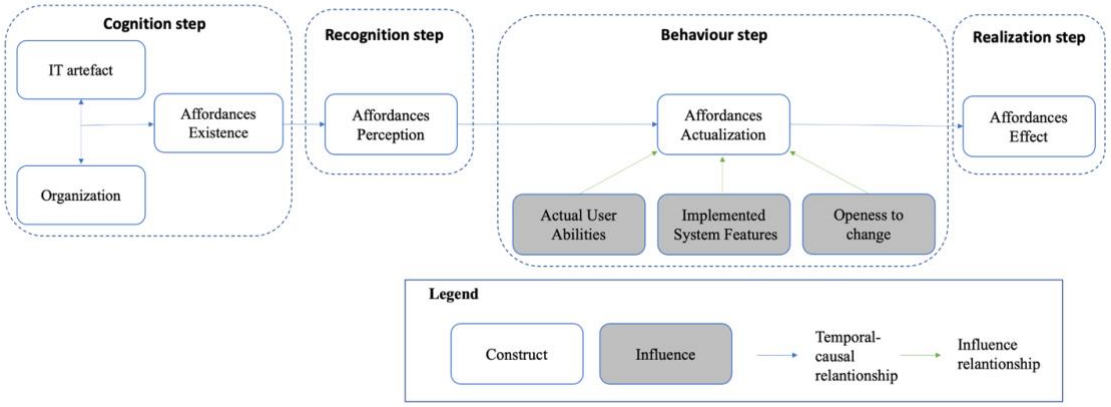

Figure 2. Theoretical Framework: The "Organization and Process-based Framework for IT Affordances", from Pérez and Vitari (2020) used to structure the literature review.

5.1 Cognition Step

Synthesis of the literature

The first contribution from existing literature in affordance theory that we clearly observed was the Affordance Existence, first construct of the theoretical framework. The observation of the emerging affordance is as well the most theoretical studied construct by scholars. In the IS field, affordances have typically been used to understand usages and adoptions of existing or new technologies. Therefore, the identification of what a technology may allow is of primary concern.

As already mentioned, we consider Affordance Existence a cognitive process (Davern et al., 2012) that is distinct from the subsequent recognition process in affordance perception. That is, we recognize the products of the interactions between IT artifacts and organizations during Affordance Existence. Affordances are preconditions to an activity, properties of when an actor interacts with an object in such a way that an activity can be supported (Greeno, 1994). Affordances exist regardless of whether an organization cares about them, whether they are perceived, or even whether there is perceptual information for them. Following Pozzi et al. (2014) example, a door allows an actor to go into another room, but it does not require the actor to perform any particular cognitive process for its existence. Affordances emerge from the relationship between actor and other systems (Greeno, 1994), their nature is relational (Hutchby, 2001; Zammuto et al., 2007; Majchrzak and Markus, 2012) as they are not inherent in the actor or the artefact by themselves. Yet, they are technology and actor specific (Strong et al., 2014) that previous door will only allow to change rooms if the specific actor is smaller than the specific door. Affordances are not only functional, but the result of a goal-oriented action offered to specified actors' groups by a technical object. (Markus and Silver, 2008) as someone will change rooms through the door, only if he intends to do so.

Affordances have been identified as enablers, as potentials of action (Leonardi 2011; Zammuto et al., 2007; Majchrzak and Markus, 2012), as a door can enable to change rooms. But hat same door can also prevent movement if the actor is bigger than the gap, therefore affordances can enable or constraint a certain action (Jarrahi and Nelson, 2018). The characteristics of both actor and artefact will condition if an affordance or a constraint emerge for their intertwining (Volkoff and Strong 2013; Perez and Vitari, 2020).

Implications for the Organizational level

Adopting affordance theory in the IS domain has two major implications. First, researchers and practitioners no longer address individuals as the only actors engaged in relationships with IT artifacts, since organizations are presented as groups of people, teams and business units and thus considered actors who originate, perceive, and enact affordances to support organizational goals. For example, a company implementing ERP software to manage current digital orders from customers of its commercial department provides affordances to offer centralized accessible information on sales to other departments. Here, the potential for coordinated action by a group of actors can be deemed an organizational affordance (Zammuto et al., 2007; Volkoff and Strong 2013; Strong et al., 2014). Second, affordances, which maintain all the characteristics indicated above, are considered and often called technology affordances, i.e., action potentials that an organization with a particular purpose can realize with a technology or an IS (Markus and Silver 2008; Savoli and Barki 2013; Seidel et al., 2013). Deng and Joshi (2016) developed the concept of a system of affordances. This system is the result of aggregating the individual affordances that arise from the relationships between actors and artifacts from each technology. Kane (2017) goes farther, defining social media as a set of affordances. This nonmaterialistic approach to technology provides a new lens to study the relationships between technology and organizations. On the other hand, constraints can also arise at an organizational level. Defined as the "ways in which an individual or organization can be held back from accomplishing a particular goal when using a technology or system" (Majchrzak and Markus, 2012).

Implications for a Process-Based orientation

The Cognition step of the framework reifies the relational nature of affordances by placing them as results of the intertwining of IT Artifact and Organization. From the relationship between the two at an organization level, both constraints and affordances emerge in their initial stage: existence. The affordances and constraints of affordance existence constructs are connected to their following stage, where they enter the recognition step through temporal-causal relationships.

5.2 Recognition Step

Synthesis of the literature

Affordances need to be perceived by actors to fulfil their potential, a process of recognition (Greeno, 1994). Affordances are not evident to perception (Hutchby, 2001), until a specific goal-oriented actor perceive particular affordances, specific potential of actions for him. Only when an actor wants to change rooms, will he perceive the door as the enabling artefact to achieve his goal. Therefore, the affordance perception process is the relationship between a specific actor and a specific system (Pozzi et al., 2014).

Implications for the Organizational level

Affordance perception at an organization level involves contrasting opinions. On one side, Volkoff and Strong (2013) consider that affordances do not need to be perceived, as they only exist as the result of the actor's intent (using the functional affordance concept from Markus and Silver, 2008). Therefore, Volkoff and Strong (2013) consider observed phenomena, actualized affordances, that reflect the underlying affordances, in finished actions. On the other hand, Zammuto et al. (2007) suggested that a technical object needs to be recognized as a social object, and "as a social object, its influence on organizational functioning and performance cannot be separated from expertise, jobs, processes, or structures". We take side in favour of this recognition in our process-based theoretical framework as an independent step. Building on the example of ERP software implementation above, the accounting department may perceive the affordance of "visibility" in the information of their sales colleagues; meanwhile, the sales department may perceive the affordance of information "availability" because they no longer must rely on paper records in their own operations. Constraints, akin to

affordances, can also be perceived (Leonardi, 2011). An affordance would be perceived positively, while a constraint would be perceived negatively (Heng et al., 2019).

Implications for a Process-Based orientation

The Recognition step illustrates the process where an organization perceives an existing affordance or constraint. Even though both have originated from the same relationship at the Existence step, here, affordances are separated from constraints; the constraint process ends in the Recognition step, while affordances have a longer process. Both are connected through a temporal-causal relationship. Affordance Perception is also connected with the posterior Affordance Actualization construct. The Recognition step aims to depict that an organization needs to perceive an affordance before directing it toward a desired goal. Constraint perception therefore represents the possibility of an organization to actually identify the constraints that the intertwining of IT artifact and organization cause.

5.3 Behaviour Step

Synthesis of the literature

Affordance actualization is the result of the goal-oriented triggering of a perceived affordance by an actor. It is defined as the actions taken by actors when they take advantage of one or more affordances through their uses of technology to achieve outcomes in support of organizational goals (Strong et al. 2014). Original work from ecological psychologists (Gibson, 1986; Greeno, 1994) did not account for actualization as a process. Similarly, the scholars that integrated the affordance concept into IS (Hutchby, 2001; Zammuto et al., 2007) did not consider this triggering of an affordance as a separate construct. Recently, scholars' interest for actualization (Strong et al., 2014; Leonardi, 2013; Volkoff and Strong, 2013; Bernhard et al., 2013; Karahanna et al., 2018) and enabling factors (Perez and Vitari, 2020) have become central to the affordance discussion.

Implications for the Organizational level

Affordance Actualization instantiates an organization's behavior to achieve a desired goal. An affordance is actualized in the behaviors that organizations adopt to act perceived opportunities for action. However, actualization, expect few empirical examples, is presented as an individual journey, i.e., an individual-level process experienced differently by each actor taking goal-oriented actions (Strong et al., 2014; Leonardi, 2013; Volkoff and Strong, 2013). Strong et al. (2014), based on the collective construct literature, theoretically introduced the concept of actualization at an organizational level—the aggregation of many actors' actualization processes at an individual level. In other words, actualization as an organizational journey emerges as the sum of multiple actor-level journeys. To actuate affordances at an organizational level, Leonardi (2013) introduced the concept of a shared affordance, that is, an affordance shared by all members of a group where all actors manifest similar uses of technology features. Leonardi summarized this, suggesting that only when actors agree on the usage of a similar sequence of technology features can an affordance created by interactions with a specific technology be actuated at an organizational level. Based on the existence of "collaborative affordances", Vos et al. (2020) described how the actualization of such affordances in an electronic health record (EHR) case study relied on a coordinated use by health professionals as a prerequisite. In our above example of an ERP implementation in a commercial department, only when the salespeople collectively begin to use the ERP software properly can the affordances be enacted for the organization. Otherwise, a partial or uncoordinated use of the software will not provide "visibility" to other departments or "availability" to the salespeople.

Volkoff and Strong (2013) conclude than an affordance may depend on the presence of appropriate enabling, stimulating, and releasing conditions. Pozzi et al. (2014) list the following conditions "*(1) technology configuration and technology features; (2) actualization of previous affordances; (3) difficulty of the actualization itself, i.e., the degree of effort an actor has to invest to act on it*

(Bernhard et al. 2013); (4) an actor's ability and understanding, i.e., cognitive load (Bernhard et al. 2013); (5) organizational and environmental structures and demands, (6) an actor's ultimate goal; (7) inability of an organization to perceive an affordance despite its availability; (8) willingness to change behaviors; and (9) organizational level skill or knowledge for the actualization of a given affordance".

Andersson and Robey (2017) created a model of affordances that sequentially expresses how IS solutions are first designed and then actualized through practice (dependent on user abilities and system features). The model includes two additional conditions for the actualization process: user perceptions and goals. This model allows the comparison between the expected or planned affordance and the actual affordances that arise on a specific IS implementation. This affordance potency could be an intermediate step between a user's perception of the affordance and enacting or actualization. However, at an organizational level, Perez and Vitari (2020) determined that situated affordances (Potency) do not comprise an isolated step in the process but are part of the actualization process. This is reflected in the theoretical framework by the inclusion of Implemented System Features and Actual User Abilities as influencing factors in the actualization process. A final influencing factor of Affordance Actualization identified by Perez and Vitari is the Openness to Change in an organization. Both Actual User Abilities and Openess to Change influencing factors take place at an organizational level, with the Implemented System Features they are included as influences on the Behavior step.

Implications for a Process-Based orientation

Affordances perceived by an organization can be consciously actualized or enacted by it. This is illustrated in the framework (Figure 2) by the Affordance Actualization construct's relationship with the previous Affordance Perception from the Perception step. The Affordance Actualization construct is, however, influenced by three additional constructs identified in the literature: Actual User Abilities, Implemented System Features and Openness to Change. These influences will condition the Affordance Actualization by an organization. Successful actualization is represented on the framework by a temporal-causal relationship between Affordance Actualization and the Affordance Effect from the next step. As a final remark on the Behavior step, our literature review shows no examples of the concept of potential constraint actualization. As per our definition, the actualization process requires an organization to act on an opportunity of action; hindering opportunities of actions through the actualization of constraints seems an unthinkable in literature.

5.4 Realization Step

Synthesis of the literature

The effects are the result of a goal-driven Affordance Actualization, a potential empirical result from an existing affordance (Pozzi et al., 2014). When an actor willingly acts on a perceived affordance, as a generative mechanism, causes an outcome.

Implications for the Organizational level

At an organizational level, the actualization of affordances also has the potential to cause a result. Scholars tend to differentiate Affordance Actualization results into two main sets based on actors' perceptions of time. In the short term, the effect generated from Affordance Actualization is called the immediate concrete outcome (Strong et al., 2014), i.e., a specific expected outcome from actualization that is useful for realizing an ultimate organizational goal in the long term: the so-called Affordance Effect. An immediate concrete outcome serves as an intermediary between actualization actions and ultimate organizational goals (Strong et al., 2014). Following our example of an organization implementing ERP software in its commercial department, the short-term effect of enacting the "availability" of information to the commercial team can be an increase in sales per customer, while in the long term, it can change the structure of the commercial team, as fewer man-hours will be required to sustain their sales per customer.

The actualization of an affordance may result in (1) enabling conditions for additional affordances, (2) developing additional IS features, and/or (3) enabling organizational changes. Actualized affordances provide explanations of causality at a level that is specific to the respect of the relevant technology in an organization (Volkoff and Strong, 2013). IT-associated organizational changes are now studied in terms of the results of Affordance Actualization processes. Most research is focused on cross-functional communication and informal network changes (Leonardi, 2013; Sebastian and Bui, 2012) and efficient controls of operations after IT implementations (Strong et al., 2014). Others look at the outcomes of such affordances, as they can produce positive, negative or paradoxical outcomes (van Zoonen and Rice, 2017).

Implications for a Process-Based orientation

The framework illustrates the affordance Realization step through its final construct, the Affordance Effect (Figure 2). It is connected through a temporal-causal relationship with the Affordance Actualization construct. Thus, in our process-based framework, the Affordance Effect represents the final stage of the affordance process.

6 Implications for research and practice

Our literature review provides a series of contributions for researchers and practitioners. In this section, we structure them using as reference the conclusions from the literature review from Pozzi et al. (2014).

First, we consider that the dispersion of definitions and models could benefit from our theoretical proposal. The usage of Perez and Vitari's (2020) framework should help consolidate the concept and its application by highlighting the main affordance process and its 4 steps. The concept of affordances offers a rich approach to study the effects of implementations and usages of IS. It facilitates the conceptualization of different perceptions and use patterns of IS based on how IS features relate to the goals and properties of specific actors and/or groups of actors (Markus and Silver, 2008; Sebastian and Buy, 2012). Affordance theory overcomes the debate in studies of contingency theory that balances technological imperatives against organizational imperatives (Zammuto et al., 2007). Affordance theory also transcends, on the one hand, the limitations of theories that emphasize only psychological or social behaviors—thereby ignoring the features and functionalities of IT—and, on the other hand, the limitations of the theories that make simplistic and deterministic assumptions about the effects of IT on human behaviors and organizational outcomes. In other words, affordance accounts for the possibility that organizations can achieve outcomes that would not occur without their uses of technology. Furthermore, it explicitly includes unintended and undiscovered uses of technology (Majchrak and Markus, 2012). Through the affordance lens, technology is no longer an outsider, i.e., an external force generating changes and possibilities for innovation, but an organizational factor.

Second, we advocate a view that is consistent with psychology researchers (Gibson, 1986; Greeno, 1994; Hutchby, 2001). Hence, the framework explicitly includes the Recognition step, where affordances, as well as constraints, are perceived. Similarly, we insist that affordance is relational in nature and alert scholars to the possible risks in identifying technology-specific affordances (Van Osch and Mendelson, 2011; Vitari and Pigni, 2014). A restricted focus on technological artifacts could result in the loss of affordances' relational natures, thereby transforming affordances into technology capabilities.

Third, in contrast with Pozzi et al. (2014), we consider affordance actualization has already been receiving recent attention by scholars (Anderson and Robey, 2017; Leidner et al., 2018; Dremel et al., 2020; Perez and Vitari, 2020). Both actualization itself as well as the factors that contribute or prevent its realization are being currently addressed.

Fourth, we observe that affordance effect continues to be underrepresented in the existing literature. Focus continues to be on why outcomes occur or not (Volkoff and Strong, 2013; Strong et al., 2014) or what an actor is trying to achieve through an affordance (Leonardi, 2013) rather than what the outcome actually is. This we continue to observe on more recent theoretical frameworks (Perez and Vitari, 2020).

Finally, case studies aside, empirical papers remain anecdotal within the whole set of publications. The application of quantitative methods seems to be lacking in affordance research. Efforts toward quantification could be relevant to provide diversified perspectives of empirical evidence. Such quantification efforts would be particularly useful for IS researchers who want to demonstrate how affordance potential becomes organizational opportunities for action that derive value and ultimately fulfil organizational goals.

7 Conclusions

We reviewed 495 articles from the information systems, organization studies and management disciplines. We used our findings to review an organization and process-based theoretical framework for IT affordances and to identify a number of implications for research and practice. Our literature review revealed the growing acceptance of a process-based approach to study IS affordances, while acknowledging an unequal recognition of the distinct constructs from Perez and Vitari's (2020) framework. The Existence and Perception of Affordances constructs are the most present in the reviewed works, followed by Affordance Actualization on received attention from scholars. The Affordance Effect is the less present of the constructs on the review literature, becoming a potential venue for future research. Another potential venue that our findings point out is the use of quantitative methodology to address the potential gap on empirical work detected in our review.

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