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An affordance perspective to understand the relationship between organization and IT

La perspective des affordances pour comprendre les relations entre organisations et TIC

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Abstract:

The objective of this paper is to enrich the Affordance Theory application on Information Systems literature. This paper follows the implementation of a CRM project, which includes ambitious Big data and Business Intelligence components, on an international organization. This research focuses on exploring the relationship between the organization and the Information System implemented project under the lens of the Affordance Theory. In result several affordances are identified, and their actualization analyzed under the Process-based Framework for Affordances. The results are used to improve the theoretical framework for future research on Information Systems.

Résumé :

L'objectif de cet article est d'enrichir la théorie des affordances dans son application aux Systèmes d'information. Du point de vue empirique, cet article suit la mise en œuvre d'un projet de CRM, qui comprend des composants Big Data et Business Intelligence, au sein d'une organisation internationale. Cette recherche se concentre sur l'exploration des relations entre l'organisation et la TIC mis en œuvre en s'appuyant sur le cadre théorique des affordances. En conséquence, plusieurs opportunités sont identifiées et leur actualisation analysées suivant le processus d'actualisation des affordances. Les résultats sont utilisés pour améliorer le cadre théorique de référence pour des recherches futures en Systèmes d'Information.

Keywords:

Affordance, Affordance Theory, Affordance Actualization, Affordance Effect, IS projects

Mots clés :

Affordance, théorie des affordances, actualisation des affordances, effets des affordances, projets informatiques

1. Introduction

It is common to find in the practitioners' magazines and academic journals topics related to Digital transformation or digitalization (Tabrizi et al., 2019). This relevance of Digital transformation can be observed on the amount of results and the increase year after year of papers that lever this concept. A search on the Association for Information Systems Electronic Library (AISEL) for "Digitalization" returns 1.925 hits in 2018, 716 hits in 2008 and 48 in 1998. The term Digital transformation usually refers to "*the process of using digital technologies to change a business model and provide new revenue and value producing opportunities or as the process of moving to a digital business*" (Gartner, 2018). This Digital transformation process is depending on the successful implementation of Information Systems (IS) projects in the organizations. IS are a central component for big corporations and a potential source for added value (Levi et al., 2002) while Information Technology (IT) has become inseparable from organizational activities (Blijleven, 2017) either public or private.

Failure in the IS project implementations is not difficult to find, for example in ambitious governmental IS projects (Casciani, 2014) or successful companies trying to improve their systems (Kolf & Kerkmann, 2018). IS research has had a negative bias towards studying failure project implementation (Heeks, 2006). Already in 1995 the Standish Group report "Chaos" (Standish Group, 1995) was searching the main driver for IS project's success or failure, determining the User Involvement (or lack of) as the critical factor. IS literature has already detected that the implementation of the same IT on different comparable organizations has had different degrees of success (Edmondson et al, 2001). Technical, management and business reasons have also been identified as potential causes of project failure, suggesting that a new methodology for project management may be the solution to mitigate failure (McManus & Wood-Harper, 2007).

With this paper, we contribute to shed light of IS project success and failures, leveraging the Affordance Theory (Gibson, 1977). Analyzing the existing IS literature on affordances, we provide a Process-based Framework for Affordances that explores the relationship of an implemented IS project and its users. The goal is to determine if the outcome of the implemented project is influenced by the organization where it is implemented, answering the following research question *how do organizations influence the actualization of IS affordances?* We address this question, exploiting the Process-based Framework for Affordances through a case study method around an international Customer Relationship Management (CRM) project and its implementation in a specific international Business Unit. The results of the case study are twofold. First, it identifies four affordances that rise from the implementation, one of which is successfully put into practice by the business unit. Second, the findings of the case study allow the enrichment of the Process-based Framework. This enriched version provides a theoretical backbone to sustain further research on the relationship between organization and IS and on IS project implementation.

2. Theoretical Framework

The multidisciplinary theoretical concept of affordances was initially developed in the field of Ecological Psychology by James J. Gibson (Gibson, 1977). An affordance is the possibility of

action that appears from the interaction of an actor and an artifact. It is then a relational concept, that only exist in the actor-artifact interaction. This principle has been firstly translated in the IT literature via the Adaptive Structured Theory (AST) (DeSanctis and Poole, 1994, 2004). In the AST, the interaction between the IT and the organization is seen as a socio-technical assemblage of two parts, the “spirit” and the “structural features” (DeSanctis and Poole, 1994, 2004). The spirit is the general organizational intent with regard to values and goals underlying a given set of structural features, while the structural features are the technical capacities of the system (DeSanctis and Poole, 1994).

Hence, when the affordance concept is applied to IT (Hutchby, 2001) it refers to the constraints and potentials that arise between the user and the technology –as an artifact. The application of this approach in IS favors a better understanding of the artifact and actor relationships within organizations. This affordance concept favors the revelation of different insights than what a simple functionality analysis of an artifact may offer. IS literature describes affordances as the possibilities for goal-directed action provided by an object in relation to a goal-oriented actor (Zammuto et al., 2007;; Strong et al., 2014). Markus and Silver (2008) levered the affordance lens, to further elaborate the AST. On one hand, they advanced that the “Spirit” concept should be seen as a “Symbolic expression”, i.e. the communicative possibilities of technical objects for a specified user group. On the other hand, the “Structural features” concept was divided into the “*Technical object*”, i.e. the IT artifact itself, and the “*Functional affordances*”. These Functional affordances are described as the possibilities of goal-oriented action afforded by the technical object to specific user groups.

Existing affordances can be perceived by the actors and depending on the circumstances, actualized (Strong et al., 2014). The actualization refers to the process where the actor, who perceived the potential affordance of an IT artifact, applies this affordance into its activity. By doing so the original affordance is actualized or triggered (Volkoff & Strong, 2013). This process from existence to actualization can be run at an individual as well as at an organizational level (Zammuto et al., 2007). Pozzi, Pigni and Vitari (2014) developed the Affordance Theoretical Framework to formalize the affordance actualization process at the organizational level. This Framework expresses affordances as the result of the intertwining of the IT artifact and an organization. Also, the affordance existence, perception and actualization are identified as processes (cognition, recognition and behavior processes) which result in an affordance effect.

Since the definition of the original Affordance Theoretical Framework two relevant concepts have been developed. First, the affordance potency process has been identified as an additional step in the affordance actualization path (Andersson & Robey, 2017). This affordance potency process reflects the degree of difficulty for an affordance to be actualized. This concept based on Strong et al. (2014) approach to affordance actualization states that there are two factors which act as enablers or constrains for an individual affordance actualization: abilities and preferences of the individuals and features of the system.

Second, the affordance actualization step can be enriched by Dulipovici, A. and Vieru, D. (2015) sociomaterial practice perspective approach. They offer a process model where, resistance, negotiation and accommodation actions from users condition the outcome of the relationship of the social context and the “technology-in-use”. According to this model, users’ perceptions of technology affordances and constraints shape their interpretation of reality and condition the outcome of the implemented technology.

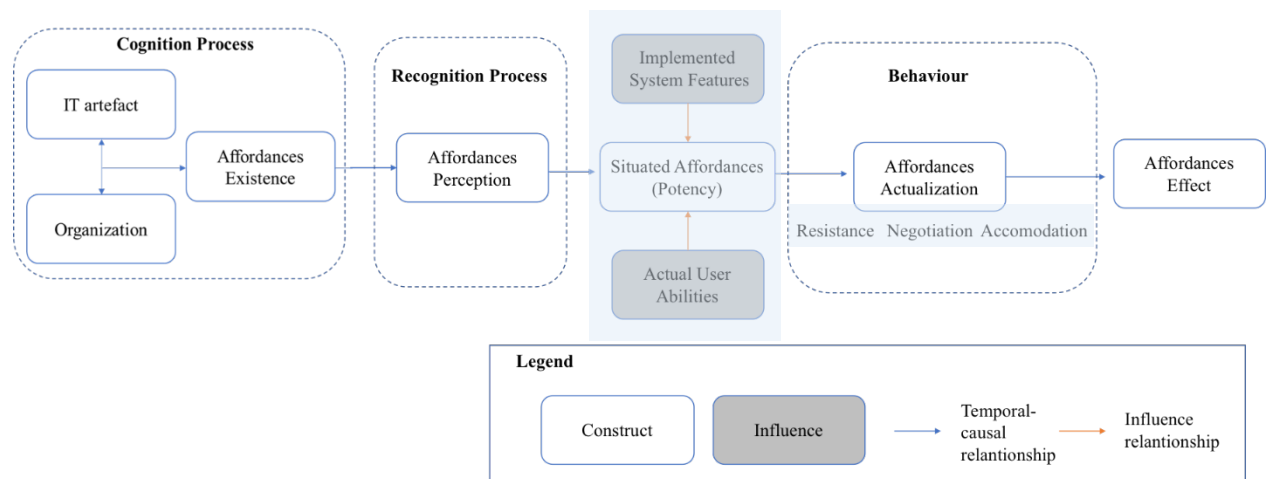


Figure 1 Process-based Framework for Affordances. With Blue colored background the new elements included in the original framework from our theory review

This research uses Pozzi, Pigni and Vitari (2014) Affordance Theoretical Framework as a starting point but integrating Anderson and Robey (2017) and Dulipovici and Vieru (2015) contributions and update it (Figure 1). The resulting Process-based Framework for Affordances is the model used in this research to address the influence of the organization on the actualization process outcome.

3. Methodology

A qualitative methodology has been selected to address the research goals. This research is designed consistently with the case study methodology (Yin, 2013). The case study explores the international implementation of a CRM project in a multinational food retail company. As affordances appear from the relationship between IT artifact and organization, the following sections describe both organization and IT artifact, as well as the case study design.

3.1 Organization

The studied organization is a German multinational food retail company, which main business model is a discount supermarket chain. It is part of a family owned private retail group. The multinational company is organized with one central international Headquarter (HQ) based in

Germany and a network of subsidiary companies (one per country) on all the countries where it has supermarkets. It is at the moment of writing this paper one of the ten largest food retailers in the world.

The country subsidiary companies have also their own Headquarter. In the following sections of the paper, the national subsidiaries will be called national business units.

This project is currently being implemented on different national business units, after a pilot in one of them. The international project implementation is led by a specific team of the digital & innovation division, at the international Headquarter of the company. This team coordinates, with each national business unit, the rollout of the solution. The solution has been conceptualized and developed by a third company. The national business units receive an extensive training from the international HQ digital & innovation division and the developer company, as well as a standardized IT platform and architecture. At the moment of the study, the national business units were granted freedom in what to do with the implemented project about their customer loyalty plans, within the technical boundaries of the implemented solution.

3.2 IT artifact

The implemented project is designed to offer the possibility of creating a digital customer loyalty program for the multinational retailer, in order to help increase the monthly purchase frequency of the retailers' customers and their average receipt.

From a technical point of view, the solution is structured around three components.

First, a smartphone application managed by a cloud third party software. This application allows the customers of the national business unit to identify themselves in the tills (via QR code) of the supermarkets owned by the organization. It also contains offers, services and promotions with third companies which the customers can only benefit from using the smartphone application.

The second component is the big data storage system. It is hosted by a leading cloud platform. The scope of the project's data collection required a flexible and always available solution. The customer experience in the supermarket required an ambitious big data platform, to ensure a lean process in the tills. When the customer identifies him or herself in the store tills, the till checks online the discounts and benefits available for the specific customer, hence requiring a solid and reliable system. After determining that none owned-server solution could match a cloud based big data platform, the organization decided to partner with a top-class platform.

The third and final component is the business intelligence solution. This component is set up by a series of dashboards, on which the national business unit employees can analyze and export information for insights generation, from the national level down to the single customers or products.

This paper is centered on the implementation of the project on one of the national business units. This national business unit has been the pilot organization for the international rollout of the project: the first market where the project was put into practice for customers.

3.3 Case-study design

The adequacy of case-study nature for exploratory work (Gerring, 2004) is the reason why this methodology was chosen for this research. Data has been gathered from nine semi-structured interviews, from the internal documentation that was accessible to the researcher and from the direct observation in the studied organization's workplace. The researchers have access to the main decision makers within the implemented CRM project, both at the national business unit and in the international HQ. Having access to relevant decision makers is an opportunity to provide qualitative insights from subjective sources that can be contrasted. The cost per subject is low, especially compared to the value of the data obtained from each of them.

Five of the interviewees are employees of the pilot national business unit, all of them with specific responsibilities on the CRM project. Two of those employees have a top management position, while the other three are employees in the team in charge of operational CRM activities, hence users of the projected CRM. The remaining four interviewees are employees in the international HQ digital & innovation division, with positions from International Vice-president to Team Leader. The interviews averaged a length of 36 minutes, with a range from 20 to 47 minutes.

Business unit	Role in the organization	Number of interviewed employees
International CRM team	Top management	3
	Employee	1
National business unit	Top management	2
	Employee	3

Table 1 Interviewees distribution according to their business unit and role in the organization.

The interviews were recorded during July 2017, one year after the project was rolled out into one tenth of the supermarket stores managed by the national business unit. That year was taken as a "learning phase" (internally named "Proof-of-Concept"), before rolling out the project to all the stores. At the moment of recording the interviews, the employees of the national business unit had at least a year of experience with the implemented features. On the other hand, the national managers had time to consider the value of the project and the potential risks of implementing it country-wide. On the international HQ, at the moment of the interviews recording, they were facing the internationalization of the project. Two more national business units were in process of implementing the project.

A set of 19 interview questions had been developed covering all the critical concepts of the Process-based framework for affordances. The questions have been mapped to the different constructs and relationships from the theoretical framework and the analysis has been performed on the software Atlas.ti. Results of the case study follow in the Findings section.

4. Findings

In terms of addressing the research question “*how do organizations influence the actualization of IS affordances?*”, the international Head of Digital CRM provided an enlightening point of view. He stated “*I have finally three different big usecases I have to compare, and I understand that... these are three country organizations with totally different cultural backgrounds. One is a south European country, one a north European country and one a very German affine, a country neighbor to Germany in the center of Europe and the results are that these countries are focusing totally different on what this program means for them and that it’s more difficult than I thought to have a common understanding about it. It is more difficult than I thought.* The manager is facing on his tasks the fact that each country is using the standard solution for different purposes actualizing its affordances on different directions to tackle their organizational needs or strategies. One of the more common complains in the studied national business unit was that not all the functionalities were designed or prioritized as needed by them, which may reflect this misalignment between the national business unit and the international division in charge for the solution. However, a standardized solution will hardly satisfy different national business units if they aim to use it for different purposes or objectives.

Four main affordances appeared from the relationship between organization and IT artifact at the national unit studied level:

- a. The segmented communication affordance. This affordance is perceived as the result of the technical feature of being able to send emails, sms and push notifications (mobile App notifications) to dynamically arranged sets of recipients and the goal of the company to segment the customer base and to communicate differently to each segment via different communication channels. It is the only actualized affordance by the organization.
- b. The app driven commercial activation affordance. This affordance is perceived as the result of the technical feature of channeling commercial discounts and promotions to the retailer’s customers through the loyalty app with the company goal of increasing sales through all possible marketing channels. This technical feature creates a differentiated commercial channel compared to the traditional mass media and point of sale, as with the app and the segmented channels, the organization can target offers and promotions to segments of customers.
- c. The data driven knowledge acquisition affordance. This affordance appears from the relationship between the technical feature of acquiring and exploiting customer’s data and the company goal of improving their managerial decisions by using this customer data in the decision-making process. The existing lack of a CRM system meant that all collected data was ticket (operation) based and not customer based prior to the project implementation. This opens for the organization a lot of possibilities as, with this knowledge and the corresponding customer centric attitude, better decisions could be taken.
- d. The social media commercial activation affordance. From the technical feature of being able to create and channel offers and discounts to segments of customers on social media and the goal of the company of increasing sales through all possible channels, appears this affordance. The organization had already a strong social media presence and good engagement figures but lacked the possibility of selling through this channel.

Even if four affordances appeared, their actualization processes were not always straightforward and successful.

Concerning the segmented communication affordance, the employee responsible for marketing communications in the national business unit has a positive feedback of the project's results. She values that it allows her national business unit to get *"closer to the customer"* by segmenting communications. This is the segmented communications affordance. The project had functional possibilities for segmenting communications since the earlier stages, and its potential was perceived soon by the national business unit. The marketing communications employee says that she recognized the possibilities very quick *"right while my boss was explaining me what we were going to do and what we were able to do (...) I found amazing being able to have this relationship with the customer"*. From the relationship between the technical feature of segmenting the communications and the goal of create a relationship with the customer the affordance emerged. The national business unit had perceived the segmented communication affordance and successfully actualized it through a specific segmented communications strategy. This strategy progressively evolved. Initially it mimicked the national marketing plan with segmented emails targeted to specific groups of interest. Six months later the segmented strategy gained relevance within the company and became part of the national marketing plan. The outcome of the segmented communication affordance was a higher engagement from the customers. This was measured in the email communications on the opening rate of the segmented emails compared to massive non-segmented emails, the segmented strategy managed to duplicate the opening rate compared to the non-segmented email plan. That outcome led to a higher expectation on segmented communications, and that affordance became more relevant for the national business unit management over time.

About the app driven commercial activation affordance, the national director explains how, from the relationship between the organization and an IT artifact, an affordance arises: *"very quickly we saw that there was a way to proceed with the transactional (transactional information of the customers at the supermarket tills), as I said, this could bring more results in the short and long term (...) if we are able to analyze the transactional and make it trigger specific actions"*. The national director is describing, in his words, the app driven commercial activation affordance. The affordance is perceived from the relationship of technical features that allow the loyalty program to become a channel for offers and promotions with the goal of increasing sales. But the national business unit does not manage to actualize as expected and generate a valuable outcome of it. In the words of the national director *"when we think of concrete usecases that will try to improve for instance frequency or trial or repeat or whatsoever I think there is no single usecase that didn't prove to be actionable"*. The national business unit could not generate an outcome from the affordance due to technical limitations of the IT artifact, their strategy was more ambitious than what the IT artifact was able to do at the moment. Hence, not generating the expected outcome.

Regarding the data driven knowledge acquisition affordance, it is clear from the collected data that the national business unit was expecting more from the project in terms of data volume and accessibility. The affordance is perceived by recognizing the data acquisition technical features and realizing the potential to achieve the goal of using customer centric data on the business decision process. However, the business intelligence and data exploitation affordance stuck, like the app driven commercial activation affordance. The employee responsible of commercial planning is critic with the project implementation, as he was expecting that the implemented CRM solution would grant him more access to Business Intelligence data: *"I was*

expecting an exponentially bigger access to data. Not having this in the end is forcing you to work on a way in which you are not comfortable. In the end this impacts you daily". The technical feature limitations of the project caused the failure of the affordance actualization process, according to the national business unit managers and employees, *"we are not currently exploiting it yet"*.

Finally, the social media commercial activation affordance is not actualized but for a different reason than the previous affordances. This affordance is the result of the potential use of the technical features of communication and making offers for segments of customers in social media through the CRM solution in relation with the goal of increasing sales through all possible channels. The reason of not actualizing the use of social media for commercial segmentation was that the organization perceived this affordance but was not comfortable with the risks associated to social media as channel for discounts and offers. Instead, the focus was placed on the other three affordances, as they were more aligned with the nature of retail and the business unit was more comfortable with them.

In synthesis, while the national business unit successfully actualized the segmented communication affordance producing a tangible outcome, it failed on actualizing and generating this outcome for the remaining three affordances. On the app driven commercial activation and the data driven knowledge acquisition affordances the technical constraints from the implemented system features prevented the actualization. After perceiving the social media commercial activation affordance, the organization decides against actualizing it due to the perceived risks associated to this affordance.

At the same time, not only affordances appeared from the relationship between the organization and IT-artifact, but also constraints. The national director exemplifies one constraint with the risk that emerges from the relationship between the organization and the IT artefact *"once we start listening to the customer and knowing their needs, we need to evaluate if we can cover those needs with a benefit that allows us to keep the business going (...) this is a risk that we have to learn to manage because it can deviate us a lot from our business model"*. Those constraints were not explicitly identified in the process-based framework for affordances and become, hence a relevant finding that need to be explicitly integrated in the framework.

5. Discussions

The Process-based Framework for Affordances is discussed in the light of the findings of the case study. The overall structure and the process-based approach was consistent with the results of the analysis. Indeed we propose four major contributions to enrich the process-based framework.

First of all, while analyzing the relationship between the organization and the IT artifact at the national business unit, it was clear that affordances appear as enablers but also as constraints. Those constraints, even though they were present in some the previous work (Majchrzak & Markus, 2012; Pozzi et al., 2014), were not considered in the theoretical model. The relevance of constraints is clear on the work from Leonardi (2007, 2011) where they are imbricated with affordances and their perception is a source of technology change. Therefore, the first contribution we propose is to consider that constraints emerge from the same relationship as affordances emerge.

Second, the Process-based Framework for Affordances included the situated affordances (potency) construct. The reason why it was included was to help understand why an affordance is actualized and which factors influence this affordance actualization. From the case study, we identified actual user abilities and implemented system features as conditioning the actualization process. However, the situated affordances construct, as an intermediate phase, did not emerge from the national business unit evidences. Moreover, there were no findings of link between affordance perception and situated affordances, while the link from affordance perception to actualization process was visible in the data. To address this conflict, this research proposes to update the framework deleting the situated affordances construct as an intermediate step.

Third, the Business Unit data was showing that the actual user abilities and the implemented system features were influencing the actualization process, therefore these influences should stay in the framework, even if the situated affordances construct disappeared. To solve this theoretical challenge, both influences stayed in the framework of the affordance actualization process but arranged differently.

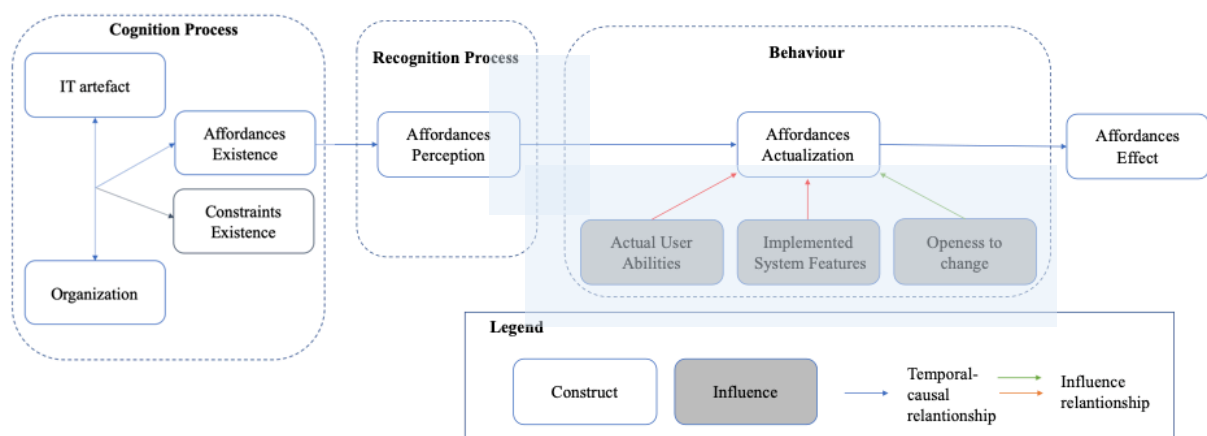


Figure 2. New version of the Process-based Framework for Affordances. With red color the changes motivated by the business unit analysis and the green ones with the changes caused by both the business unit and the international division analysis. Highlighted with blue background the changes vs the original framework used for the case study.

Finally, the resistance, negotiation and accommodation phases have also been reconsidered. They were included in the actualization process of the Process-based Framework for Affordances. They have appeared in our empirical field, as a process that influences the adoption and exploitation of the solution in the affordances actualization step. To better represent their role as an influence on the actualization process, they have been represented in the framework under the influence *openness to change*, which is constructed as aggregation of those three aspects. In the collected data it was mentioned across the interviews the positive attitude towards the project of the CRM employees of the business unit and it was identified as

a success factor for the project implementation. Figure two summarizes all those updates and changes on the process-based framework for affordances.

6. Conclusions

This research has offered a comprehensive case study on the influence of organizations in the affordance actualization process. Moreover, it has identified four affordances that result from the relationship between IT artifact and organization from the case-study.

The analyzed national business unit of the food retail company has actualized the segmented communication affordance as a result of the project implementation. This affordance was perceived as aligned with the company nature and straight forward actualized. On the other hand, the national business unit failed to actualize two perceived affordances that were also aligned with the nature of the organization. Those affordances were not actualized due to technical limitations of the project and the constraints that follow. The national business unit also decided not to actualize a perceived affordance, as the organization considered that its use of social media as a commercial channel was too risky.

At a theoretical level, the paper has also explored the Process-based Framework for Affordances, applying it to the analysis of the national business unit. The situated potencies construct did not emerge from the data, so it has been deleted from the framework. Constraints did emerge from the collected data, consequently they have been included. Finally, a new influence has been included in the actualization process, openness to change. This reflects the willingness of the employees that are in contact with the IT artifact to embrace the affordances. A limitation of this research has been that only one business unit has been analyzed, further research should explore and compare different business units or teams so that the detected affordances can be analyzed under the *individualized, collective and shared affordances* concepts (Leonardi, 2013). Another limitation has been that the Process Based framework for affordances does not include the functional affordances and Symbolic expressions classification, which may be relevant to consider in future research. With the resulting improvements on the theoretical framework, the future research would have a solid tool to proceed with further steps. This paper covered one national business unit, but the research design will allow to connect several cases studies from the other national business units of the same company as well as extending the time-frame to transform it in a longitudinal study.

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