

CONTINUOUS EXPERIMENTATION FOR ORGANIZATIONAL AMBIDEXTERITY: A CROSS- INDUSTRY PERSPECTIVE

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ABSTRACT

Companies' capabilities to experiment continuously and ambidextrously have an enabler for growth. Scientific literature focused on experimentation and ambidexterity separately, thus not investigating how effective experimentation can be implemented to achieve ambidexterity. Moreover, most of the empirical evidence comes from digital companies, thus missing opportunities to provide contribution regarding other companies. This study offers a cross-industry perspective on how different companies are dealing with experimentation to achieve ambidexterity showing the crucial role of organizational.

Keywords: *Experimentation, Ambidexterity, Organizational Culture, Innovation, Multiple Case Study*

1. INTRODUCTION, LITERATURE BACKGROUND AND RESEARCH OBJECTIVES

Firms inhabit increasingly dynamic environments where destabilizing forces operate with amplified frequency (Wiggins & Ruefli, 2005; Schreyögg & Sydow, 2010). As a result, continuous experimentation is becoming necessary (Adner & Kapoor, 2010; Blank & Dorf, 2012). Firms are compelled to ambidextrously exploit experiments on existing solutions to ensure their current viability, as well as experiment to launch new solutions in order to ensure their future viability (Božič & Dimovski, 2019). However, little is known about how experimentation can be properly implemented to achieve ambidexterity (Thomke & Manzi, 2014; Kohavi, et al., 2020).

This study aims understanding *how can a company structure itself to experiment in an ambidextrous way*. More specifically, we pursue the following objectives:

- Understanding how companies are dealing with experimentation, which experimentation are they using and with which results;
- Deepening the relationship among experimentation and ambidexterity, understanding how the former helps in achieving the latter;
- Understanding how culture should evolve and adapt in an ambidextrous perspective, exploring how these can be seen as enablers to successful experimentation.

Regarding the first point, literature has already shown that firms that are able to experiment in the right way enjoy higher profits and gain a competitive advantage within the market (Duncan, 1976; Tushman & O'Reilly, 1996; Kohavi & Thomke, 2017). However, experimenting need not only capabilities to do so, but it is necessary to gain data to head in this direction. This is relatively easy for the tech giants (such as Google, Booking and Netflix), but can be more complex for firms in other industry. As we know digital environments facilitate randomization, controlled experiments, known as A/B tests, have become an increasingly popular part of a firm's analytics capabilities (Schwartz, et al., 2017; Johnson, et al., 2017). Thus, we have chosen to conduct a cross-industry analysis to gain an all-round understanding and highlight aspect from which they can learn from each other. We have defined three typologies: "born digital", "capital intensive"

and “consulting”. For the former, there are already several studies which show how they conduct experiments (Kohavi, et al., 2009; Gallo, 2017; Kohavi, et al., 2020) and their implications for growth and innovation (Thomke, 2020; Zeitler, 2019). Much less is known about the other two. On the one hand, “capital intensive” not having a platform-based model may struggle to have a lot of data on which to experiment, while on the other hand “consulting” will experience different tensions, give the need to consider customer requirements.

Regarding the second and third points, we want to fill in some literature gaps by explaining the relevance of ambidexterity and culture in conducting effective experiments and how the whole thing is a self-feeding cycle. This cycle leads to better experimentation, more complete ambidexterity and developing a stronger culture. These aspects imply reasoning on several levels: individual, enterprise, and ecosystem.

2. RESEARCH METHODS

The aim of this study is to generate new theory and so, an interpretative and qualitative methodology is applied. This research strategy consists in building theory from multiple case studies and allow us to create a theoretical construct, propositions and/or midrange theory from case-based, empirical evidence (Eisenhardt, 1989). We conducted the research using a circular inductive-deductive process, following two macro-steps: (1) a comprehensive literature review; (2) an empirical analysis based on interviews and case studies. The former enabled us to develop an initial conceptual framework based on the state of the art elaborated, to define the research objectives and the reason why it was worth answering them, to structure the cross-case study and to develop data collection protocols for company interviews. Then, since this study aims at providing guidelines on how a generic company behaves towards experimentation, ambidexterity and culture, we have chosen to not restrict our population to any industry and to define our theoretical sampling according to the principles of (Eisenhardt & Graebner, 2007). As anticipated above, we have focused on three clusters:

- **Cluster 1:** it should be “born digital”, mainly data-driven, with not a clear preference if globally diffused or a newly born startup. The opportunity to study this cluster comes from the fact that they are often the best at it.
- **Cluster 2:** it should be “capital intensive”, based on assets and in the manufacturing industries (or similar ones). Here, the chance to understand these companies to experiment start leveraging digital products or find ways to do so with their legacy product is exploited.
- **Cluster 3:** it should be a “consulting” firm using experimentation in its process. Here, we highlight the tensions arising from experimenting while also having to balance the expectations of a customer.

Regarding the interviewees, the focus was on people had worked with digital daily or that have a broader overview of the company. The decision on who interview was made as follow:

- **High level employees** (C-levels or closer, mainly related to digital transformation, R&D and marketing), so that it is possible to have a broader view of how firms were managed, and of which were the strategic implications of the decision made;
- **Middle management** (with a daily work related to experimentation), so that it is possible to have an operational viewpoint.

In Table 1, it can be noted the company names, the cluster where we included them, the role of people interviewed, and the number of interviews conducted.

Company	Typology	Role of interviewees	Number of Interviews
Amazon	Born Digital	Product Manager	2
		Management Area	
Booking		Product Manager	2
		Director, Operations and Strategy for Partnerships/Accommodations dept.	
Gamindo		CEO and Co-Founder	1
LinkedIn		Sales Strategy & Operations	1
Microsoft		Principal Digital Program Manager	1
N26		Product Manager	1
OneDay		Head of Startup and Talent Acceleration, Equity Partner	1
Beretta	Capital Intensive	CEO and President	3
		Digital Business Development Manager	
		R&D Director	
Disney		Digital Marketing Manager	1
Ferrero		Global Marketing & Partnership Manager	1
IBM		CEO and President of IBM Italia	5
		General Manager at Intesa, an IBM Company	
		Vice President Europe and Africa and Director IBM Research - Zurich	
		IBM Software Lab Director Rome	
		Associate Partner – Digital Experience	
Deloitte	Consulting	Talent Attraction & Engagement Project Manager	1
		Senior HR, Talent Attraction	
PWC		Senior Manager	1
		Senior Manager	
Reply		Sales Leader for Digital Transformation	1
		Team Leader and Business Analyst for Ecommerce Projects	

Table 1. Companies Interviewed

The interviews lasted about 45 minutes each and, to avoid possible biases, we used open questions, letting the interviews “speak first” and resulting in more authentic and reliable information (Flick, 2009). Each interview was transcribed verbatim and, afterwards, it was possible to start the 3 levels coding process following the Gioia Methodology, which is a systematic approach to examine transcriptions line by line and it is aimed at developing new concepts, while keeping a “qualitative rigor” in conducting and presenting the research (Gioia, et al., 2012).

During the whole research journey, it was key to compare the intermediate results, deriving from the interviews, allowing us to generate findings with higher internal validity, to sharpen and enrich the conceptual level of the research itself (Eisenhardt, 1989). Therefore, after three cyclical round of literature review and data coding – when we achieved theoretical saturation (Eisenhardt, 1989), we built our framework.

3. RESULTS AND DISCUSSION

This section explains our results through five propositions. We provide an overview that allow a better understanding of how these three types of companies (digital born, capital intensive, consulting) approach and conduct experiments from a statistical/numerical perspective, as well as from a strategic one. Then, we build on “Test and Learn Wheel” (Davenport, 2009) to validate and extend the model with additional characteristics.

3.1 THE PIVOTAL ROLE OF DATA AVAILABILITY

Almost all the “born digital”, adopt Data-Driven approaches to experimentation and many of them are taking experimentation to the next level, thinking about AI that will make basic experiments fully automated and autonomous in offering useful insights for decision-making; as for the strategic point, the “born digital” adopt integration approaches when confronted with ambidexterity. In fact, the use of behavioral, cognitive, and social means useful to integrate divergent activities is more emphasized in these companies as stated by (Gibson & Birkinshaw, 2004; Eisenhardt, et al., 2010). We found that these companies had in common a structure based on integration principles in addition to using different tools to promote integration in the organization. For capital intensive companies, the most suitable method of experimentation is the use of sprints, since the Data Driven model is much more complicated to implement for them. There are many reasons for this, such as the difficulty in obtaining a necessary pool of people for statistical significance and the difficulty in scaling up experiments that are not online. The resulting business structure emphasizes differential approaches to ambidexterity, thus a differentiation between organizational units (Andriopoulos & Lewis, 2009). In fact, through the interviews conducted, in the capital-intensive companies, we noticed greater differentiation in the corporate structure and a well-defined and aligned strategy for the purpose of achieving this differentiation. However, we need to consider that some capital intensive, such as Beretta, are starting to leverage digital technology-based experiments to create radical innovations, but without a clear structural approach.

Consulting firms tend to experiment on their clients by organizing themselves into repeated sprints to make, test, and improve prototypes, so like capital intensive they are very much toward a differentiation approach to ambidexterity. We also must consider that they have limited capacity for experimentation in terms of exploration, and so they are positioned at the extreme end of the exploit pole. They have great tensions in addressing exploration activities with a client rather than applying something already established.

Summing up, it is worth arguing that data-driven and non-data-driven companies differ in their approach to using experiments. Data-driven companies, and therefore those we

call 'born digital', tend to focus on the huge amount of data they have, while non-data-driven companies use feedback loops to validate their learning. According to that, we have formalized the first proposition:

P1: *Data driven companies experiment on huge amount of data on customers – validated thanks to statistics – and by understanding their behaviour. Non-data-driven ones experiment through several and frequent feedback loops with a direct confrontation with customers, even though less frequent than data-driven ones.*

Furthermore, the interviews conducted showed that the availability of data also leads to different strategic decisions that allow us to elaborate other two propositions. The first is related to the “Make or Buy” choice of experimentation by companies, that is, the option to develop a platform internally to run experiments or to rely on an external service provider. Data driven companies tend to develop all the capabilities and the platform related to experimentation inside, while the non-data driven tend to have a partnership or to go for a buy. Insourcing can be the right solution if a company is strong enough to do it computationally and if there are some synergies with the core business. If the decision is to outsource the platform, there are many possible solutions, starting from a simple purchase, to parameterizing a product, or even co-designing with an external vendor. The decision should be based on the need to fully control the product and a cost analysis, comparing the cost of developing the product in-house, versus the rates you would pay for an external one. As stated by (Kohavi, et al., 2020), the decision whether to opt for building or purchasing an experimentation platform is crucial not only in terms of the cost related to this activity, but also in terms of the possibilities of growing experiments. All these considerations are highlighted in the proposition 2 below:

P2: *Data- driven company chooses to run internally experimentation when it is related to the core business or has a computational capacity surplus or to protect sensitive data. Non-data-driven goes into outsourcing due to lack of capabilities and resources.*

Another relevant aspect and central for our discussion are related to ambidexterity. As can be seen in table 2 below, all data-driven companies have an integrative organizational structure, supported by a strong corporate culture, and adopt ambidextrous approaches such as: Administered, Emergent, Heuristic-based. The only two exceptions in the "born digital" are OneDay and Gamindo, which can however be explained by the fact that they are both startups and therefore, although they are digital and fit into the proposed category, they don't have as much data as the tech giants. Non-data driven companies are limited by their organizational structure and inability to run thousands of tests like the others and therefore adopt differential approaches, such as Organizational, Temporal and Domain.

Differentiation Approaches		
<i>Organizational</i>	<i>Temporal</i>	<i>Domain</i>
OneDay, Disney, Deloitte, PWC	Ferrero, Gamindo	Beretta
Integration Approaches		
<i>Administered</i>	<i>Emergent</i>	<i>Heuristic-Based</i>
LinkedIn, N26, Amazon	Booking, Reply, IBM	Microsoft

Table 2. Different ambidextrous approaches.

All these considerations are highlighted in the proposition 4 below:

P4: *Data-driven companies tend to ambidextrously experiment through integrative approaches. Non-data-driven tend using a differentiation approach to experimentation.*

3.2 EXTENDING THE “TEST AND LEARN WHEEL”

Companies have realized how important and complex it is to set the right evaluation criteria for experiments and have deepened the topic by understanding that it is necessary to go deeper into the context, to fully understand what the final goal is or even to set the whole experiment in a way that it is easier to test according to the requirements provided by the end user. Once results are collected using a single OEC or set of metrics, some companies feel the urgency to understand whether they are valid or not. One way to solve this problem, as stated in the literature review, is to do some statistical analysis on it.

Underlying the different approaches mentioned above, integration versus differentiation, are associated advantages and disadvantages which may change depending on the context. What does not change is that every company should have a valid evaluation criterion for the experiments. According to that, we have formalized the following proposition:

P3: *Each experimentation, to be effective, must have a valid evaluation criterion, which has to be chosen coherently with the context.*

Delving into how the experiments should be conducted, we built on the work of (Davenport, 2009) named “Put Your Ideas Into Test” that explains the six key points for an effective testing process: Create and Refine the hypothesis, Design the test, execute the test, Analyze the test, Plan the rollout and then a final rollout, all with a learning library in which to store knowledge.

According to the interviews conducted, we added some influencing factors (drivers/triggers) that come from the organizational culture part of this study: ethics, culture of failure, and democratization. These factors, in fact, seem to be the relevant ones for deciding which approach to ambidexterity to focus on.

Since this model is designed for data-driven companies, our addition allows for a validation and extension of the model regarding “born digital” companies. Simultaneously, the adaptation of this model to the other two types of companies surveyed, will be of interest to both researchers and practitioners.

Our first addition is to include ethics in the step “Create and Refine the hypothesis”. When defining the key points of the test, it is essential to also run an ethical assessment on what the company is going to experiment, to prevent potential damage and understand the potential impact in the society. In the “Analyze the test” there should be particular attention devoted to developing a culture of failure, in which failures are accepted and in which it is possible to learn deeply from what did not work, without the fear of being penalized. Experimentation is a continuous iteration process in which most of the time you will fail. The relevant thing to achieve is to quickly learn from these experiments and repeat it inserting what you have learned. As stated by Amazon, their culture carries the motto of: “Fail Fast, Learn Faster”. Finally, we added democratization as the big picture of the whole cycle, as their impact pervades the whole structure of the cycle, and it was not possible to localize them on one point. Regarding democratization, it is a crucial driver to achieve ambidexterity, since allowing all employees to propose their own ideas, generates very different proposals that extend from the exploit to the explore side. In figure 1 below, the Davenport model with our additions.

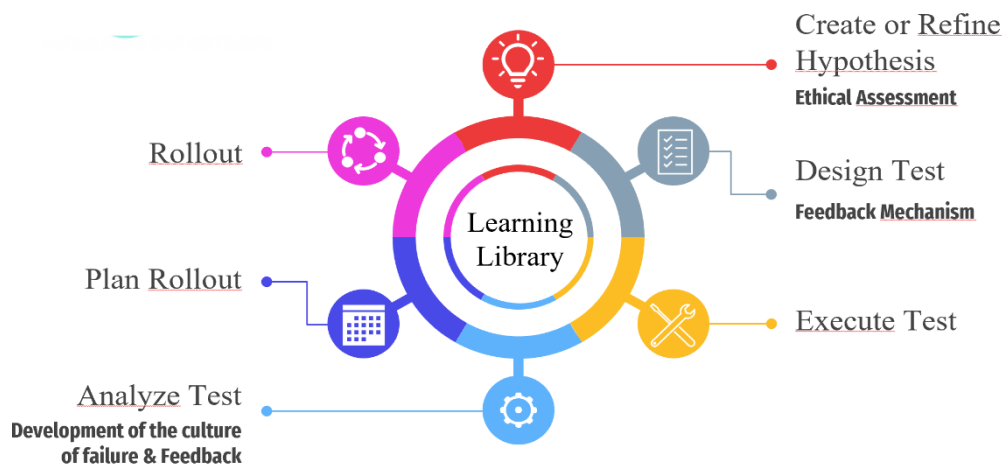


Figure 1. Extension and adaptation of “Test and Learn Wheel” (Davenport, 2009).

Thanks to the interviews conducted, we were able to adapt the Davenport’s model also to the non-data driven companies. We made changes to some steps of the cycle: in “Design Test”, we established a feedback mechanism with a very quick response. One way to get this feedback can be focus groups, field surveys, etc., methods with which non-data driven companies are very experienced and therefore easily employable. This will obviously also affect “Analyze Test”, where we will not rely on big data and statistics to analyze the experiment but through surveys, focus groups etc.

As for the other steps, we believe they don't need any change and can be easily leveraged by non-data driven companies. The roles of culture of failure, ethics and democratization, continue to be critical to the development of complete ambidexterity and effective experimentation.

Accordingly, we then formalized the last two propositions:

P5. *Companies that are effective in ambidextrously experimenting have a culture that accepts and learns from failures and ponders potential ethical implications before experimenting.*

4. CONCLUSION

This paper provides three notable contributions. First, we provide evidence for a better understanding of how three clusters of companies approach and structure themselves to conduct effective experiments. In this regard, we can highlight that: “born digital” are mainly data-driven and are thinking about automating basic experiments through AI; “capital intensive” leverage digitally-based experiments to create radical innovations, even if without a clear structural approach; “consulting firms” tend to conduct experiments on their customers through repeated sprints (make, test, and improve prototypes).

Second, we offer a new perspective to investigate the link among experimentation and ambidexterity. Here we found that each company interviewed, no matter which cluster, is using experimentation to both improve existing products and to create new ones, whereas literature is using it only for the former. So, we can state that continuous experimentation helps ambidexterity balance between explore and exploit.

Finally, as a third contribution, we built on and extended the “Test and Earn” model (Davenport, 2009) integrating the concept of ambidexterity and adding some influencing

organizational culture factors (drivers/triggers) that are relevant for deciding which approach to ambidexterity to focus on

- *Ethics*: is a necessary component in the ideation phase of hypothesis that allows us to avoid some later problems and operate in favor of customers;
- *Culture of Failure*: allows the entire organization to make each experiment a source of learning to improve the next experiment and thus make better use of the experiment;
- *Democratization*: allows everyone to propose ideas, this makes experimentation widespread on both explore and exploit.

Our cross-industry perspective allows us to adapt this model (that was design only for data-driven/digital) also for the other two typologies of companies interviewed and to provide three crucial insights to researchers as well as practitioners:

- Data driven companies tend to use an integrative approach. Non-data driven ones tend to use a differentiation approach;
- Data driven companies can enrich their “test and learn wheel” by leveraging on ethics, culture of failure and democratization;
 - Non-data driven companies can adapt the “test and learn wheel” by focusing on feedbacks loops.

The value of this paper is to be found in the opportunity to understand how companies from various industries are structured to conduct effective experiments without neglecting an organizational perspective that is crucial in a turbulent context like what we are experiencing. Furthermore, thanks to the concept of ambidexterity, we have explored common or different approaches in experimenting with existing or new products. From the scientific viewpoint, in addition to the contributions already mentioned, this work could be expanded by investigating the drivers, antecedents and triggers of each phase of our model, highlighting, if any, the differences between the various industries. From a practical point of view, the breadth of this work allows practitioners to understand the current scenario and identify themselves in their specific category.

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