How do Big Bang Disruptors look like? A Business Model perspective

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The breakthrough impact of new-born companies over the last years brought to the definition of Big Bang Disruption, a new kind of innovation that relies on an unencumbered development, an unconstrained growth, and an undisciplined strategy. The relevance from a practitioner perspective is straightforward: entire industries have been challenged and disrupted. From a theoretical perspective, the concept is less developed. This research aims to understand it through a Business Model perspective, better highlighting the design variables that may lead to this kind of innovation. Leveraging crisp-set Qualitative Comparative Analysis (csQCA) to define the necessary conditions to be called a Big Bang Disruptor, this paper relies on a rock clustering method – using the Unicorns' list as the sample - to highlight common patterns. Results show two main factors: the chance to innovate the meaning and to rely on a two-sided market structure as key variables to design a Big Bang Disruptor. Results are discussed under the lenses of previous research. Finally, limitations and avenues for further studies are explored.

Keywords: Big Bang Disruption; Business Model; Two-Sided Market; Innovation of Meaning; Unicorns

1. Introduction

Over the last years, the concept of Big Bang Disruption has drawn attention both from scholars and practitioners. The publication of "Big Bang Disruption" by Downes and Nunes (2014) sheds light on an emerging phenomenon that is challenging several mature industries: the rise and the disruptive impact of new-born companies that in a very short time can change the market equilibrium.

According to the authors, Big Bang Disruptors (BBDs) rely on an unencumbered development, unconstrained growth, and undisciplined strategy, making their impact devastating for incumbents on the market. Moreover, they seem able to challenge traditional management models and theories significantly.

First, the concept of Big Bang Disruption challenges and somehow enlarges its reference theory: the disruptive innovation model by Christensen (Christensen, 1997). The original model claims that there are technologies that at the very beginning of their development process may be underperforming even for the lowest-end of the market, but, investing on them, they may go through a slow process that bring them to overcome even the needs required at the highest-end of the market (e.g., Bower and Christensen, 1995; Christensen, 1997). Nevertheless, Downes and Nunes present cases of "disruptive innovations" that shrink the slow process described by Christensen. This perspective seems coherent with the critiques that have been moved to the disruptive innovation model (Christensen et al., 2015). Second, BBDs are claimed to have an "unconstrained growth", which challenges the traditional and established model for the diffusion of innovation (Rogers, 2010). Rogers described the common path of diffusion and acceptance of innovation, highlighting five different segments of customers that adopt the product over time. The original model shows how innovations gain popularity segment after segment. Downes and Nunes proposed their revised version of the model through the "Shark-Fin" diffusion curve. Disrupters face just two market segments: trial users and the vast majority, going quickly through all the diffusion process.

Finally, the model proposed by Treacy and Wiersema (1995) defines three main value disciplines that market leaders should choose: operational excellence, product leadership, and customer intimacy building on the Porter's (1980) strategy model that claims for

differentiation, cost leadership or a niche strategy. Big Bang Disruptors challenge these models being – at the same time – cheaper, better and closer to the customers.

These three points show how the cases presented by Downes and Nunes can challenge years of management research, proposing cases which are not fitting in traditional models.

The practitioner relevance of their work is straightforward: BBDs can have a significant impact on the market, both regarding customer base and concerning investments. On the one hand, entrepreneurs would desire to leverage the benefits proper of disruption and, on the other hand, incumbents aim at being able to face them effectively.

From the academic perspective, many emphases has been given to the concept of disruptive innovation mainly taking a technological perspective (e.g., Christensen, 1997; Kostoff et al., 2004; Sainio and Puumalainen, 2007; Kilkki et al., 2018). Given the novelty of the broader concept of Big Bang Disruption, little research – mainly as conference proceedings – has been done on the phenomenon (e.g., Karimi & Walter, 2015; Kazan et al., 2014; Kobus, 2016; Smailhodzic, Boonstra, & Langley, 2016), however, on the other hand, a concept which can challenge at least three fundamental management pillars in a row needs scholarly attention. This research aims to understand the commonalities behind innovation which has an unencumbered development, an unconstrained growth, and an undisciplined strategy. In other words, this paper digs in BBDs to define common patterns concerning their Business Model configuration. The concept of Business Model received an increasing attention over the last years, both as a tool to describe a company (e.g., Osterwalder and Pigneur, 2010) and as a unit of analysis (e.g., Amit and Zott, 2001; Zott et al., 2011; Massa et al., 2017; Battistella et al., 2017). Therefore, this research aims to understand which are the design variables of the business model that may lead to the creation of a BBD.

2. Theoretical Background

2.1 Business Model Design

The concept of business model has been highly studied in recent years, and different scholars proposed significantly different perspectives. Among the others, Stewart and Zhaon (2000) consider the business model as a statement, Applegate (2001) as a description, Afuah and Tucci (2001) as a method, while Osterwalder and Pigneur (2010) as a conceptual tool and Amit and Zott (2000) a suitable unit of analysis for e-businesses. In many other cases, the business

model has been studied without providing an explicit definition (Zott et al., 2011). Despite the lack of a commonly accepted definition, since mid-90s researchers have studied this concept, especially with the rise of the Internet and e-business (Amit and Zott, 2001).

The business model can be used to explain the value creation process and the firm's competitive advantages. According to Hamel and Ruben (2000), to survive in the competitive market, companies need to develop new business models. Business models themselves can become a competitive advantage (Chirstensen, 2001; Casadesus-Masanell and Ricart, 2010), having a direct impact on financial performances (Kulins et al., 2016). Indeed, researchers show how the design of an appropriate business model may be the key to unlock the potential value embedded in innovation (e.g., Chesbrough and Roenbloom, 2002; Björkdahl, 2009). In particular, it gets together the concepts of value creation, and value capturing that are by definition both part of an innovation (e.g., Teece, 1986) even if it may be challenging to implement both of them (e.g., Mizik and Jacobson, 2003; Doganova and Eyquem-Renault, 2009). Furthermore, firms can see the business model itself as a subject of innovation (Mitchell and Coles, 2003). Indeed, even it is a recent stream in the literature (Trimi and Berbegal-Mirabent, 2012; Ghezzi et al., 2013; Ghezzi et al., 2015), scholars are paying growing attention to the concepts of Business Model Innovation and Business Model Design, described as the managerial intent to reconfigure the firm's existing business model or to create a new one (e.g., Massa et al., 2017; Foss and Saebi, 2017). In particular, Business Model Design generally investigates the representation of business models, for example through ontologies (Zott and Amit, 2007; Pigneur and Werthner, 2009; Zott and Amit, 2010). The Business Model Canvas (Osterwalder and Pigneur, 2010) represents one of the main developments in Business Model Design, being widely adopted both by practitioners and academics (e.g., Chesbrough, 2010). In this perspective, recent literature also focused on the role of the manager behind the business model design process, highlighting the cognitive process at its foundations (Schneckenberg et al., 2018).

In this complex scenario, where different dimensions and perspectives have been considered (Rayna and Striukova, 2016; Massa et al., 2017; Foss and Saebi,2017; Ghezzi and Cavallo, 2018; Schneckenberg et al., 2018), this paper considers the business model as a conceptual tool to describe the firm (Osterwalder and Pigneur, 2010).

This lead to the definition of the research question of this paper. Bringing together the concept of Big Bang Disruption and Business Model: are there common patterns in the

business models of Big Bang Disruptors? In other words, are there commonalities among the design variables of the business models implemented by BBDs?

To answer the research question, a conceptual framework is going to be built, relying on previous literature to define the main alternatives and concepts regarding the design variables of the different building blocks composing a business model.

2.2 Developing a Conceptual Framework

The Business Model Canvas presented by Osterwalder and Pigneur (2010) has often been used as a tool to describe companies even in academic researches (e.g., Adrodegari et al., 2017; Daly, 2017; Bertels et al., 2015; Toro-Jarrín et al. 2016), mainly to analyze and compare case studies. Nevertheless, this tool has often been criticized (e.g., Cosenz, 2017) and several other canvases have been proposed. Among the others, the Value Proposition Canvas by Osterwalder et al. (2014) or the Lean Canvas (Maurya, 2012). In particular, the Lean Canvas aims to be suitable for entrepreneurs and fast-growing companies, while the original canvas seems to be better for established companies (Maurya, 2012).

This research aims to search for common patterns among the design variables of the business model among the BBDs; therefore, we are not considering industry-related characteristics (e.g., the key activities or the key resources that would be pointed out by the Business Model Canvas) or company-specific dimension (such as the solution offered to the market, according to the Lean Canvas). Indeed, we build on the canvases mentioned above to create the necessary building blocks to propose the conceptual framework at the basis of this research. Therefore, a literature survey for each design variable is going to be presented, highlighting the constructs used to proceed with our investigation. These components are the structural elements of a business, or the so-called antecedents (Herrmann et al., 2007; Rumble & Mangematin, 2015; Storey et al., 2016). The upcoming dimensions are going to represent the basis on which we are going to build our research on.

Relying on previously developed models, six building blocks have been considered: i) the innovation strategy, referring to the way in which the solution is designed to resolve the highlighted problem (referring to the Lean Canvas building blocks), ii) the value proposition, iii) the channels, iv) the customer relationship, v) the cost structure and vi) the revenue

streams. Each of the building blocks is going to be further explored, highlighting the constructs emerging from the literature.

2.2.1 Innovation strategy

Verganti (2009) proposes a model summarizing three main innovation strategies: technology-push innovation, market-pull innovation, and design-driven innovation. The presented frameworks leverage on previous academic studies on the dyadic relationship between technology and market needs in innovation, adding a third perspective: the meaning, the reason why people would use a product or a service. The three strategies have deep roots in the scientific literature. Technology is considered one of the leading innovation triggers, often bringing to breakthrough innovations (e.g., Anderson and Tushman, 1990; Christensen, 1997; Schuelke-Leech, 2018). Market needs have been highly studied, giving birth to solutions that provide a clear answer to what customers are searching (e.g., Von Hippel 1986). Finally, the meaning, the reason why being a product or a service, may bring to breakthrough innovation by shifting the paradigm in the market (e.g., Verganti, 2008; Buganza et al., 2015; Dell'Era et al.,2017; Magistretti and Dell'Era, 2018).

2.2.2 Value Proposition

The academic literature identifies three main types of value proposition: cost leadership, premium product and ease of use. The first two are among the traditional strategies proposed by Porter (1980), focusing on the chance to provide a product with a price lower than competitors, or a very high-quality product. The other one is coherent with the evolution of market expectations over the last decades. Ease of use is related to quick and easy access to product or service (Treacy, 2005; Treacy & Wiersema, 1997).

2.2.3 Channels

The first categorization of channels is the division between digital and physical channels (Downes et al., 2000). A physical channel may be direct or indirect (e.g., Ostwerwalder and Pigneur, 2010), while a digital channel may be outsourced digital (e.g., marketplaces), proprietary digital (e.g., proprietary marketplaces) and applications. While the latter is mobile-based, the two first channels are internet platforms.

2.2.4 Customer Relationship

Leveraging the insights of different studies (e.g., Osterwalder et al., 2010; Hagiu, 2009; Bhradwaj et al., 2013), it is possible to highlight three main strategies related to the customer relationship. First, the chance to address a single market segment. Second, the chance to address multiple segments. Finally, the chance to rely on a multi-sided structure, bringing together different segment through an intermediary platform. Multi-sided platforms that in the literature have also been addressed two-sided market, are intermediaries that bring together different kinds of customers that have some sort of relations among them (Rochet and Tirole, 2003; Muzellec et al., 2015; Trabucchi and Buganza, 2018; Tauscher and Laudien, 2018). In particular, they are different from the "multiple segments" because the different sides are groups of customers that interact among them on the same product value chain, while multiple segments are not necessarily interdependent among each other.

Traditionally, a niche market has been considered a type of customer relationship, which is becoming less and less relevant due to the diffusion of digital technologies (Bhradwaj et al., 2013).

2.2.5 Cost Structure

Costs are classified in different ways to their nature and their sources, but they coexist within the same company. Digital technologies enabled, over the last decades, a radical revolution in the cost structure of companies. Several digital businesses are based on aa zero-marginal-cost structures that can be opposed to a more traditional (brick-and-mortar base) non-zero marginal cost structure (Rifkin, 2014). The first one allows a rapid scale up and a potential global impact since the beginning; it is common in software-based industries and digital services (Rifkin, 2014).

2.2.6 Revenue Streams

Two main types of revenues may be identified: a direct purchase or a subscription-based purchase (Osterwalder and Pigneur, 2010). Further developments in the digital business models brought to a broader classification: advertisement, freemium, in-app selling or pay-

per-usage (e.g., Buganza et al., 2015; Maurya, 2012; Osterwalder and Pigneur, 2010; Trabucchi et al., 2017a).

Table 1 summarizes the fundamental constructs and the key references for each building block.

Building Block	Constructs	References
Innovation strategy	Design-Driven Technology-Push Market-Pull	Von Hippel, 1986 Anderson and Tushman, 1990 Verganti, 2009
Value Proposition	Cost Leadership Premium Product Ease of use	Porter, 1980 Treacy, 2005 Treacy & Wiersema, 1997
Channels	Physical channels Mobile applications Proprietary digital channels Outsources digital channels	Downes and Mui, 2000 Osterwalder and Pigneur, 2010
Customer Relationship	Single Segment Multiple Segment Multi-Sided Markets	Hagiu, 2009 Osterwalder and Pigneur, 2010 Bharadwaj et al., 2013 Rochet and Tirole, 2003; Muzellec et al., 2015; Tauscher and Laudien, 2018; Trabucchi and Buganza, 2018
Cost Structure	Zero or Not-Zero Marginal cost structure	Rifkin, 2015
Revenue Streams	Freemium In-app selling Advertisement Pay per usage Purchase Subscription	Osterwalder and Pigneur, 2010 Buganza et al., 2015 Trabucchi et al., 2017a

Table 1 - Conceptual framework

3. Research Design and Method

To reach the goal of this research, understanding which are the business model features of a Big Bang Disruption, a two-step process has been designed (summarized in Figure 1).

In the first step, a way to identify BBDs needs to be defined. In the second step, a business model analysis of the sample has to be performed.

First of all, since the only sample of Big Bang Disruptors is the one present in the seminal book previously mentioned (Downes and Nunes, 2004), a preliminary analysis through a Qualitative Comparative Analysis (QCA) is performed, to define necessary conditions a case must fulfill to be classified as BBD.

Then, relying on the results of the previous step, a new sample – based on the Unicorns' list – has been classified according to the rules emerged from the QCA. Following, a clustering analysis is performed, aiming to define common patterns in the business model design of this

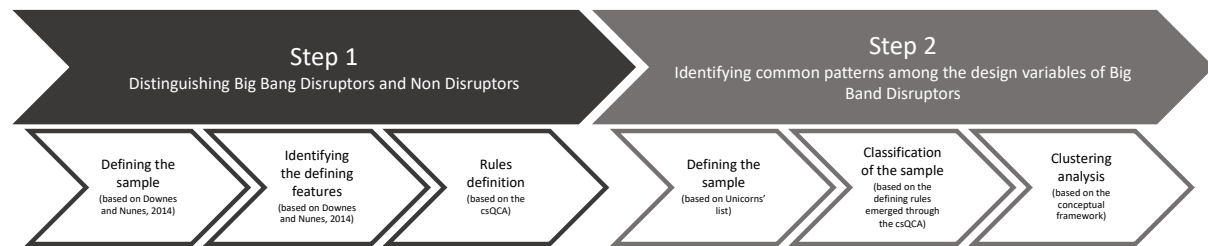kind of innovations. In the next sub-section, the entire research process is going to be fully described.

Figure 1 – Research process

3.1 Step 1: Distinguishing Big Bang Disruptors and Non-Disruptors

For the preliminary analysis of this study, the crisp-set qualitative comparative analysis (QCA) is selected. QCA is a research method which enables the inference of typical configurations within a limited set of cases (or observations) (Ganter and Hecker, 2014). In the crisp-set Qualitative Comparative Analysis (csQCA), the features according to which the cases are evaluated are binary, where 1 implies full membership to the condition while 0 implies no membership. The algorithm tries to infer the combinations of conditions which lead to the outcome by constructing a Boolean table, also called truth table, where all the possible combinations are present (a total of 2^k combination, where k is the number of conditions). Two parameters characterize the QCA: i) consistency, that measures the degree to which a causal relationship between a condition configuration and the outcome is met (Ragin, 2006, 2013); and ii) coverage: that measures "*the size of the overlap of two sets relative to the size of the larger set*" (Ragin, 2006). The csQCA allows distinguishing between sufficient and necessary conditions for the explanation of the Boolean outcome.

The training set of the algorithm has been defined by relying on the 23 disruptors presented by Downes and Nunes (2014) in their book, which have been grouped into nine industries (see Table 2). To define the association rules that define a Big Bang Disruptors, a control set of Not-Disruptors (NDs) is needed. Therefore, 17 companies have been identified neglecting the definition of BBD, considering companies that act as followers or imitators without getting the fast and pervasive diffusion of BBDs (see Table 2). For the sake of clarity, the companies have been identified aiming to deny the basic definition of BBD (at least one of the three characteristics: undisciplined strategy ,unconstrained growth, and unencumbered development). Starting from the companies mentioned in the book, such as Spotify, the

authors identified other companies that do not have those characteristics, for example Tidal, which followed Spotify without having an unconstrained growth or proposing radical differences from the predecessor.

Big Bang Disruptors	Non-Disruptors	Industry
Jawbone AppleiPodd	Google Glass, PebbleWatch Pirate3D	Hardware
AirBnb Wimdu Hailu Lyft Uber	Housetrip Karhoo Leap Transit	On demand/Intermediaries
Twitter Reddit	Google+	Social
TripAdvisor Yelp	Quirky	Business Rating & Advertising
Skype	Joost, iMessage	Communication/Mobile Software
Prosper Lending Club	Clinkle	Fintech
eBay Amazon	Dot&Bo	e-Commerce
Netflix Hulu Youtube	Nouncer Rdio	Media
Spotify DropBox Zynga Google	Zune AppSumo Tidal	Internet Software & Services

Table 2 – Step 1: The sample

The final set of forty companies (BBDs + NDs) is evaluated according to 9 different conditions, or binary features, as found in Downes and Nunes (2014). The set of features (defined through an in-depth analysis of the book) is presented in Table 3, starting from the three fundamentals of Big Bang Disruption. The conditions are then assessed for each company through secondary sources of information. The assessment has been done independently by two of the three authors, further considerations have been done when the data gathering brought to different results.

The qualitative comparative analysis has been performed through to the R package "QCA". It allows the usage of a graphic user interface (GUI) (Duşa, 2007) and the performance of both csQCA and fuzzy set QCA. Given the reduced number of instances in the dataset, it is established a frequency threshold of one case and a consistency of 75% coherently with previous researches (e.g., Schneider & Wagemann, 2010).

Big Bang Disruption Characteristic	Condition	Rationale of condition
Unencumbered Development	Exponential Technology in Use	The potential of disruptors is enclosed in exponentially improving technologies(Kurzweil, 2005)
	Existence of Direct Network Externalities	The increase in the number of users leads to a more than proportional increase in the value of the network (Hellofs & Jacobson, 1999; Libert et al., 2016)
	Strong Intellectual Property Protection	To make the development process faster and cheaper, disruptors should rely on off-the-shelf components,i.e.,. characterized by low intellectual property protection (Bontis, 2001)
Undisciplined Strategy	No Classical Porter Positioning	Disruptors do not follow any of Porter's generic strategies but an optimized combination of them (Kim et al., 2004; Miller, 1988; Porter, 1980, 2001)
	Customization in Place	The solution provided by the disruptor is not only better and cheaper but also more customized (Nielsen & Brunoe, 2014)
Unconstrained Growth	Lowered Transaction Costs	Disruptors, thanks to digitalization, lead to a decrease in searching, information and access costs (Madhok, 2002)
	Negligible Switching Costs	The adoption of the disruptive solution is pervasive and so simple to adopt that it does not follow the classical Roger's diffusion of innovation (Katz & Shapiro, 1985)
	No Customer Segmentation	The disruptor is able to target everybody since the beginning since the solution is customizing (Fleisher & Bensoussan, 2003)
	No Marginal Cost of Production	The company is able to scale up, and scale down, incurring in little to no additional cost (Rifkin, 2014)

Table 3 – Step 1: Set of features used to define a Big Bang Disruptors through the csQCA

The analysis brought to the definition of four necessary – but not sufficient – conditions to be defined as a BBD. Any disruptor with a Big Bang effect must satisfy these conditions: i) usage of an exponential technology, ii) absence of a classical Porter strategy, iii) absence or irrelevance switching costs, and iv) absence of customer segmentation. Each rule is then characterized by three to five non-necessary conditions as presented in Table 4. The table is not presenting all the possible combinations that have been considered by the algorithm during the analysis, but only the ones relevant to classify an observation among BBDs and NDs. The set of necessary and non-necessary conditions – getting to one of the four rules - form a sufficient condition for being considered a BBD.

	Exponential technology in Use	Existence of direct network externalitie	Strong Intellectual property protection	Absence of classical porter positioning	Customizati on in place	Lowered transaction costs	Negligible Switching Costs	Absence of Customer segmentati on	No marginal cost of production
Rule 1	1*	-	0	1*	-	1	1*	1*	1
Rule 2	1*	1	-	1*	0	1	1*	1*	1
Rule 3	1*	0	0	1*	1	-	1*	1*	1
Rule 4	1*	0	1	1*	1	0	1*	1*	0

Table 4 – Defining rules. 1 implies the fulfillment of the condition, 0 implies the absence of the condition, - implies the irrelevance of the condition in the rule (may be both 1 or 0), * indicates the necessary conditions. For a rule to be satisfied, the series of condition reported in each line has to be fulfilled.

3.2 Step 2: Identifying common patterns among the design variables of Big Bang Disruptors

3.2.1 Defining the sample

The purpose of this study is the definition of the Business Model characteristics which distinguish a Big Bang Disruptors. In order to reach the aim, a recognized sample of companies where both BBDs and NDs is needed. The Unicorn list (private companies with a minimum market evaluation of $1 billion), updated in March 2017 and available at Cbinsights.com, has been used. It has been selected since i) It is a widely acknowledged set of companies by both professionals and academics (e.g., De Massis et al., 2016; Hathaway, 2016); ii) it contains a large number of fast-growing companies so that we can assume the presence of a relevant subset of disruptors (De Massis et al., 2016; Downes & Nunes, 2014); iii) it is characterized by heterogeneity of industries (more than thirty) and countries (more than twenty) (CB Insights, 2016), aiming to increase the generalizability of the results according to these dimensions. Finally, it is important to highlight how these companies share a private capitalization higher than $1 billion, which is linked with a relevant market success that leads to that evaluation (e.g., De Massis et al., 2016). The dataset is composed of a total of 186 companies.

First, the dataset has been analyzed according to the nine binary conditions identified in the preliminary analysis with the same logic previously exposed. Therefore, the set has been divided into BBDs and NDs through the four association rules. Out of the 186 unicorns, the association rules determine 79 BBDs, corresponding to 42.5% of the instances, as reported in Table 5.

Big Bang Disruptors		Non Disruptors	
23andMe	One97 Communications	Actifio	MarkLogic
51Xinyongka	Pinterest	Adaptive Biotechnologies	Medallia
Adyen	Prosper Marketplace	Africa Internet Group	Meizu Technology
Airbnb	Quanergy Systems	Age of Learning	Mia.com
Apus Group	Rong360	Anaplan	MindMaze
Automattic	Shazam	AppDirect	Moderna
Avant	Shopclues	Appnexus	Mofang Gongyu
AVAST Software	Slack Technologies	Apttus	MongoDB
BlaBlaCar	Snapdeal	Auto1 Group	Mu Sigma
Careem Networks	Souq	BeiBei	Nextdoor
China Rapid Finance	Spotify	benevolent.ai	NIO
Compass	Stripe	Bloom Energy	Okta
ContextLogic (dba. Wish)	SurveyMonkey	Blue Apron	OpenDoor Labs
Coupang	TangoMe	Buzzfeed	Oscar Health Insurance Co.
Credit Karma	Thumbtack	C3 IoT	OVH
Dada	TransferWise	Carbon3D	Oxford Nanopore
Decolar	Uber	China Internet Plus Holding	Technologies
Delivery Hero	VANCL	CJ Games	Palantir Technologies
Didi Chuxing	Weiying	Cloudera	Panshi
DocuSign	Yello Mobile	CloudFlare	Pivotal
Dropbox	Yixia	CureVac	Pluralsight

Ele.me	Zhangyue	Cylance	Procore Technologies
Eventbrite	Zhihu	Datto	Promasidor Holdings
Fanli	Zocdoc	DJI Innovations	Proteus Digital Health
Flipkart	Zomato Media	Docker	Qualtrics
Funding Circle		Domo Technologies	Razer
Github		DraftKings	ReNew Power Ventures
Glassdoor		Fanatics	Royole Corporation
Global Fashion Group		Fanduel	SMS Assist
Go-Jek		Farfetch	Social Finance
GrabTaxi		Flatiron Health	SpaceX
GuaHao		Garena	Sprinklr
Gusto		Global Switch	STX Entertainment
Hike		Greensky	Tanium
Houzz		Guazi	Ten-X
Human Longevity		Hellofresh	The Honest Company
iCarbonX		Huimin	Trendy Group International
Illumio		Huochebang	Tujia
Instacart		Infinidat	UBTECH Robotics
iwjw.com		Infor	Unity Technologies
Jawbone		InMobi	Uptake
Kabbage		Insidesales.com	URWork
Kik Interactive		Intarcia Therapeutics	Vice Media
Klarna		ironSource	Vox Media
LaKala		iTutorGroup	Warby Parker
Lookout		JetSmarter	WeWork
Lu.com		Jiuxian	Xiaohongshu
Lyft		JustFab	Xiaomi
Mercari		Kendra Scott Jewelry	Zenefits
Mogujie		Koudai Gouwu	Zeta Interactive
Mozido		Lianjia	Zhong An Insurance
OfferUp		Liepin	Zoom Communications
Ofo		LIfeMiles	Zoox
Olacabs		Magic Leap	Zscaler

Table 5 – List of BBDs and NDs according to the application of the rules

3.2.2 Data Gathering

Consequently, to the classification of the Unicorns between BBDs and NDs, they have been evaluated according to the six building blocks defined in the conceptual framework.

The creation of the database, analyzing each of the 186 companies through the conceptual framework previously presented, has been done independently by two of the authors and later compared to increase the validity of the judgment. Each design variable of each building block has been evaluated through a binary variable (1 presence, 0 absence) relying on secondary sources (e.g., official website, digital magazines). The entire dataset is then composed of a 186x20 Boolean table, which is available upon request to foster other studies on the same variables.

To increase the reliability of the built database, it has been further tested through a panel of experts. Three external experts – chosen within the academic community for their knowledge of Business Model, Big Bang Disruption and innovation management - evaluated a random subset of the database independently. Two different experts have analyzed each tested

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company through a survey based on the conceptual model. The results are then compared with the performed classification, showing a consistency rate off response higher than 80% which leads to the acceptance of the database.

3.2.3 Data Analysis

The formation of homogeneous groups of BBDs and NDs is performed with a robust clustering of categorical attributes (ROCK). The ROCK is an unsupervised statistical method specific for the case of binary variables, where most of the clustering algorithm are not suited for (Muhlenbach & Lallich, 2009). The ROCK requires two inputs: i) beta, which sets the minimum percentage of common features two companies should share to be considered neighbors, or belonging to the same cluster; and ii) theta, which sets the minimum percentage of links between two clusters' instances, out of the potential number of links, for the two clusters to be merged.

Different levels of beta and theta have been tested, due to the trade-off between the number of clusters and their homogeneity (Hastie et al., 2009). Through an iterative approach on both the parameters, we finally identified two clusters for the BBDs dataset (beta equal to 0.9 and theta equal to 0.01) and three clusters for the NDs (beta equal to 0.95 and theta equal to 0.01). It shall be noticed that both parameters assume similar values in the two analyses and are significant of loose constraints (Dutta et al., 2005). A very low similarity coefficient is required for two instances to be considered as neighbors, due to the high number of attributes compared to the number of samples in each dataset, a tighter constraint would lead to the definition of a sharply increasing number of clusters (Guha et al., 2000).

Finally, the over-population or under-population of certain conditions in the formed clusters is measured with the lift measure. The lift score is the ratio of the frequency of a specific feature inside the cluster and the frequency of the same feature in the overall population. If the lift is higher than 1, the cluster is overpopulated by that feature, if lower than one the cluster is underpopulated by the feature under analysis (Tuffery, 2011). To test the statistical significance of the over or under population, we rely on the binomial test and the corresponding p-value (e.g., Maidique and Zirger, 1984; Taddesse and Belay, 2004).

The ROCK method has been performed thanks to the rock cluster function implemented in the R package CBA (Clustering for Business Analytics).

4. Results

Data show a good heterogeneity concerning industries among all the clusters, having several industries which are represented in both BBDs NDs' clusters (such as Hardware or Cybersecurity). At the same time, some commonalities can be found. For example, in the first BBD cluster many companies belonging to Fintech (e.g., Credit Karma, Avant), Internet software and services (e.g., Slack Technologies, Automattic), and social platforms (e.g., Hike, Zomato Media) are present, while in the second there is a relatively higher concentration of marketplaces (e.g., Airbnb, Uber, BlaBlaCar), coherently with their core characteristics. Similarly, in the NDs clusters we can find some industries which are more coherent with the general traits, having other marketplaces in the e-Shopper cluster (e.g., The Honest Company, BeiBei, Mia.com), a lot of Big Data (e.g., Domo Technologies, Cloudera) and Fintech (e.g., Social Finance, Zhong An Insurance) companies in the Digital Tailors, and may hard-technology industries in the Inventors' cluster (e.g., Magic Leap, ReNew Power Ventures, Zoox, UBITECH Robotics, DJI).

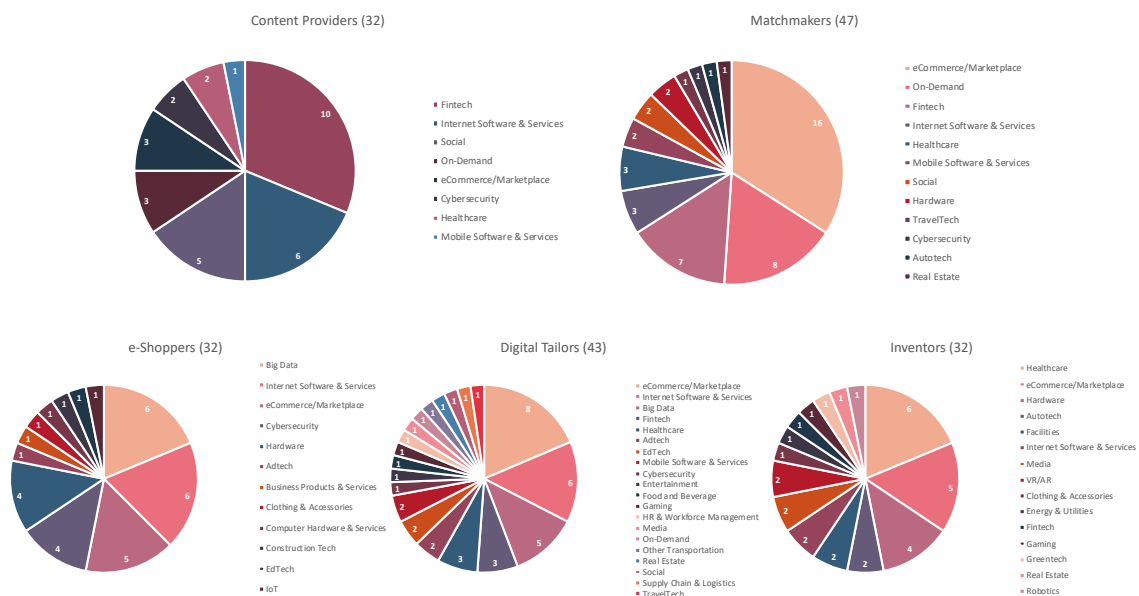Figure 2 shows descriptive analyses of the five clusters emerging from the data analysis.

Figure 2 – Descriptive analysis of the clusters

Moving from a general description to a more in-depth analysis, Table 6 shows the distribution of the design variables identified in the conceptual framework in the different clusters. The stars show the degree of statistical significance of the over-population (higher than 1) or under-population (lower than 1) of the feature in the cluster calculated through an exact

binomial test. Moreover, the table shows the degree of over- or under-population in the cluster in terms of lift measure and its significance.

		Big Bang Disruptors		Not-Disruptors		
		Content providers	Matchmakers	e-Shoppers	Digital Tailors	Inventors
	n	32	47	32	43	32
Innovation Strategy	Design-Driven	1.61**	1.47**	0***	0.96	0.75
	Technology-Push	0**	0.86	0*	0.75	3.54***
	Market-Pull	0.88	0.82	1.75***	1.06	0.55***
Value Proposition	Cost Leadership	0.97	0.66	2.91*	0.72	0
	Premium Product	0***	0.26***	1.91***	1.31*	1.53**
	Ease of use	1.75***	1.46***	0.22***	0.78	0.66**
Channel	Physical channels	0***	0.46*	0.89	0.67	3.35***
	Mobile applications	1.74***	1.78***	0.23***	0.51**	0.34**
	Proprietary digital channels	0.79	0.58	1.51***	1.35**	0.85
	Outsourced digital channels	0.65	2.2**	0.65	0.48	0.65
Customer Segments	Single segment	1.18	0.81	1.4	0.88	0.86
	Multiple segments	0.26***	0.53***	1.56**	1.29	1.47**
	Multi-sided market	1.61**	1.64***	0.09**	0.8	0.63**
Cost Structure	Zero or Not-zero marginal cost structure	1.6***	1.4***	0.2***	1.19*	0.35***
Revenue Streams	Freemium	3.88***	0.44	0	0.96	0
	In-app selling	5.81	0	0	0	0
	Advertisement	3.08***	0.93	0**	0.51	0.68
	Pay per usage	0.73	2.31***	0	0.72	0.73
	Purchase	0***	1.55***	0.76	0.78	1.71***
	Subscription	0.97	0.36***	1.79***	1.39**	0.67*

Table 6 – Results of the Rock Clustering

Regarding the Innovation Strategy building block, BBDs present an overpopulation in the design-driven innovation strategy, differently from the NDs where the other two strategies are delineated. Also, the market-pull strategy is consistently present in the two disruptors' clusters being the most represented strategy in the dataset (about 58%), but its presence is lower, as the lift show, than in the whole dataset. A remarkable concentration of technology-push solutions characterizes the third NDs clusters.

Considering the value proposition variable, the two BBDs clusters differentiate from the rest with a neat Ease of Use proposition. Indeed, since the disruptors prior classification, they are characterized by a non-classic Porter positioning which is in line with this result. Non-disruptors present premium value proposition majorly and, in the minority, a cost leadership value proposition.

Looking at the channels, BBDs separate among app-driven solution and outsourced digital solution, proper of marketplaces and e-commerce. The difference with NDs is still evident. These latter adopt a proprietary digital channel or a retail distribution. We can denote how a retail channel is combined with a technology-push solution in the third cluster.

BBDs are uniform regarding the customer segmentation, since being a multi-sided business is an essential characteristic. Instead, NDs usually rely on multiple segmentation.

Zero-cost structure organizations are prevalent in the BBDs clusters. Nonetheless, both disruptors' clusters show a robust zero-cost structure representation, significantly higher than the average population. This was, indeed, one of the conditions shared by 74 disruptors out of 79 of the database (the one respecting rules 1,2, and 3). This element also characterizes one of the NDs clusters.

In the end, regarding the revenues streams, the situation is more complex. Different models can be recognized as significantly more present in the disruptors' clusters: advertising, pay-per-usage, freemium and purchase. Notwithstanding their over-representation, the in-app revenue model is consistently present. The issue with in-app selling is the low global representativeness of this revenue model in the database which ostracizes its statistical significance. From the side of NDs, subscription (present in two clusters) and purchase are the most represented and significant revenue streams. This latter is consistent with the other results of the same cluster which shows the physical delivery of a premium, high-end, technological product.

5. Discussion

As previously mentioned, this research aims to identify the decisions on the design variables of a business model which may lead to the creation of a Big Bang Disruptor. Therefore, we critically analyze the results of the clustering analysis on the Unicorn's sample, divided between BBDs and NDs. The discussion is going to be based on the main dimensions defined in the conceptual framework.

Table 7 summarizes the representative characteristics for each cluster, highlighting a symbolic case for each one.

First of all, it is important to stress how these pieces of evidence are not pointing at the best decision on a design variable in the business model. The entire sample, both BBDs, and NDs are companies able to convince the investors, being Unicorns successfully. What these results point out is the relevance of some design variables to have a disruptive impact on the market. In this perspective, we want to stress how these are all successful companies (De Massis et al., 2016), despite being or not BBDs, indeed we are aiming to define common characteristics

among BBDs, and how they differ from other successful companies which do not have the BBD characteristics (Downes and Nunes, 2014).

	Big Bang Disruptors		Not-Disruptors		
	Content providers	Matchmakers	e-Shoppers	Digital Tailors	Inventors
Innovation Strategy	Design-Driven	Design-Driven	Market-Pull	Market-Pull	Technology-Push
Value Proposition	Ease of Use	Ease of Use	Premium Cost Leadership	Premium	Premium
Channel	Mobile Apps	Mobile Apps Outsourced digital	Proprietary Digital	Proprietary Digital	Retail
Segments	Multi-sided	Multi-sided	Multiple Segments	Multiple Segments	Multiple Segments
Cost Structure	Zero	Zero	Non-zero	Zero	Non-zero
Revenue Stream	Freemium Advertisement	Purchase Pay-per-usage	Subscription	Subscription	Purchase
Example	Spotify	Airbnb	The Honest Company	Cloudera	DJI

Table 7 – Representative characteristics and cases for each cluster

Before entering in the details discussion of the design variables that characterize the different clusters, we would like to discuss the link between the defining characteristics of BBDs that defined the rules, and the clusters and those characteristics which are common among BBDs and NDs.

The defining characteristics of Big Bang Disruption let emerge four rules and four necessary conditions (Table 4). It is interesting to see how technology play a key role among the necessary conditions, even though technological innovation is a common strategy among NDs. This seems to let emerge a different role of technologies, which act as an enabler of systems, more than being the heart of the innovation process (Adner and Kapoor, 2016).

The negligible switching costs seem not to have a direct link among the design variables of the business model that emerged in the following analyses. On the contrary, the absence of a classical Poter positioning and the absence of customer segments seem to be coherent with the relevance of the Ease of use among the disruptors, as well as the diffusion of multiple segmentations among NDs.

Among numerous differences, which are going to be further detailed in the next sections, there are some characteristics which seem to describe both some BBDs and NDs: the cost-structure and the Revenue Streams. Indeed, in both cases the most common implementation of these building blocks among the two clusters of BBDs can also be found in at least one

cluster of NDs, making them not distinctive characteristics. This seem coherent with Big Bang Disruption as an innovation strategy, rather than an operationalization of an innovation into a solution (Downes and Nunes, 2014).

5.1 Big Bang Disruptors as Innovators of Meanings

Regarding the innovation strategy of BBDs, based on the interaction between Problem and Solution, we are dealing with strategies based on the fact that "*[disruptors] don't share your [the incumbents'] approach to solving customer needs*" (Downes and Nunes, 2014). Our empirical results fully support this statements. Therefore, the innovation strategy significantly adopted by disruptors is the so-called design-driven strategy which consists in the innovation of the meaning: aiming to change the reason why people use and love a product or a service, instead of improving functionalities relying on market analysis or technological innovation (Verganti, 2009).

The starting point of this innovation strategy is the key difference with traditional approaches. Technology itself is not the center of innovation, as it was the case for Christensen and Rosenbloom (1995) and Chesbrough (2003), but it is more considered as an enabler (e.g., Buganza et al., 2015, Dell'Era et al., 2017). Market needs' analysis (e.g., Von Hippel, 1986), as well, is not enough to propose an innovation in the meaning domain, bringing more to incremental innovations of what is already present on the market (Verganti, 2009). These results are coherent with the latest evolution of the Design-Driven Innovation model; indeed according to Verganti (2017), we are now living in an overcrowded world, awash with ideas. In other words, it is not difficult – anymore – to generate ideas to foster innovation, while it is still challenging and perhaps more relevant to define a meaningful vision to be followed, having an impact to the reason why people use a product or a service.

A clear example of this may be Airbnb, which has seen its business model taking off when the mission of the company become "*Belong anywhere*", proposing users' to use their booking services, instead of other digital platforms that rely on hotels and professional providers, to have the chance to feel a "local" experience all over the world, feeling at home (Gallagher, 2017). Similarly, also Spotify – representative of the first cluster – leverage innovation of meaning and has been studied in that perspective (Trabucchi et al., 2017a).

Regarding the ND,s the results are coherent with the definitions of the two strategies. Technology-push innovation (e.g., Anderson and Tushman, 1990; Tushman et al., 1997) can lead to excellent results, but at the same time its development process is long and complicated going through different stages before setting a dominant design (e.g., Tushman et al., 1997), as the JDI case – working in the drone industry – can show. The technology is promising and driving innovation, but companies are still searching for the solution that can significantly take the market. Regarding the market-pull structure, once again the fact that it does not lead to a disruptive impact on the market is coherent with previous researches that claim that it is more suitable for incremental innovations (e.g., Verganti, 2009).

Coherently with the innovation strategy, both the BBDs clusters share a value proposition based on the ease-of-use. It is not a traditional Porter's strategy, leveraging on the simplicity, usability and customer immediacy of the solution as the main value for the customer (Al-Momani et al., 2009; Khare et al., 2016). Furthermore, ease of use has also been highlighted by Hamel (1996) as the main driver of the future strategy focus and by March (1994) as a new dimension in product design. The importance of this factor is not merely industrial or economic, but it is psychologically rooted. Indeed, Schwartz (2004) – considering the paradox of choice - remarks how the augmenting choice criteria and offering width increase the anxiety during product selection with a deterrent effect towards shopping.

Looking at the NDs clusters, they are all based on traditional innovation strategies, i.e., market pull or technology push) and more traditional value proposition, i.e., premium, cost leadership), still successful, but with a less disruptive impact on the market.

5.2 Big Bang Disruptors as fast-growing platforms

Big Bang Disruption is – by definition -characterized by an exponentially fast growth (Downes & Nunes, 2014), this is coherent with the kind of channels mainly adopted by disruptors: apps and outsourced digital channels. Both of them enhance the chance of a fast and pervasive diffusion, leveraging network effects built by other providers (Gawer and Cusumano, 2014), such as Apple, Google or Amazon.

The customer segments offer another relevant insight. Both BBDs clusters share a multi-sided market segmentation, meaning that they address two or more set of customers with a specific value proposition and match them (Rochet and Tirole, 2003; Muzellec et al., 2015; Trabucchi

et al., 2017b). Two representative cases, for regarding the BBDs clusters, are Spotify and Airbnb that bring together end-users on one side and artists and host on the second side. According to Evans (2009) and Eisenmann et al. (2006), multi-sided platforms enable the reduction of transaction costs by increasing return scale (Eisenmann et al., 2006) and internalizing externalities (Evans, 2009). The reduction of transaction costs is strictly related to an enhanced diffusion and adoption of the solution, since it is linked to a more optimal economic state (Gawer, 2009). This market structure can be directly linked with the diffusion process. According to the Bass (1969) model of innovation and the following extended models, also presented by Cantamessa and Montagna (2016), non-multi-sided solution, which we will call single-sided, rely on an imitative diffusion process (Bass, 1969; Cantamessa and Montagna, 2016). Multi-sided platforms, on the other hand, rely on a so-called imitative-reciprocal process (Cantamessa and Montagna, 2016). In this case, the rapidity of diffusion depends on the number of users on the other sides since the different segments of customers are interrelated. The robustness of this finding can be further explored. Indeed, the more rapid diffusion can also be tested on the Unicorns' dataset by measuring the number of years elapsed between the foundation of each company and its inclusion in the unicorns' list as proxy: this measure is also known as time to market cap (TTMC) (Ramadan et al., 2015). BBDs have an average TTMC of 5.86 years while NDs have an average of 8 years, with an acceptable 0,73 likelihood ratio test (Han et al., 2012). It is proved that the TTMC of disruptors is significantly lower than the one of non-disruptors.

This common characteristics among the two clusters seem to be coherent with recent contribution coming from the research stream on platforms (e.g., Libert et al., 2016). In particular, recent contributions shows how platform mechanisms and evolutions among platform providers and complementors may lead to significative changes in the competitive scenario (Legrand et al., 2017; Pellizzoni et al., 2018).

The faster diffusion of BBDs is also enhanced by the findings on the cost structure. Therefore, the Zero-cost structure is found as an important antecedent of disruption. A zero-marginal-cost structure, as introduced by Rifkin (2014), has an important, probably the highest, impact on scalability. Indeed, this type of cost structure nullifies the cost of offering the solution to a fast-growing number of users (Rifkin, 2014).

On the other hand, NDs, usually leverages on multiple segments, often through a differentiation strategy and may or may not have a zero-cost structure. The two

representative companies showed in Table 5 match these possibilities. On the one hand, we have The Honest Company, based on a traditional cost structure offering a different kind of consumer goods to different targets, leveraging the concept of ethical consumerism. On the other hand, Cloudera relies on a zero-marginal-cost structure, offering software which is suitable for different market segments due to their large offer.

In the end, the revenue streams differentiate the two clusters of BBDs. On the one hand, some companies are mainly based on advertising or freemium models, coherently with the growing trend of offering services for free (Trabucchi et al., 2017b). On the other, the pay-per-usage and the eventually the purchase of the access is typical of multi-sided platforms (Rochet and Tirole, 2003; 2006; Rysman, 2009).

NDs leverage more traditional revenues streams, being based on the typical purchase or subscription models.

6. Conclusion

This paper leverages the concept of Big Bang Disruption with the aim to understand the design variable of a Business Model that may lead to this kind of innovation.

To reach the goal preliminary analyses are needed, defining rules to distinguish a Big Bang Disruptors from a Failed-to-Be-Big Bang Disruptors through csQCA (Ganter & Hecker, 2014). Once the rules have been defined, they have been applied to the Unicorns' list defining a sample of BBDs and a sample of NDs. The two sets have been analyzed according to the developed conceptual framework. It is based on the Lean Canvas (Maurya, 2012), highlighting the primary design variables that can help in defining each building blocks. Through a ROCK clustering method (Muhlenbach and Lallich, 2009), five clusters that contain common pattern regarding design variables have been identified, two for BBDs and three for NDs.

From a theoretical perspective, this research has three main contributions. First, the developed conceptual framework offers the chance to leverage the Lean Canvas (Maurya, 2012) for further research, using it as a tool of analysis for innovative companies.

Moreover, it provides a link between the innovation of meaning and its impact on the market. Research so far focused mainly on the characteristics of this kind of innovation (e.g., Verganti, 2008, 2009, 2011) and on the process to develop it (e.g., Buganza et al., 2015; Verganti, 2016,

2017). This study confirms that the radicalness of this innovation strategy may lead to a disruptive impact on the market.

Finally, the literature on Two-Sided Markets and Multi-Sided Markets (e.g., Rochet and Tirole, 2003, 2006; Evans, 2003; Rysman, 2009) expanded significantly over the last years from a management perspective (e.g., Muzellec et al., 2015; Dou et al., 2016; Trabucchi et al. 2017b) showing the potentialities and the opportunities on this market structure. This study links this market structure with the concept of disruption, confirming models that treats this kind of businesses as a revolution in the market (e.g., Trabucchi et al. 2017b).

This study, of course, has limitations that may be overcome with further developments. First of all, the chance to leverage the Unicorns' sample has been useful to consider successful companies also in the control group (NDs), but at the same time, it introduces a bias. Indeed, all the considered companies have been positively evaluated by investors. Re-proposing a similar approach in different settings may increase the validity of the results. Moreover, the need to create defining rules for BBDs brought to a double effort in data gathering, a confirmatory panel of expert has confirmed the validity of the final database, but further research is needed to corroborate the results.

Finally, more emphasis should be posed upon the operational resources, activities, and partnerships which could precede a disruption. Indeed, this research focused on the strategic dimensions highlighted by the Lean Canvas, without considering other building blocks presented in the Business Model Canvas. Further research to explore the role of partnerships and resources may be interesting. Also, the confirmation of these findings through qualitative research, that may dig into the relationships between the different design variables could be relevant. Disruptors have to be foreseen, preferably considering case-dependent features and infrastructures and, then, adopt a qualitative approach.

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