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Characterizing digital disruption in the general theory of disruptive innovation

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Abstract: Development in the digital area during most recent decades has made the possibility and fear of being disrupted by digital platforms, communities, and digital services more present. Even though theories of disruption and managerial implications have been explored and developed since the mid 90's, some characteristics applying to the digital domain, i.e. lower development costs and fast scalability, call for nuanced theories and methodologies. This paper is a first endeavour into developing a specialized theory and methodology for digital disruption. The aim is to provide an overview of research within the area of digital disruption and its correspondence to more traditional disruptive innovation theory. The outcome of the paper is a framework that highlights characteristics of digital disruption as a special category of disruptive innovation and thereby highlights vital aspects and perspectives that need to be taken into consideration when working with digital disruption compared to disruptive innovation in general.

Keywords: Digital disruption; disruptive innovation; discriminators

1 Introduction

Today, digital disruption is acknowledged as a threat in most industries. Widely exposed examples such as Airbnb, Facebook, Netflix, and Amazon show that industries of various types can be subject to disruption and therefore, CEOs and innovation managers across industries are interested in exploring possibilities of digitalization to be at the forefront of this development rather than being the ones left to be disrupted. Reimer *et al.* (2015) describe digital disruption as follows:

> *"Digital disruption refers to advancements in digital technologies, that occur at a pace and magnitude that disrupt established ways of creating value within and across markets, social interactions, and more generally, our understanding and thinking* (p. 4)

As the definition reveals, the concept of digital disruption emanates from the concept of disruptive innovation or disruptive technology.

Disruptive innovation

The original concept of disruptive technology was based on studies of tangible products, including the disk drive industry throughout the mid 80's to early 90's, and introduced in 1995 in an article by Bower & Christensen (1995). The concept later became the theory of disruptive innovation to better align with the inherent broader meaning of the concept (competition, market, and business model) and the contemporary business discourse (Christensen & Raynor, 2003). A disruptive innovation is a new product or service—typically launched by a smaller company—with a lower and/or different performance targeted at a low-end segment of the market and then incrementally improved until the point where it dominates (disrupts) companies in the mainstream market (and makes the incumbents of that market obsolete). Christensen and Raynor (2003) later made a distinction between two types of disruption based on the specific entrant market type. 'Low-end disruption' initially offers a lower product or service performance at lower price (to the low-end of a market) than had historically been demanded by the mainstream market. 'New-market disruption' initially creates a new or expanded market by offering relatively new performance attributes to a product or service turning non-consumers into consumers. Since many cases of disruption encompass both categories to a varying extent, the distinction is often unclear. The essential point, however, is the fact that incumbents are not adopting to the new offerings due to a heavy focus on current customers, rendering them stuck with the legacy of their current competences and investments.

Until now, the concept digital disruption has mainly been explored in a broader societal scale (Latzer, 2009; Schmidt & Cohen, 2010) or as an integrated part of disruptive innovation (Menon, 2011; Elie-Dit-Cosaque & Straub, 2011; Mohan et al., 2012) and not as an area of study per see; one exception found though, is Baiyere & Salmela (2013). Discussions of whether specific cases such as Uber are examples of disruptive innovation might be a direct consequence of this (Christensen, 2015; Chiaroni et al., 2015). Another consequence is that extant research on digital disruption is scattered and in lack of targeted structured research.

Furthermore, some characteristics applying to the digital domain, i.e. lower development costs and fast scalability, call for development of theory and methodology specifically related to the digital domain.

Hence in this paper, we argue for development of specialized theory and methodology for digital disruption rooted in disruptive innovation theory but taking into consideration differences between innovation in the physical and digital domain, respectively. We find

this of importance to the ambition of creating a solid and contextualized basis for creating future theories and methodologies for digital disruption.

The aim is to provide an overview of research within the area of digital disruption and its correspondence to disruptive innovation theory. Secondly, the objective is to develop a framework that highlights characteristics of digital disruption as a special category of disruptive innovation and thereby highlights aspects and perspectives that need to be taken into consideration when working with digital disruption compared to disruptive innovation in general.

Hence, the research question is:
What are special characteristics of digital disruption within the general theory of disruptive innovation?

Since digitalization is an increasing part of most industries, it is important that theory and methodology is developed to support practitioners' ability to deal with potential threats or opportunities related to digital disruption. This paper is research-in-progress aiming at creating theory and methodology for digital disruption.

2 Methodology

The study will be based on a literature review focusing narrowly on the terms 'digital disruption' and 'disruptive innovation' with the aim of investigating differences and defining the two terms in respect to each other. Secondly, the study will engage in a more explorative and speculative part that intends to provide a better understanding and contribution to adapting or building theory of disruption in the digital domain.
The main outcome of this research project will be a framework that specifies digital disruption relatively to disruption in general.

The methodology used for the literature review is adopted from Webster & Watson (2002) and further inspired by Papaioannou *et al.* (2010). The first task was to identify existing literature with some degree of relation between disruptive innovation and the digital domain. This was done by creating a concept-centric search in both Business Source Premier (provided by EBSCOhost), which covers business and marketing literature, as well as in Scopus, which broadly covers all subjects and, therefore, possible grey area literature. Besides searching for the word digital disruption, the search also included all possible combinations of the following search words:

Table 1 Search word combinations.

Digital	*Disruption*
Information technology	Disruptive innovat*
Digital media	Disruption
Digital devices	Disruptive change
Digital domain	

The search included peer-reviewed material from 2000-2016, and it was conducted on the 2nd of December 2016.

The outcome of the search included 35 articles from Business Source Premier and 176 articles from Scopus. After reviewing the abstracts of the uncovered literature, 10 articles from each search were deemed relevant to this study. 4 of these were identical. Of the 16 papers selected on the basis of the abstract, 5 articles were found relevant for this study. The search did not include any reference list checking, contact with experts, citation searching or comprehensive pearl growing. However, literature on digital disruption or relevant for digital disruption, shared by our colleagues from the Consortium for Digital Disruption at Aalborg University was also included in the final list (see Table 2).

Table 2 Articles discussing disruptive innovation in relation to / relevance for the digital domain

Year	Author	Article	Journal	Special Digital Disruption Characteristics
2015	Reimer K *et al.*	Digital Disruptive intermediaries	Publisher: Australian Digital transformation Lab	Digital disruptive companies approach markets as a matter of information management (as intermediaries) rather than traditional recourse deployment and exploitation.
2001	Stace D *et al.*	E-change: Charting a path towards sustainable e-strategies	Strategic Change	Virtual organization structures and close collaborative networks
2016	Utesheva A *et al.*	Identity metamorphoses in digital disruption: a relational theory of identity	European journal of information systems	Differentiating organizational identity (i.e. a printed news organization has a authoritative identity; whereas a digital news organization has a curator based-identity)
				Differentiating user identity (i.e. from consumer of news to active prosumer of news due to the digital interaction possibilities).
2010	Katsamakas E & Geor-gantzas N C	Open source disruptive innovation strategy	Human system management	The digital domain holds the possibility of open-source as a disruptive strategy
2015	Alles M G	Drivers of the use and facilitators and obstacles of the evolution of big data by the audit profession	Accounting Horizons	The digital domain holds the possibility of big data as a disruptive strategy
2014	Carlo J L *et al.*	Internet computing as a disruptive information technology innovation: the role of strong order effects	Info Systems Journal	Disruptive information technologies (i.e. computing platforms) result in pervasive and radical innovations in software development organizations both in relation to digital services and processes.

3 Findings and discussion

From the literature review, we have extracted several propositions about differences between features of digital disruption and features of 'traditional disruption'.

We draw on the literature mentioned in Table 2 as well as on Christensen's (1995, 1997, 2003, 2016) work elaborated in the introduction section to propose the features of traditional disruption. Furthermore, we draw on the work of Ismail et al (2014) on the concept of 'exponential organizations' to propose features of digital disruption. This work has been described in the book "Exponential Organizations – Why new organizations are ten times better, faster, and cheaper than yours (and what to do about it)" (op. cit.). The book attempts to explain key features of exponentially growing organization (many highly digitalized) and is not directly linked to Christensen's theory of disruptive innovation. Ismail et al summarizes the concept of exponential organizations with two acronyms describing the revealed features of successful exponential organisations: SCALE regards external properties (Staff on demand, Community & crowd, Algorithms, Leveraged assets, and end user Engagement) and IDEAS regards internal properties (Interfaces, Dashboards, Experimentation, employee Autonomy, and Social technologies) (Ibid, p. 53; Ibid. pp. 58-84; Ibid, 85-115). Moreover, an exponential organization is characterized by an MTP (Multiple Transformative Purpose) which has the key purpose to generate a cultural movement…" (Ibid. p. 55).

The proposed differences in features of digital and traditional disruption is shown in Table 3.

Many features of digital disruptive organisation are enabled by bringing several big developments in computing synergistically together such as – of cause the basics computer and internet – and cloud computing, smart phones, internet of sensors, wearable computers, big data, internet of things, artificial intelligence, and ubiquitous computing – all linked and open for many combinatory innovations that can provide fast connectedness, customised intelligent information on demand. This is an essential foundation for many digital disruptions and at the core of the differences proposed in Table 3. Intangibility of offering, interaction and fast learning while co-creating value together, and fast diffusing/scaling of the business, as well as the use of new business models, including platform-based ones seems to be particular important distinctions of digital disruption.

Table 3 Differences between features of digital disruption compared to traditional disruption as observed in literature reviews.

Features of Disruption	Digital Disruption	Traditional Disruption
Role of disruptor in the value chain/network.	Serves often as intermediaries between (but digitally immerged) with suppliers and users/customers, thus rearrange existing value chain/network.	Establishes new value chain/network.
Organisational structure of disruptor/disrupting network	Often a virtual organization structures and close collaborative networks of interdependencies	Often independent organisations competing against other independent organisations.
Impact on identity of organisations and people involved in the disruption.	Disruptors may often enter with an identity different from establishes players, e.g., a less authoritative identity to fit an intermediary's role. The user identity may change as effect of being more engaged, e.g., as co-creator of service.	For established organisations, the lack of change of identity to adapt is often considered a mind-set barrier of management, which prevent change (and may lead to extinction, eventually).
Business model	An area of focus, creativity and combinations, often to quick creating and exploiting scale; e.g., taking a slice of the value, expand qua open source or freemium. Often involving/engaging users/customers in a exploiting, mutually beneficial or democratic way.	Finding niches in the market (typically "over served customers in the low end of the market") or finding untapped needs ("non-consumers") expanding the market.
Use of big data auditing	The digital domain often holds a convenient possibility of big data as a disruptive strategy	Use of big data is often less of a focus and less convenient in many cases.
The role of platforms	Disruptive information technologies, especially computing platforms is often followed by pervasive and radical innovations in software development organizations both in relation to digital services and processes. Platforms often enable others to create and thus engage many to scale fast.	Traditional disruptions are less so platform based but may define new product categories.
Speed of diffusion.	Fast to exponential building or penetration of market (scaling). Exploiting digital channels. Speed of down-sizing can also be fast.	Slow penetration of market. Speed is often restrained by physical logistics. Down-sizing is also –perhaps advantageously - slower.

Initiators of disruption.	Start-ups or established players using digital platforms (e.g., Apple app store, Amazon)	Start-ups based on technology.
Nature of offer.	Often service or large part of service (intangible). Functions are created by software and electronic devices. Engaging users/customers.	Often involve new tangible offers. Functions are created by tangible products.
Role of invention.	Often recombination of existing solutions.	Often involve some technological invention/innovation.
Distribution of value created	Value is often more distributed in the value network involved. Value that goes to the disrupter is often a minor charge of a scaled attention of users/customers.	The value is often proprietary to the disruptor on the expense of the disrupted.
Physical assets	Few. Often 'rented' assets.	Many, often proprietary.
Humans in work	Often more flexible 'free-lance' engagement of staff.	Traditional hiring to jobs.
Control of the business	Tends to be real-time, interactive and automated.	More traditional control systems.
Sustainability	Connectedness allow for potential better use of resources as visible, e.g., in sharing economy concepts.	Not so concerned about sustainability, but generally drives performance improvement and costs.
Democratisation	Connectedness has the potential to widely engage.	'Democratic' in the sense that it gives room for smaller new-comers to the market.

Reflecting on the methodology, we had expecting to find more literature on Digital Disruption. This calls for a redesign and a wider search in the further research.

4 Conclusion

This paper is a first endeavour into developing a specialized theory and methodology for digital disruption. The aim was to provide an overview of research within the area of digital disruption and its correspondence to more traditional disruptive innovation theory. The outcome of the paper is a comparison of digital disruption and more traditional disruption in 16 dimensions or features proposed as an outcome of a literature study.

The outcome needs further validation, but is a first step in highlights vital aspects and perspectives that need to be taken into consideration when working with digital disruption as compared to disruptive innovation in general.

5 Areas for feedback and development

We seek research coupling the fields of disruptive innovation and digitalization.

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