
THE IMPACT OF DIGITAL DISRUPTION AND DISRUPTIVE INNOVATION ON BUSINESS ENVIRONMENT

Snežana Radukić

University of Niš, Faculty of Economics, Republic of Serbia, snezana.radukic@eknfak.ni.ac.rs

Zorana Kostić

University of Niš, Faculty of Science and Mathematics, Republic of Serbia, zoksinis@gmail.com

Abstract: Digital trends change business environment. The digital business environment is a modern arena for business activities which use computer and networking technologies. Business models and strategies are directed towards digital environment, and it is also important to emphasise that dependency on the digital environment is on the rise progressively. In addition, the dynamic and progressive nature of the disruptive innovations still await sufficient attention. Considering that disruptive innovation is essentially a process, reviewing the developmental trends of innovations in the markets with a pronounced digital transformation is highly desirable. Disruption happens when small, more agile companies take advantage of new technologies to completely change the way business operate, while larger companies often find it difficult to respond to the market changes. The innovator's dilemma present investing in disruptive technology which, at least in the short-term, might make worse products, for less margin, for new customers. When companies identify a disruptive technology they often fail to go forward due to they consider that the market as too small or the margins too low. These changes inevitably favours the new entrants to the market. Furthermore, the main difficult in embracing digital disruption is the adaptation to the new business reality which goes with adopting the digital technology. Companies faced with a disruptive innovations can try and hold on to an existing market by doing the same thing better, or can try to expand new markets by embracing new business models and technologies.

This paper aims to highlight a quantitative measurement framework to assess disruptive innovations with regard to their multidimensional characteristics. In addition, this paper intends to add value to the ongoing discussion on how well does the Disruptive Innovation Theory describe what actually happens in business environment. Based on the analysis of the literature and concepts, research focus is on digital disruptions. Disruptive innovations must possess distinctive characteristics in terms of technological features and marketplace dynamics. Considering that, the nature of an innovation's disruptive potential is multidimensional. Hence, we believe that digital disruption and disruptive innovations are interconnected. In light of this, the paper contributes to understanding how technology is transforming market and how companies can respond to digital disruptions. In this regard, we present a conceptualization framework for modelling the digital disruption dynamics, and give a framework to assess the disruptive potential of innovations.

Keywords: Digital disruption, Digital Transformation, Disruptive Innovation Theory, Business Environment

The paper is a part of the research done within the projects 44007 and I79066 funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

1. INTRODUCTION

The world has become more integrated and inclusive due to liberalization and globalization. The Fourth Industrial Revolution has facilitated the growth of disruptive technologies which have changed people's lives and undoubtedly, led to better services and the quality of products being offered to consumers.

A digital disruption and disruptive innovation are attracting substantial attention amongst both researchers and practitioners. The concept of digital disruption refers to the environmental turbulence induced by digital innovation. Numerous publications frequently emphasize the rapid and systemic impacts of digital disruption on business. There is limited understanding of how digital innovation causes the dynamic processes that can generate digital disruption. Furthermore, digital disruption is often conflated with disruptive innovation theory.¹³⁴

¹³⁴ Christensen, C. M. (1997). *The innovators dilemma: when new technologies cause great firms to fail*. Harvard Business School Press, Boston; Christensen, C. M. (2006). The ongoing process of building a theory of disruption. *Journal of Product innovation management*, 23(1), pp. 39-55. and Christensen C. M., Raynor, M., & McDonald, R. (2015). What Is disruptive innovation? *Harvard business review*, December 2015 Issue. <https://hbr.org/2015/12/what-is-disruptive-innovation>. Accessed 20 May 2019.

A combination of new business models, new technologies, market volatility, the digital transformation, as well as a commitment to operational excellence are all contributing to a considerable differentiation and competitive advantage. In this regard, it is critical for companies to understand the digital transformation, its associated opportunities and risks, the possibilities for new operating models and new levels of optimization.

In this paper, we give a conceptualization framework for modelling the digital disruption dynamics, and give a framework to assess the disruptive potential of innovations. The main purpose of this paper is to stimulate further theorization of this processes and support future research on the relationship between digital disruptions and disruptive innovations.

2. THE DISRUPTIVE INNOVATION THEORY

”A critical insight from our research is that one's ability to generate innovative ideas is not merely a function of the mind, but also a function of behaviors...it means that if we change our behaviors, we can improve our creative impact”.¹³⁵ The disruptive innovation theory is concerned with business-model innovation that enables companies to enter markets with cheap, easy to use, but low-performing products. In addition, disruption refers to a very specific process. The theory of disruptive innovation was introduced in 1995 and has proved to be a way of thinking about innovation-driven growth.¹³⁶

In the early literature, disruptive innovations are defined as the technologies that enable a new set of product features.¹³⁷ These features are different from those associated with mainstream technologies and they are initially inferior in certain attributes which are the most valued by customers. During the early stage, the disruptiveness of an innovation is subtle so that top managers cannot perceive.¹³⁸ Over time, the performance of disruptive technologies surpasses the dominant technologies and gain the markets.

A disruptive innovation is one that dramatically disrupts the current market. It is not necessarily a disruptive innovation. Some studies propose a three-step framework to identified the potential diffusion pattern and impact of an innovation. This can help companies to determine the threat or opportunity that an innovation represents. In connection with this, when an innovation diffuses from the low end upward toward the high end, a pattern called low-end encroachment. Conversely, when the pattern is one of high-end encroachment, the impact on the current market is immediate and striking.¹³⁹ Disruptive innovations do not accept mainstream customers until quality catches up to their standards. Disruption theory differentiates disruptive innovations from sustaining innovations. In general, there are two different types of disruptive innovations:

- 1) New market innovation which creates a new demand for novel technologies and related products, and
- 2) Low-end innovation which provides technologies with similar characteristics to existing technologies but at a lower cost. According to Bower and Christensen (1995), typical disruptive process could be labelled as low-end disruptive innovations, so their disruptive potential is usually fulfilled through products.¹⁴⁰

¹³⁵ Christensen, C. M., Dyer, J., & Gregersen, H. (2011). *The innovator's DNA: Mastering the five skills of disruptive innovators*. Harvard Business Press.

¹³⁶ Christensen, C. M. (2006). The ongoing process of building a theory of disruption. *Journal of Product innovation management*, 23(1), pp. 39-55. and Christensen C. M., Raynor, M., & McDonald, R. (2015). What Is disruptive innovation? *Harvard business review, December 2015 Issue*. <https://hbr.org/2015/12/what-is-disruptive-innovation>. Accessed 20 May 2019.

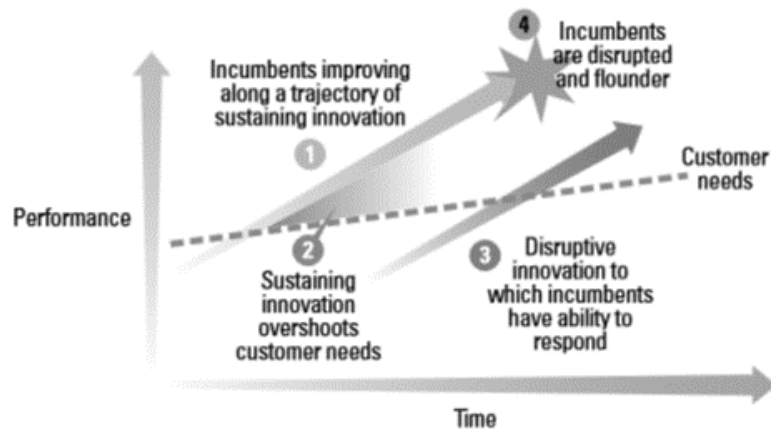
¹³⁷ Christensen, C. M., & Bower, J. L. (1996). Customer power, strategic investment, and the failure of leading firms. *Strategic management journal*, 17(3), pp. 197-218.

¹³⁸ Henderson, R. (2006). The innovator's dilemma as a problem of organizational competence. *Journal of Product Innovation Management*, 23(1), pp. 5-11.

¹³⁹ Schmidt, G. M., & Druehl, C. T. (2008). When is a disruptive innovation disruptive?. *Journal of product innovation management*, 25(4), 347-369. DOI: 10.1111/j.1540-5885.2008.00306.x

¹⁴⁰ Bower, J. L., & C. M. Christensen. (1995). Disruptive technologies: catching the wave. *Harvard Business Review*, 73 (1), pp. 43-53.

Figure 1. Four key elements of the Theory of Disruptive Innovation



Source: MIT Sloan Management Review. (2015). <https://sloanreview.mit.edu/article/how-useful-is-the-theory-of-disruptive-innovation/>. pp. 80. Accessed 20 May 2019.

Four key elements of the Theory of Disruptive Innovation are: (1) incumbents in a market are improving along a trajectory of sustaining innovation, (2) that they overshoot customer needs, (3) that they possess the capability to respond to disruptive threats, and (4) incumbents end up floundering as a result of the disruption. The multiple value dimensions of products have shown as one dimension - performance. There is a distribution of needs which is presented as a line (Figure 1).

3. THE DISRUPTIVE POTENTIAL OF INNOVATIONS AND DIGITAL DYNAMICS

”Digital disruption is the flip side of digital opportunity. Established companies and startups alike enlist new technologies in the fight to dislodge incumbents, protect entrenched positions, or re-invent entire industries and business activities”.¹⁴¹ According to World Economic Forum (2019), innovations have expanded digital space and also raised legal and regulatory concerns around the world. Further, the market should be balanced so that competition does not suffer at the cost of regulating disruptive technologies.¹⁴²

In order to identify if a new technology is a disruptive innovation to organization, before a disruption has occurred, Nagy, Schuessler and Dubinsky (2016) redefine disruptive innovations through the use of innovation adoption characteristics. Hence, through the relative nature of innovation characteristics is possible to determine if an innovation could be disruptive.¹⁴³

Feder (2018) highlights that the effects of disruptive innovations impact differently between countries and time. He claims that the disruptive innovations modify the productivity, and that the crowding-out effect is almost always more relevant than the substitution effect.¹⁴⁴

Disruptive innovations could balance the gap between the value of technological innovations and the economic value perceived by various customer segments. Starting from the characteristics of disruptive innovation, some authors suggest a lean design methodology to support disruptiveness, to reduce ineffectiveness and maximize value. In addition, it combines market analysis with business model innovation and directed system evolution.¹⁴⁵

¹⁴¹ Forbes. (2019). <https://www.forbes.com/sites/gilpress/2017/04/27/5-top-technologies-for-digital-disruption/#44c7666a4898>. Accessed 20 May 2019.

¹⁴² World Economic Forum. (2019). <https://www.weforum.org/agenda/2019/02/how-can-we-regulate-disruptive-technologies/>. Accessed 20 May 2019.

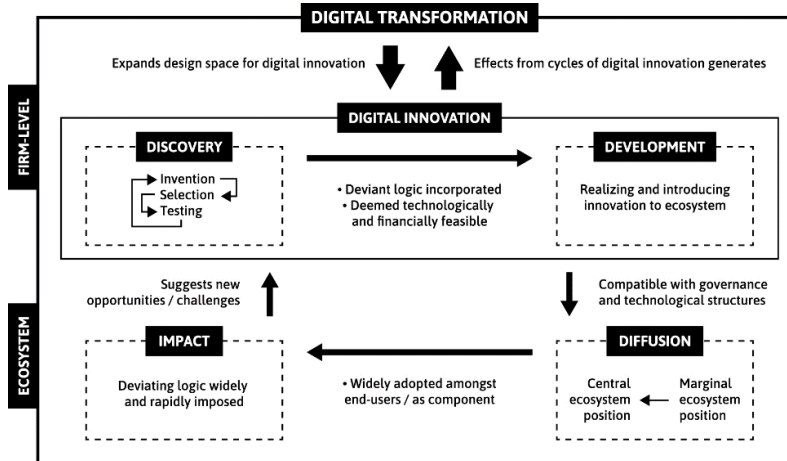
¹⁴³ Nagy, D., Schuessler, J., & Dubinsky, A. (2016). Defining and identifying disruptive innovations. *Industrial Marketing Management*, 57, pp. 119-126. <https://doi.org/10.1016/j.indmarman.2015.11.017>

¹⁴⁴ Feder, C. (2018). The effects of disruptive innovations on productivity. *Technological Forecasting and Social Change*, 126(C), pp. 186-193. <https://doi.org/10.1016/j.techfore.2017.05.009>. Accessed 20 May 2019.

¹⁴⁵ Brad, S., Murar, M., & Brad, E. (2016). Methodology for lean design of disruptive innovations. *Procedia CIRP*, 50, pp. 153-159. <https://doi.org/10.1016/j.procir.2016.04.204>

In order to support further work on digital disruption, some authors propose a conceptual model of digital disruption dynamics (Figure 2). The model is structured according to stages of digital innovation: discovery, development, diffusion and impact.¹⁴⁶ Also, it illustrates how the core constitutive elements can actualize digital disruption.

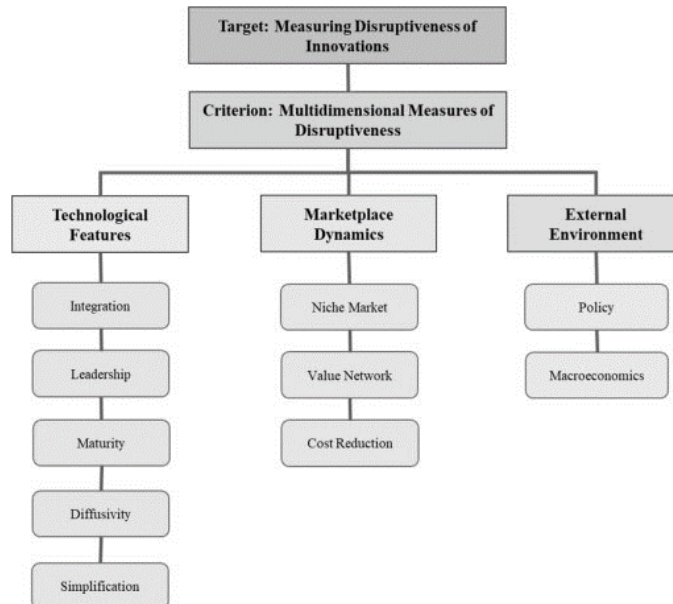
Figure 2. Digital disruption dynamics



Source: Skog, D. A., Wimelius, H., & Sandberg, J. (2018). Digital disruption. *Business & Information Systems Engineering*, 60(5), pp. 431-437. DOI <https://doi.org/10.1007/s12599-018-0550-4>, pp.435.

Figure 3 shows a framework of assessing disruptive innovations based on the identified multidimensionality of potential disruptiveness indicators. The special attention is paid on the technological features, marketplace dynamics and external environment.

Figure 3. Framework to assess the disruptive potential of innovations



Source: Guo, J., Pan, J., Guo, J., Gu, F., & Kuusisto, J. (2019). Measurement framework for assessing disruptive innovations. *Technological Forecasting and Social Change*, 139, pp. 250-265. <https://doi.org/10.1016/j.techfore.2018.10.015>

¹⁴⁶ Fichman, R. G., Dos Santos, B. L., & Zheng, Z. E. (2014). Digital innovation as a fundamental and powerful concept in the information systems curriculum. *MIS quarterly*, 38(2).

According to the newest research in this field, the mathematical calculation for measurement the disruptive potential of innovations can be summarised in the following equation:

$$DII = \sum a_i d_i * \prod \frac{1}{b_j} \quad (1)$$

where *DII* refers to Disruptive Innovation Index, which is a quantitative measure of intrinsic disruptive potential of innovations; a_i refers to the rating of the scoring item based on the indicators in the technological and marketplace categories; d_i is their corresponding degree, which is defined as the weight of the indicator and b_j refers to the rating of the scoring item based on the external environment indicators, i.e. the Policy and Macroeconomics indicators.¹⁴⁷

4. CONCLUSION

Companies are more difficult to adapt to digital disruptions than earlier technologies. Findings from McKinsey suggest that "the current pace of disruption is happening ten times faster than the industrial revolution, at 300 times the scale, and with 3000 times the impact."¹⁴⁸ This present a opportunity for businesses to thrive, but at the same time a threat to slower-moving companies to be disrupted. The ability to respond to disruptions requires an understanding of overall business strategy with special focus on digital transformation.

It is worth noting that digital disruption describes the radical change of markets and business models through digitalization. However there is a difference between digital transformation and digital disruption. On the one hand, digital disruption refers to the radical change and even dissolution of traditional business processes and models. On the other hand, digital transformation describes a continuous process of change. Digital Disruption goes beyond the conventional understanding of innovation, so new markets are emerging as well as new forms of value creation.

Companies tend to innovate faster than their customers' needs evolve, so the most of them produce products or services that are actually too sophisticated, too expensive, and too complicated for many customers. Disruptive innovation is an innovation that create a new market and value, and eventually goes on to disrupt an existing market or value network. The main characteristics of disruptive businesses in their initial stages, can include: lower gross margins, smaller target markets, and simpler products and services. Lower tiers of the market offer lower gross margins, so they are unattractive to other companies moving upward in the market. As a result space is creating at the bottom of the market for new disruptive competitors to emerge. To conclude, the main fundamental contribution of this paper is a design framework that describe disruptive innovation process in a structured way. The digital disruption is at the foundation of this multidimensional process.

REFERENCES

- Bower, J. L., & C. M. Christensen. (1995). Disruptive technologies: catching the wave. *Harvard Business Review*, 73 (1), pp. 43-53.
- Brad, S., Murar, M., & Brad, E. (2016). Methodology for lean design of disruptive innovations. *Procedia CIRP*, 50, pp. 153-159. <https://doi.org/10.1016/j.procir.2016.04.204>
- Christensen, C. M., & Bower, J. L. (1996). Customer power, strategic investment, and the failure of leading firms. *Strategic management journal*, 17(3), pp. 197-218.
- Christensen, C. M. (1997). *The innovators dilemma: when new technologies cause great firms to fail*. Harvard Business School Press, Boston.
- Christensen, C. M. (2006). The ongoing process of building a theory of disruption. *Journal of Product innovation management*, 23(1), pp. 39-55.
- Christensen, C. M., Dyer, J., & Gregersen, H. (2011). *The innovator's DNA: Mastering the five skills of disruptive innovators*. Harvard Business Press.
- Christensen C. M., Raynor, M., & McDonald, R. (2015). What Is disruptive innovation? *Harvard business review*, December 2015 Issue. <https://hbr.org/2015/12/what-is-disruptive-innovation>. Accessed 20 May 2019.
- Feder, C. (2018). The effects of disruptive innovations on productivity. *Technological Forecasting and Social Change*, 126(C), pp. 186-193. <https://doi.org/10.1016/j.techfore.2017.05.009>. Accessed 20 May 2019.
- Fichman, R. G., Dos Santos, B. L., & Zheng, Z. E. (2014). Digital innovation as a fundamental and powerful concept in the information systems curriculum. *MIS quarterly*, 38(2).
- Forbes. (2019). <https://www.forbes.com/sites/gilpress/2017/04/27/5-top-technologies-for-digital-disruption/#44c7666a4898>. Accessed 20 May 2019.

¹⁴⁷ Guo, J., Pan, J., Guo, J., Gu, F., & Kuusisto, J. (2019). Measurement framework for assessing disruptive innovations. *Technological Forecasting and Social Change*, 139, pp. 250-265. <https://doi.org/10.1016/j.techfore.2018.10.015>

¹⁴⁸ McKinsey. <https://www.mckinsey.com/featured-insights/digital-disruption>. Accessed 20 May 2019.

- Guo, J., Pan, J., Guo, J., Gu, F., & Kuusisto, J. (2019). Measurement framework for assessing disruptive innovations. *Technological Forecasting and Social Change*, 139, pp. 250-265. <https://doi.org/10.1016/j.techfore.2018.10.015>
- Henderson, R. (2006). The innovator's dilemma as a problem of organizational competence. *Journal of Product Innovation Management*, 23(1), pp. 5-11.
- McKinsey. <https://www.mckinsey.com/featured-insights/digital-disruption>. Accessed 20 May 2019.
- MIT Sloan Management Review. (2015). <https://sloanreview.mit.edu/article/how-useful-is-the-theory-of-disruptive-innovation/>. Accessed 20 May 2019.
- Nagy, D., Schuessler, J., & Dubinsky, A. (2016). Defining and identifying disruptive innovations. *Industrial Marketing Management*, 57, pp. 119-126. <https://doi.org/10.1016/j.indmarman.2015.11.017>
- Schmidt, G. M., & Druehl, C. T. (2008). When is a disruptive innovation disruptive?. *Journal of product innovation management*, 25(4), 347-369. DOI: 10.1111/j.1540-5885.2008.00306.x
- Skog, D. A., Wimelius, H., & Sandberg, J. (2018). Digital disruption. *Business & Information Systems Engineering*, 60(5), pp. 431-437. DOI <https://doi.org/10.1007/s12599-018-0550-4>
- World Economic Forum. (2019). <https://www.weforum.org/agenda/2019/02/how-can-we-regulate-disruptive-technologies/>. Accessed 20 May 2019.