

# The digital disruption of ubiquitous economic theories

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**Abstract.** Digitalisation demands new economic theories because the old laws are losing their validity. They were established to describe the business interrelationships in an analogue world. Now digital business models are breaking the boundaries and taking learned knowledge ad absurdum. New economic theories are emerging from the literature to explain how digitalisation works. The author finds that the new assumptions conflict with some ubiquitous economic theories. The inconsistencies were collected, reviewed, and evaluated. It turns out that at least five doctrines are no longer applicable in the digital world, as their parameters shift elementarily. Using a contrasting example from the music industry, the results were examined and confirmed by way of example. The result is that certain economic theories - from Porter to Pareto - no longer apply in the digital world. The rules must be rewritten so that order can emerge again from the growing chaos.

**Keywords:** digitalisation, digital goods, digital business model, disruption

**JEL classification:** *O33, M21, M15*

## 1 Introduction

Digitalisation is referred to as the fourth industrial revolution<sup>1</sup>. It is changing our lives, our jobs and society. Digitalisation is the result of the convergence of information and communication technology<sup>2</sup>. Information is systematically collected in digital formats, can be stored, processed, and exchanged via the internet to any extent<sup>3</sup>. Digital convergence<sup>4</sup> allows companies to move their offerings to the cloud and develop platform-oriented business models. The four internet giants Google, Amazon,

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<sup>1</sup> Schwab (2016)

<sup>2</sup> Stähler (2002)

<sup>3</sup> Bauriedel (2020a)

<sup>4</sup> Covell (2000)

Facebook, and Apple top the list of the most valuable companies<sup>5</sup>. But they play by different rules and are shaking up the traditional order.

The digital good<sup>6</sup> and its associated business models are fuelling the disruption of economic theories widely used until today. An example why those ubiquitous economic theories are not anymore applicable: In the past, music was stored on physical sound carriers, which were produced in a pressing plant, distributed via a dealer network and sold in stationary music shops. The music shop was subject to the restrictions of the stationary trade: low range, limited opening hours, limited product variety and low storage capacity. The manual work for handling the goods, advising the customers, collecting the money and other administrative tasks set further limits to the business model. Today, music is a digital good and is offered for download or consumed directly in a stream. A music platform like iTunes needs no physical goods, no factory, no shops, and no operational staff. It eliminates all manual and intellectual activities in manufacturing, logistics, storage, consulting, and payment. In addition, digital business models can be used at any time, are accessible from anywhere and are particularly easy to use<sup>7</sup>. iTunes has revolutionised the music business. Digitalisation was not used to improve the stationary music business, but to create a completely new, innovative business model. The basic needs of the customer are satisfied in a new way, and the new business model is faster, better, and easier. First and foremost, customers save time and money, experience a huge choice as well as one hundred percent availability. Ultimately, they get a product that neither wears out nor gets lost.

At first glance, iTunes is an app for the smartphone. Only a deeper look behind the scenes shows that digitalisation brings multi-layered and complex changes. The disruption of the music sector is one example. Many other industries such as retail, travel agencies, car rental companies, banks, etc. are also affected.

## **2 Theoretical background**

The economic theories mentioned in this article are part of the recognised basic knowledge in economics. For a better understanding, the basics are briefly described. Furthermore, the terms digital good, digital business model and disruption are named.

### **2.1 Ubiquitous economic**

The term ubiquitous economic theories is deliberately chosen because the economic theories mentioned here are anchored in microeconomics on the level of business management. They really "occur everywhere". They are on the syllabus of every business university, they influence our entrepreneurial actions and have become social consensus. Every manager is shaped by these doctrines and must first discard their own limited way of thinking to be able to tap the potential of digitalisation for themselves.

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<sup>5</sup> Focus Online Group GmbH (2020)

<sup>6</sup> Clement, Schreiber and Bossauer (2019)

<sup>7</sup> Bauriedel (2017)

For the digital era it is necessary to rethink the corporate strategy, the business model, the processes and the IT infrastructure.<sup>8</sup>

## 2.2 Productivity

According to Hal Varian, master of microeconomics, productivity results from the three factors labour, capital, and resources<sup>9</sup>. It is the ratio that determines the effort (labour hours, monetary units, and raw materials) to produce a certain product.

## 2.3 Porter's theories

Michael E. Porter is one of the most influential theorists in strategic management. He follows the assumption that companies should choose from three generic competitive strategies (segmentation, differentiation, and cost leadership)<sup>10</sup> to take a distinct, strategic position in the market.

## 2.4 Blue Ocean Strategy

W. Chan Kim outlines his idea of a Blue Ocean<sup>11</sup>. He challenges entrepreneurs to ignore existing competition, think outside the box and develop new markets. The new business idea should offer the customer greater benefits and at the same time reduce costs. He describes that companies focus too much on bloody competition: "The dominant focus of strategy work over the past thirty years has been on competition-based red ocean strategies."<sup>12</sup> He contrasts this with his theory of a redefined market with changed competitive factors, the blue ocean. "Blue oceans, in contrast, are defined by untapped market space, demand creation, and the opportunity for highly profitable growth."<sup>13</sup>

## 2.5 Scarcity

The insatiability axiom<sup>14</sup> states that people have an infinite need. Since there is a cost to providing goods, the quantity supplied is always less than the quantity demanded. There is an eternal scarcity of goods.

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<sup>8</sup> Bauriedel (2020c)

<sup>9</sup> Varian (2016)

<sup>10</sup> Porter (1985)

<sup>11</sup> Kim and Mauborgne (2015)

<sup>12</sup> Kim and Mauborgne (2015, p. 8)

<sup>13</sup> Kim and Mauborgne (2015, p. 4)

<sup>14</sup> Woll (2003, p. 50)

## 2.6 Pareto principle

The Pareto effect<sup>15</sup> describes that with 20 percent of the effort 80 percent of the result is achieved.

## 2.7 Digital goods

Digital goods are intangible products (images, audio, video, information) or virtual services (games, software, cloud computing). In contrast to physical goods, they have special characteristics: easy reproduction, simple processing, simple distribution, multiple ownership and no wear and tear or loss<sup>16</sup>. The exchange of digital goods via networks makes them independent of time and space<sup>17</sup>. The mass distribution of digital goods requires the standardisation of file formats (e.g., html, pdf or jpeg).<sup>18</sup>

## 2.8 Digital business models

Christian Hoffmeister sees business models as a development process for standardised trade. "The permanent repetition of processes turns a trial-and-error procedure into a fixed procedure that serves as a binding instruction for all employees."<sup>19</sup> Business models are evolving from individual to dominant to unstable. Traditional business models - in his view - are becoming increasingly unstable because "the internet creates new needs through new service models. At the same time, known needs are being satisfied differently than before. This leads to changes in established industries as well through new providers with new business models."<sup>20</sup>

Patrick Stähler examined digital business models at an early stage. He explains, "By means of business models, information management attempts to map the reality of a company with its processes, tasks and communication relationships onto an IT system in order to support the company in its tasks."<sup>21</sup> He names three components of a business model: the value proposition, the architecture of value creation and the revenue model.<sup>22</sup> In addition, he points out, "Business models on the internet are only new if they also use the possibilities of new media, i.e. ubiquity, the activity of the information carrier, networking and multimedia, although it is not crucial to use all features at the same time."<sup>23</sup>

Alexander Osterwalder has taken Stähler's concept of a business model and developed it further. His definition is: "A business model describes the basic principle

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<sup>15</sup> Koch and Mader (2015)

<sup>16</sup> Clement, Schreiber and Bossauer (2019, p. 36)

<sup>17</sup> Stähler (2002, p. 112–113)

<sup>18</sup> Covell (2000)

<sup>19</sup> Hoffmeister (2013, p. 6)

<sup>20</sup> Hoffmeister (2013, p. 13)

<sup>21</sup> Stähler (2002, p. 38)

<sup>22</sup> Stähler (2002, p. 42)

<sup>23</sup> Stähler (2002, p. 181)

by which an organisation creates, conveys and captures value."<sup>24</sup> In contrast to a traditional business model, the digital business model focuses on the possibilities of digital technologies. Digital business models satisfy basic needs in a new form<sup>25</sup> and they are better in the performance characteristics that are important for the customer.<sup>26</sup>

## 2.9 Disruption

Disruption is a young term with a longer history. As early as 1942, Joseph Alois Schumpeter published his remarks on the renewal of markets, which is initiated by entrepreneurs. He describes disruption as follows: An idea is good until a new, better one replaces it.<sup>27</sup> Later, Richard N. Foster<sup>28</sup> found that there is a dependency between the effort for improvements of a technology and its performance. According to his S-curve model, new technologies show only a low performance at the beginning, which can be improved slightly. During development, the performance increases and helps the technology to achieve a breakthrough. In the third phase of the S-curve, a further increase in performance can only be achieved at great expense. Clayton Christensen<sup>29</sup> took up Foster's idea and expanded his model into a Multiple S-curve Model. In his doctoral thesis at Harvard University, he examined waves of technological innovations among manufacturers of storage media. He found that disruptive innovations initially perform worse. After a certain point, the new technology overtakes its predecessor - in rapid steps - and becomes the leading technology. Clayton Christensen created the term disruptive innovation and studied why companies fail when new technologies change the market. According to his studies, there are two criteria that constitute a disruptive innovation. First, the new technology has new performance characteristics. Second, the performance characteristics that the customer values can be improved quickly so that the new technology takes over the established market. Rebecca M. Henderson<sup>30</sup> created the term Architectural Innovation. She does not look at a product as a whole but divides it into different components and thus examines the structure of a product. Henderson distinguishes between four directions of innovation: incremental, modular, and architectural innovation, as well as radical rethinking. While Christensen and Henderson placed a clear focus on technical innovation and product design, the horizon must be broadened for the digital disruption of business models. It encompasses the entire customer life cycle (initiation, purchase, delivery, use, service) and not only the disruptive innovation of the product.

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<sup>24</sup> Osterwalder and Pigneur (2011, p. 6)

<sup>25</sup> Stähler (2002)

<sup>26</sup> Christensen (2016)

<sup>27</sup> Schumpeter (1942)

<sup>28</sup> Foster (1986)

<sup>29</sup> Christensen (2016)

<sup>30</sup> Henderson and Clark (1990)

### **3 Research Design**

This research shows that well-known economic theories conflict with the digital world. It is delicate to challenge these established doctrines lightly and the explanations will cause incomprehension as well as resistance, but it is necessary.

#### **3.1 Triggers**

The literature presents a fragmented picture of digitisation. Each author describes digitalisation from their own point of view, which leads to a one-sided and isolated view. The strategy consultants explain the new business models, the microeconomists have recognised that transaction costs are falling, and the technology providers talk exclusively about web, app and cloud.

The study of the literature also shows that new theories are emerging to explain the digital world. These assumptions have two weaknesses. First, they each illuminate only one aspect of digitalisation and do not show the whole picture. Second, the authors disrupt the ubiquitous economic theories, even if they may not be aware of it.

#### **3.2 Procedure**

The procedure for this argumentative study is based on assertion, justification, and examples. Inconsistencies were found and initially collected during an intensive literature review. Gradually, the insight emerged that all disagreements are restrictions of a physical world.

The examination of the discrepancies was done by directly comparing a physical good, which is offered in stationary distribution, and a comparable digital good, which is distributed via a digital platform. For a complete elimination of physical limits, the author specifically replaced variables of known economic formulas with zero or infinity. This resulted in recognised formulas no longer making sense in the digital world. In the following, all collected inconsistencies were examined to see if they disrupted known economic theories. A total of five established models were identified that no longer work in the digital world or require revision. These could be substantiated with prominent examples.

#### **3.3 Framework conditions**

Digitisation has no clear contours, so a research design is chosen that shows as much contrast as possible between the analogue and digital worlds. The following framework conditions and simplifications reinforce the contrast.

##### **Digital goods and business models**

This study focuses on digital goods and business models, which are contrasted with their respective analogue counterparts. Platforms that sell digital goods were specifically selected for comparison with stationary trade. The music platform iTunes is an ideal example.

### **Infinite transaction volume**

Another assumption is that platforms have infinite capacity. They can be scaled arbitrarily in terms of processors, memory, and bandwidth. Transaction volumes are now so high that platforms are dubbed hyperscalers<sup>31</sup>. Facebook, for example, has more than 2.85 billion active visitors<sup>32</sup> and the online retailer Amazon offers 226 million products<sup>33</sup> in Germany.

### **Zero transaction costs**

Transaction costs are assumed to be zero. The construction and operation of a platform certainly cause costs. Therefore, the second assumption is that the transaction volume grows exponentially. With the high volume, the marginal costs decrease drastically<sup>34</sup>. The assumption of zero is possible because transaction costs are high in the analogue world and marginal in the digital world. Processing a loan application, for example, takes several hours in a bank, while the platform only needs a fraction of a second. The enormous difference in transaction costs - analogue vs. digital - allows an idealised value of zero.

## **4 Key Results**

Some economic theories are changing as the limitations of an analogue world are broken down. This is triggered by digital goods and the associated business models. Productivity increases as the two factors of labour and resources approach zero. The "blue ocean" strategy aims at a new market with higher value and lower costs. Digital goods create an abundance and vie for customers' attention. The new frontier of the retail shelf is the market. Revenue models are reshaping significantly.

### **4.1 Productivity**

The digital business model requires no manual labour and the digital good is an inexhaustible resource that can be copied or recalculated at will. The example of music distribution shows that manual labour is eliminated, less capital is required, and music is simply copied. Even the remaining component of capital is reduced, since the development of a platform is cheaper than the construction of a production plant including an international distribution network. The calculation of productivity includes two factors (labour and resources) with a value of zero. Its calculation based on capital alone is therefore meaningless. Without the physical capacity constraints<sup>35</sup>, there are extreme productivity gains<sup>36</sup>, limited only by customer demand.

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<sup>31</sup> Manyika und Chui (2014)

<sup>32</sup> Statista GmbH (2021)

<sup>33</sup> Brandt (2017)

<sup>34</sup> Clement, Schreiber and Bossauer (2019, p. 67–69)

<sup>35</sup> Stähler (2002)

<sup>36</sup> Bauriedel (2020b)

## 4.2 Porter

W. Chan Kim<sup>37</sup> opposes Porter's views with his "Blue Ocean Strategy". He calls on companies not to orient themselves to the competition, but to focus on the core elements from the customer's point of view. According to his theory, markets are formed around the fulfilment of customer requirements. A "blue ocean" is created when it is possible to convince customers and non-customers by offering better benefits as well as at a lower price. Digital business models follow exactly this call. They provide services in a new form, improve their important features from the customer's point of view and drastically reduce transaction costs. The centre of digital business models is the customer purpose<sup>38</sup> or value proposition<sup>39</sup>, the promise to the customer. Apple's success illustrates how digital business models are disrupting the old world. Porter's protectionism could not protect the brick-and-mortar music store because, as Schumpeter describes it, the new idea has relentlessly taken hold.

## 4.3 Abundance

Digital goods are neither scarce nor free. Free goods are usually taken from nature, whereas digital goods are generated the moment the need arises. This creates an abundance since any need is met immediately without effort. A simple but obvious example is the digital photo. In the past, the holiday photo was a scarce commodity because a 35mm film held 36 shots. Each shot was meticulously planned, as films were scarce and development costly. Today, every smartphone has a camera built in. Photos are now digital goods that can be stored, presented, and shared for free. The cost of a photo approaches zero and availability tends towards infinity. This leads to another phenomenon: waste<sup>40</sup>.

## 4.4 Pareto

Every stationary shop has a limited range of products. It is necessary to limit the product variety in advance according to the Pareto principle because the sales area is limited. For economic reasons, it is necessary to fill the sales shelves with popular offers to achieve the profit optimum. Retailers concentrate on the section of the market that promises them the greatest profit. In contrast, the iTunes music platform has created a perfect marketplace<sup>41</sup>. With over 70 million songs<sup>42</sup>, it offers all the commercially published music in the world. The platform is an infinite, digital sales shelf without physical boundaries. It does not follow the Pareto principle, but takes advantage of the long tail.

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<sup>37</sup> Kim and Mauborgne (2015)

<sup>38</sup> Ismail, Malone and van Geest (2017)

<sup>39</sup> Osterwalder, Pigneur, Bernarda and Smith (2015)

<sup>40</sup> Diamandis and Kotler (2012)

<sup>41</sup> Jevons (1871)

<sup>42</sup> Apple Inc. (2021)

Chris Anderson<sup>43</sup> has evaluated the downloads of music platforms and found that the long tail is economically interesting. His research in the music industry shows 98 percent of the platform offer is continuously in demand. Customers love the variety and consume niche offers that have been sorted out by the stationary trade. In the digital world, the long tail is an additional offer that produces significant sales without further effort. Anderson then also examined sales and profits. According to his calculations, an online platform with a 10-fold larger offering compared to a brick-and-mortar shop generates 25 percent of its sales and 33 percent of its profits through the long tail. Compared to Anderson's calculation, the leverage of the large internet platforms is many times greater. The profitability of electronic platforms thus increases with their product diversity.<sup>44</sup>

Platforms have no capacity limits, they scale arbitrarily and adapt to the available supply. It makes absolutely no difference to the platforms which and how many digital goods they host. It is even an advantage to fill them to the limits of the market, because the already low marginal costs fall even further via unit cost degression<sup>45</sup>. As Patrick Stähler, a thought leader on digital business models, points out, "The optimal output is the market."<sup>46</sup> Pareto fails because the expenditure for an additional product offering approaches zero. It is completely misguided to emphasise the 20 per cent or neglect the 80 per cent when the 100 per cent represents no additional effort.

#### 4.5 "Free"

There is a saying that goes, "Nothing is free." But digital goods are offered free of charge. The reason is the low transaction costs. This is because platforms do not require manual labour and do not need physical resources. On the other hand, the platform requires high utilisation, and a lack of transactions means stagnation. The third important reason is customer attention, as a free offer seduces and lowers switching barriers. Brick-and-mortar retailers also advertise free offers, but their high expenses limit their ability to push them through.

Chris Anderson<sup>47</sup> has examined the free offer, also called "free", and described the various revenue models behind it. These are diverse and range from a free basic offer to a commissioned business model to advertising-based sponsoring. According to his research, the background is that the revenue model has fundamentally changed, or free resources are given away as a loss leader. "Free" or a price of zero, does not fit into our traditional basic understanding of business administration. Turnover is calculated by multiplying the products sold by the price. With "Free", however, the price and thus the turnover is zero. The idea of a mixed calculation arises, but the ratio of fee-based to free products is not 90/10, but 10/90. Another objection is that indirect revenues (e.g., commissions, advertising, or donations) make up the actual turnover. This is opposed by a complete decoupling of the product from the revenue model. There is no

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<sup>43</sup> Anderson (2008)

<sup>44</sup> Stähler (2002, p. 197)

<sup>45</sup> Clement, Schreiber and Bossauer (2019, p. 67–69)

<sup>46</sup> Stähler (2002, p. 197)

<sup>47</sup> Anderson, Schöbitz and Vode (2009)

compulsion whatsoever for the customer to buy. Typical examples are the search engine Google, the game "Angry Birds" or the encyclopaedia Wikipedia. It is a serious change in revenue models, because until now it was not possible to give everything away and still generate revenue.

## 5 Conclusions and Recommendations

Technological progress is inevitable. It begins with Peter Schumpeter, who describes the constant renewal of the economy<sup>48</sup>, goes on to Nikolai Kondratjew<sup>49</sup>, who describes economic development as cycles and does not really end with Klaus Schwab, who proclaims the fourth industrial revolution<sup>50</sup>. Ultimately, it is Peter Glaser who aptly describes digitalisation: "Everything that can be digitalised will be digitalised. Everything."<sup>51</sup>

The elimination of physical boundaries demands a new way of thinking, but the digitalisation of goods and business models has only just begun. The music platform iTunes shows how fast and relentlessly digital disruption can proceed. Other industries - travel, banking, retail, etc. - will follow and significantly change our inner cities.

At the same time, this contribution creates great resistance. It arises from our analogue thinking, because it is not possible to grasp the digital world with analogue laws. A new perspective is needed to understand and accept the new laws for oneself. One way to solve that dilemma is that science starts to incorporate the new laws into its teachings.

### 5.1 Everything is going digital

Digital convergence is only just beginning. Books, music, pictures, and videos are already digital goods, but now the big block of information is following. Little by little, digital goods are taking over our lives, forming ever more complex structures.

The digital goods network with each other and form themselves into multi-layered blocks of information. Every online shop needs highly precise digital product information. These are composed of texts, photos, videos, and reviews and now form an information block. Digital convergence now also covers advice-intensive products and services such as real estate, travel, cars and securities. In principle, the knowledge of the salesperson is slowly but surely being transferred into digital information, making the salesperson superfluous.

Facebook and Google are data collectors that gather all available information and use it to form targeted user profiles. These profiles reflect, for example, a person's taste in music, but also their political opinion or sexual preference. The person does not have to have explicitly expressed this preference or even be aware of it. Complex algorithms

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<sup>48</sup> Schumpeter (1942)

<sup>49</sup> Nefiodow and Nefiodow (2014)

<sup>50</sup> Schwab (2016)

<sup>51</sup> Glaser (2018)

generate multi-faceted profiles with a high hit probability from a small amount of information. User profiles are digital goods that are used for advertising.

Our money is also a digital good. Its entire cycle, account balances and deposits are electronic bookings. Internet start-ups rely exclusively on cashless payments because they don't want cash registers, change or safes. They have realised that physical money is no longer needed. Unfortunately, cash is still a relic from the Middle Ages. Clinging to notes and coins paralyses our economy and delays the step into the next era.

With the proliferation of digital goods, the upheaval of economic theories is also beginning. Our analogue world may continue to follow the old rules, but digital business models are taking over the world. Salim Ismail describes this particularly aptly in his book *Exponential Organisation*: "An information-based environment creates fundamental disruptive opportunities."<sup>52</sup>

## 5.2 Rejection

The author has over 30 years of experience in strategy, business, technology, and change. As a management consultant, he has gained deep knowledge of the organisational structure of companies and their IT infrastructure in numerous projects. He has been researching and publishing on digital strategies and their implementation for five years.<sup>53</sup>

Despite the success of digitalisation is proven by big tech companies. The author observes a lot of rejection after an initial interest when it comes to the rethinking of established theories by decision-makers, managers, project leaders and even scientists. Even the Readers of this paper must first process these huge changes in economic theories. Accepting the new facts is not easy. This has been shown in numerous discussions and workshops with interested parties. Rather, it is necessary to present the arguments several times, to show the change with examples and to explain it again and again. The interest is great, but unfortunately so is the resistance. If entrepreneurs use digital freedom for themselves, disruptive opportunities open. The failure of economic theories creates unease and chaos. Which rules can the entrepreneur still follow? How can decisions be tested? Which strategy is the right one? It is a time of upheaval, looking for new answers and a new order. Theories for the digital world need to be developed and anchored in textbooks, universities, and companies. But it is not only about the institutions that house these theories, but about the people - graduates, professors, executives, strategy consultants and digital experts - who should transport them.

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<sup>53</sup> Bauriedel (2017)

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