

Creating and Measuring Company Value in the Digital Economy



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Abstract The paradigm shift in the development of the global economy and the accent of Industry 4.0 raise interest in the digital transformation of companies. However, the methods of selecting the factors and metrics appropriate for analyzing and measuring the value it creates are yet to be developed. In this publication, we discuss the key factors that need to be analyzed and considered to improve the reliability of the measurement of the value created by companies and projects in the digital economy. Specifically, how the digital economy creates value and the related risks, the nature of competition at the times of digital monopolies, and what constitutes a digital business model. Additional research of the above factors will result in the development of new approaches to and methods of value measurement that take into account the feedback and network effects as well as externalities of the digital transformation.

Keywords Digital economy · Digital transformation · Business model · Value measurement

JEL Classification O10-O30

1 Introduction

The World Economic Forum (WEF) where the digital transformation of the economy has been widely discussed over the past few years called for a change of the management paradigm through the adoption of computers, Internet-based technologies and the use of artificial intelligence for management support and investment decision-making [1]. The significant benefits of the digital transformation in the industry and

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its impact on economic development is becoming increasingly visible and acknowledged. The WEF estimated that more than 60% of the world's new GDP will come from digital products or services, with 70% of the new value will be created by digital platforms. The practical implementation of the innovations is noted to require significant investment, measured in trillions of dollars, which creates the risk of increasing disparity between countries since almost 50% of the world's population is currently not involved in the digital economy. The WEF concludes that “companies need to take a fresh look at creating, distributing, and sustaining value in this new environment.” [2].

The economic changes of recent decades are often justifiably described using the adjective “digital” in various combinations, i.e., digital economy, digital technology, digital transformation, digital monopolies, digital professions, digital money, digital inequality, etc. The importance of digital transformation is evident, however, to understand and measure its impact on the economic development and the value it creates, the noun that comes in combination with the adjective “digital” should have a priority of consideration. In both the analog or digital economy, the economy is the critical element. The excessive and not always appropriate use of the term “digital” often creates confusion and sometimes devalues its real significance.

Erik Brynjolfson, Program Director of the Digital Economy Initiative and Professor at MIT Sloan School, formulated the challenges for managing companies and the entire industries that the new economy creates:

Gross domestic product (GDP) is one the most commonly used measures of economic activity. But GDP misses out on huge chunks of value in the digital economy. When digital goods, whether Google Maps or Wikipedia, are available free of charge, they make no impact on GDP despite the value to their users. Without a valid tool to measure the value of the digital economy, policymakers are left scratching their heads over how to manage it [3].

2 Materials and Methodology

Among the results of digitalization, there was a change in the structure of the economy and the type of companies that drive its development. It is well evidenced by the changes in the world's largest companies over the past ten years (see Table 1).

Today, seven out of the ten largest companies in the world by market capitalization are not only high-tech companies based on intangible assets—they are platforms. New formats of corporate economic activity and market organization raise a lot of questions for regulators and managers. Among other things, this is due to the notion that digital technology and the Internet can radically reduce costs, creating unique opportunities for consumers [4]. At the same time, the popular statement that the business model of platforms is practically devoid of costs requires significant clarifications. The fact that the end user of some digital services does not pay the full cost of the digital product or service purchased or received does not mean that the product or service of the transactional platform through which it is provided is free of charge. It means that the costs are paid by someone else, often the consumer themselves, but not in the form of a cash payment, but in the form of information provided

Table 1 10 Largest companies in the world by market capitalization, 2009–2019

World Top 10 as of 31 March 2009, billion dollars			
No.	Company	Industry	Capitalization
1	Kxxon Mobil	Oil and gas	337
2	Pctro China	Oil and gas	287
3	Walmart	Consumer goods	204
1	ICBC	Finance	188
5	China Mobile	Telecommunications	175
6	Microsoft	Technology	163
7	AT&T	Telecommunications	149
8	Johnson and Johnson	Healthcare	145
9	Royal Dutch Shell	Oil and gas	139
10	Procter and Gamble	Consumer goods	138
World Top 10 as of 31 March 2019, billion dollars			
No.	Company	Industry	Capitalization
1	Microsoft	Technology	905
2	Apple	Technology	896
3	Amazoo.com	Consumer goods	875
4	Alphabet	Technology	817
5	Berkshire Hathaway	Finance	494
6	Facebook	Technology	476
7	Alibaba	Consumer goods	472
S	Tencent Holdings	Technology	438
9	Johnson and Johnson	Healthcare	372
10	Exxon Mobil	Oil and gas	342

about themselves. Often, the value of such information provided in exchange for non-monetary contributions is greater than the savings generated. In particular, because of the risks associated with its uncontrolled and unauthorized use. Increasingly, you can hear about the practice of successful monetization of data accumulated by social networks and transactional platforms in their own analytical applications or when selling accumulated data sets to other companies that are willing to pay a significant amount of money for it. Sometimes attempts to monetize digital assets end up in a public scandal, similar to the recent one involving Facebook and Cambridge Analytica [5]. The assumption that there is no ‘free lunch’ in the analogue economy is also true for the digital economy (Fig. 1).

The illusion of free services or digital goods (content) creates problems for regulators, company managers and investors who traditionally use prices as a measure of value creation and who need to be able to assess the value of data, a core component of digital goods and services [6]. The speed of digital technology development in this case is ahead of the speed of managerial and regulatory innovation.

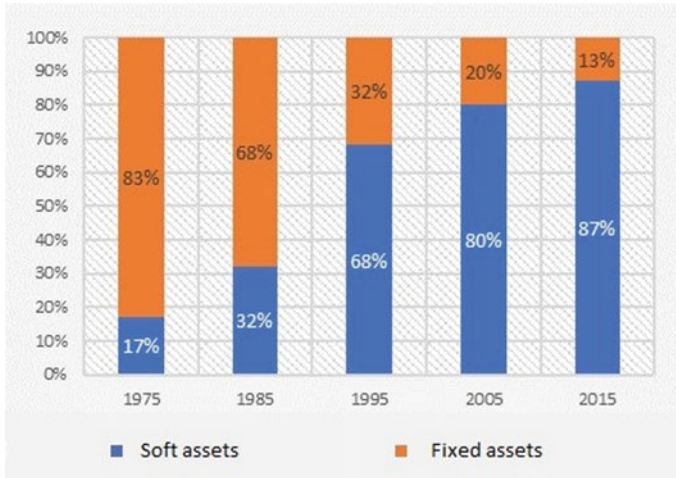


Fig. 1 Components of market value (S&P 500). *Source* Ocean Tomo’s Intangible Asset Market Value Study

Economic development has always been accompanied by the evolution and transformation of the nature of competition of its subjects—from competition for access to raw materials (natural rent) to competition for goods and technologies (technological rent). As a consequence, over the last 40 years the economic balances (when assets are measured through market capitalization of companies) of the world’s largest companies have changed radically. From the industrial companies, the main value of which was created by the capital invested in the fixed assets of the enterprises, the leadership passed to the companies, and the most valuable assets of the companies of the new economy were intangible assets, most of which, having a significant value, are not accounted for in the financial statements and balance sheets. An additional advantage of companies built on intangible assets is that their most important assets cannot be copied by competitors without violating international or national protection laws.

The current digital transformation of the economy is largely due to attempts to create additional value by developing a new class of intangible assets—digital assets. The novelty of this category of assets leads to confusion as to their definition and distinction from a wider class of intangible assets. As a result, you can see unexpected estimates of the value of the main asset of platform companies, where such an asset is called the brand of the company—a marketing asset, not a technological one. An example of such an estimate [7] is given in Table 2. Without denying the significance of brands created by the world’s largest technological companies, it is difficult to believe that it is a brand that can account for up to a third of their value measured through market capitalization. It might be a reflection of an incorrect taxonomy of intangible assets and a reason to clarify it.

Table 2 The world’s most valuable brands 2019

• Amazon \$315.5 billion
• Apple \$309.5 billion
• Google \$309 billion
• Microsoft \$251.2 billion
• Visa \$177.9 billion
• Facebook \$159 billion
• Alibaba \$131.2 billion
• Tencent \$130.9 billion
• McDonald’s \$130.4 billion
• AT&T \$108.4 billion

Source BrandZ

Equally important and urgent is the task of accounting for new digital assets in the financial statements of enterprises. Unfortunately, the issue of recording in the financial statements of intangible assets created in the course of companies’ activities is still unresolved [8]. Based on this, it can be assumed that the assets created in the process of digital transformation will be visible only in the market capitalization of companies for a long time and will remain out of sight of managers of the companies themselves, their investors and regulators. Without being measured, they are unlikely to be subject to management or taxation. The importance of fair taxation of intangible assets and intellectual property, especially in cross-border transfer transactions, is growing, and addressing it is a priority for OECD and national regulators. [9]. It can be assumed that it will become even sharper as transnational digital platforms continue to develop.

A distinctive feature of competition in the digital economy, one of the forms of evolutionary development of the knowledge economy, has become competition based on the advantages associated with the quantity and quality of data, as well as algorithms for their processing, analysis and use for making various operational and investment decisions. The next phase to which we are only approaching today is competition through the use of artificial intelligence [10]. The expected economic effect of AI technology development will certainly be significant, but it must be recognized that there is still no reliable tool to measure the value it creates. Moreover, it became clear that the next and much more significant step in the evolution of competition will be the competition of artificial intelligence among themselves. One can only hope that the economic consequences of this change will be taken into account and assessed in advance.

Today in the world not only the majority of the largest companies are platforms, but also among new companies, the so-called unicorns, about 60–70% are transaction platforms. Among the examples of what factors bring success and create value for transactional platforms, a new type of infrastructure company providing e-commerce, can be mentioned:

- open-mindedness;

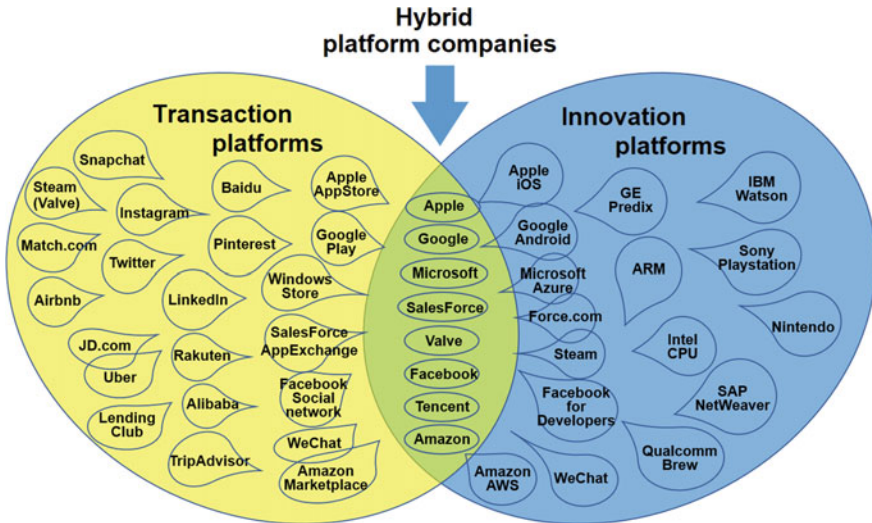


Fig. 2 Types of platform companies [12]

- ease of access;
- modularity;
- scalability;
- size;
- activity.

At the same time, the operating models of platforms are constantly evolving. The most successful of them have a so-called hybrid structure (such as Apple, Google, Microsoft and others) [11], combining (a) the benefits of a single ecosystem that they have created to integrate technological innovations, and (b) the benefits of maintaining an active transactional infrastructure of the direct exchange intermediary and beneficiary of the emerging network effects (Fig. 2).

Important, if not critical to understanding and analyzing the value created by platforms, is the asymmetry of benefits, where the winner gets everything. This factor has an aspect already recognized as negative—an unprecedented level of monopolization in the platform market. A vivid example of the dominant role of digital technology market leaders is the fact that after Google left the Chinese market in 2010, its Chinese competitor Baidu was able to collect 70% of the revenue of the entire search segment in the country. Another company—Alibaba—earns an extremely high share, almost 80% of all e-commerce revenue in China. With over 800 million active users of WeChat and QQ services, another Chinese IT giant, Tencent, serves approximately 60% of the country's population (Table 3).

It is useful to remember that the capitalization and revenues of major technological companies are comparable to the budgets and the gross domestic product of quite large countries. At the same time, it is difficult to foresee how the development of

Table 3 Market capitalization of the world’s largest platform companies as of December 2019, million US dollars

Apple	1,174
Microsoft	1,141
Google	889
Amazon	883
Facebook	569
Alibaba	525
Tencent	403
Visa	392

the market can change the existing “digital divide” and how antitrust practice of the early twentieth century is applicable in this case. The asymmetry of the emerging market is illustrated by the analysis of the so-called unicorn companies, i.e. those new technological companies whose expected market capitalization exceeds one billion US dollars. China has recently become a leader in the number of such companies. However, even the total capitalization of Chinese unicorn companies, estimated at about \$400 billion, or about 36% of all such companies in the world [12], does not compare in any way to the “trillionaires” leading global platform companies. The cost of China’s 15 largest unicorn companies in the field of artificial intelligence is estimated at about \$40 billion, which is almost imperceptible against the background of the capitalization of technology market leaders, including China itself. Many new successful companies at a certain stage of their development are likely to be taken over by some of the largest monopolist companies, further increasing their value and distance from other market participants [13].

The challenge of the transition to a digital economy is not only the urgent need to regulate the sector, whose importance, size and level of monopolization are rapidly increasing, but also the fact that the return on capital is steadily higher than the return on labor [14]. The increasing share of capital invested in assets with high and growing levels of automation and digitalization only reinforces this imbalance. For today’s society, where consumption is the main factor of economic growth, such dynamics cannot be considered a factor of sustainable development [15].

Difficulties in determining and measuring the value of digital assets are complemented by the appearance of digital means of calculation—cryptocurrencies. Confusion is caused by attempts of active supporters of digital money to define it as a new “digital asset” that has not only a price—formed in the supply and demand market—but also a fundamental value that money that is not secured by state obligations does not possess. Even the pejorative phraseology used to describe devalued money, which is said to be “not even worth the paper on which it is printed”, does not apply to them—cryptocurrencies have no physical essence. The view of the clear majority of economists was formulated by Aswath Damodaran, Professor at New York University, who stressed that it is fundamentally impossible to determine the cost of bitcoin or other cryptocurrencies, you can only find out the value in transactions with them [16]. This, however, does not stop supporters of the view that cryptocurrencies are a

new kind of asset that continue to invent ways to “calculate” their value. The problem is partly alleviated by the low level of monetization of the financial sector with digital currencies, but it does not eliminate the terminology itself and the risks associated with it.

Another digital innovation in finance, asset tokenization, is equally questionable. Defined as “the process of converting rights or ownership interests in an asset into a digital token in a Blockchain system” [17], tokenization is declared to be a revolutionary way of creating liquidity for a wide range of traditionally illiquid assets, including by, as financial innovators claim, “increasing the transparency and reliability of data” about such assets.

What is to be tokenized? Practically everything that today is not the object of transactions on regulated stock exchanges and therefore has no reliable market price reference: financial instruments, real estate, precious metals, intangible assets—copyrights and intellectual property, rare cars, works of art.

It should be noted that both the problem of digital currencies and the problem of asset tokenization are primarily of a legal nature, related to the understanding of the nature of the rights associated with them and the methods of their regulation. From an economic point of view, tokenization is essentially an attempt to create parallel and yet unregulated markets for illiquid assets rather than new markets for them. The existing practice is not enough to predict whether this financial and technological innovation will lead to a clarification of the value of illiquid assets and reduce transaction costs or create problems similar to those of building financial pyramids. It is important to remember that corporate finance has not yet created a reliable tool for assessing partial and even more digital rights to analogue assets. At the same time, the estimation of the value of partial rights, illiquid and high-risk assets remains an unexplored issue, while the error of measuring their value is significant and fundamentally unrecoverable.

An immanently unrecoverable error in measuring the value of high-risk assets determines the specific type of investors in venture projects and the portfolio approach to investment they use. Let it also not be forgotten that these are first of all experienced qualified investors, public offerings of shares of such companies take place on specialized platforms, with a special procedure of regulation and admission to them of both investors and issuers. The emergence of an uncontrolled market for digital assets and the attraction of unsophisticated investors can create problems more significant than the infamous ENRON, Bre-X or Madoff pyramid.

3 Results and Discussion

Among the features of new technologies, new corporate and market structures that make it difficult to determine the value they create are the high speed of change, the novelty of the technologies themselves, as well as the presence of complex feedback, network effects and externalities. Absence of methods for analyzing the value of companies in the phase of exponential growth expectations and at the same time often

deprived of not only profit but also revenue, lack of analogues and reliable history—all this leads to distortion of managers, investors and regulators' perception of the real potential of such companies. And the indirect financial or operational metrics they use are illustrations of expectations rather than indicators from which the value of the investment can be determined. The problem is not new, well known since tulip mania and subsequent crises, including the relatively recent but almost forgotten dot.com crisis in the early 2000s technology companies market.

The demand for new digital business models that is taking shape today means that virtually all companies want to see themselves or are trying to present themselves as digital while remaining essentially analogue. The history of WeWork and its investor SoftBank is a clear illustration of the dangers associated with misunderstanding of new organizational forms [18]. A company that tried to implement a number of innovations in the real estate market, but did not become digital, determined its value using the metrics of digital companies. The result was a mismatch of valuation with market realities, a multiple reduction in this valuation within just one year, a multi-billion-dollar loss of an investor and the resignation of the company's manager and chief ideologist [19].

The economics of the platform business model is an emerging field of knowledge. Standard metrics—such as market share and savings on operating costs—may not be applicable to value analysis of platforms that are supported solely by fixed and significant capital infusions, as in the case of Uber [20]. The shareholders of such companies, sometimes unaware of it, actually pay for expensive experiments to study the economic model of growth without creating value.

Perhaps the most difficult event for economic analysis of digital companies is the emergence of a new class of technology based on the use of artificial intelligence systems. With the unquestionable attractiveness and significant potential that the use of such technologies has, the issue of the risk they pose to individual users and to markets in general has not been fully explored to date. In many cases, neither the size of the risk nor the price of a negative outcome are known, as in the case of autonomous AI-based systems without human involvement. Existing financial models for value determination based on income and risk indicators are not applicable to projects whose risks cannot be defined and the amount of damage in case of a negative outcome can be catastrophic. All this leads to high uncertainty of estimates of the cost of similar projects and companies, many of which are built on the proportion of the size of investments at the intermediate stages of the project's financing and clearly cannot be considered as any reliable indicators of their value.

The solution, which follows from the above analysis, should be the advanced development of methods and tools of value analysis, created in the process of digital transformation of the enterprise and the economy as a whole.

4 Conclusion

This publication considers the factors requiring detailed analysis to improve the reliability of the measurement of value created by companies and projects in the digital economy. These include nature of value and risks in the digital economy, peculiarities of competition at the time of digital monopolies, and defining the digital business model.

A more in-depth study of the above factors will make it possible to create new approaches and methods of cost calculation that take into account feedback, network effects and externalities of digital transformations.

References

1. The Digital Enterprise: Moving from experimentation to transformation. Available at: [http://www3.weforum.org/docs/Media/47538_Digital%20Enterprise_Moving_Experimentation_Transformation_report_2018%20-%20final%20\(2\).pdf](http://www3.weforum.org/docs/Media/47538_Digital%20Enterprise_Moving_Experimentation_Transformation_report_2018%20-%20final%20(2).pdf) (2018). Access 20 Feb 2020
2. Shaping the Future of Digital Economy and New Value Creation. Available at <https://www.weforum.org/platforms/shaping-the-future-of-digital-economy-and-new-value-creation> (2020). Access 20 Feb 2020
3. Brynjolfson, E, Parker, C.: Economists have got GDP calculations wrong for years—here’s why. Available at <https://www.weforum.org/agenda/2019/05/an-economist-explains-how-to-value-the-internet/> (2019). Access 20 Feb 2020
4. Spulber, D.F.: The economics of markets and platforms (2018), p. 23. Available at <https://ssrn.com/abstract=3227135> or <http://dx.doi.org/10.2139/ssrn.3227135>
5. Meredith, S.: Here’s everything you need to know about the Cambridge Analytica scandal (2018). Available at <https://www.cnbc.com/2018/03/21/facebook-cambridge-analytica-scandal-everything-you-need-to-know.html>. Access 20 Feb 2020
6. Li, W.C.Y., Nirei, M., Yamana, K.: Value of data: there’s no such thing as a free lunch in the digital economy (2019). p. 4, available at <https://www.bea.gov/research/papers/2018/value-data-theres-no-such-thing-free-lunch-digital-economy> (access date: 20.02.2020)
7. WPP (2019), “BrandZ™ Top 100 Most Valuable Global Brands 2019” (Methodology and Valuation by Kantar), available at https://www.brandz.com/admin/uploads/files/BZ_Global_2019_WPP.pdf (access date: 20.02.2020)
8. Baruch Lev, Feng Gu. The End of Accounting and the Path Forward for Investors and Managers, Wiley Finance, p. 30 (2016)
9. OECD (2014), “Guidance on Transfer Pricing Aspects of Intangibles“, p. 9 (2014)/ available at <https://www.oecd.org/ctp/guidance-on-transfer-pricing-aspects-of-intangibles-9789264219212-en.htm> (access date: 20.02.2020)
10. Lee, K.-F.: AI Superpowers: China, Silicon Valley, and the New World, Houghton Mifflin Harcourt, p. 105 (2018)
11. Michael, A.C., Annabelle, G., David, B.Y: Platform versus non-platform company performance: some exploratory data analysis, 1995–2015, p. 11. Available at <https://cdn.questronworld.bu.edu/platformstrategy/files/2018/07/Platform-vs-Non-Platform-Performance-Working-Paper-v2.pdf> (2018). Access 20 Feb 2020
12. China Daily: World’s top 10 unicorns by valuation. Available at <https://www.chinadaily.com.cn/a/201906/25/WS5d115140a3103dbf14329f45.html> (2019). Access 20 Feb 2020
13. Room, T.: FTC will review past mergers by Facebook, Google and other Big Tech companies. Available at <https://www.washingtonpost.com/technology/2020/02/11/ftc-will-review-past-mergers-by-facebook-google-other-big-tech-companies/> (2020). Access 20 Feb 2020

14. Piketty, T.: Capital in the Twenty First Century, Belknap Press, Harvard University Press, p. 33 (2014)
15. Ford, M.: Rise of the robots: technology and the threat of a jobless future, Basic Books; Reprint edition, p. 36 (2016)
16. Damodaran, A.: The Bitcoin Boom: Asset, Currency, Commodity or Collectible? Available at <http://aswathdamodaran.blogspot.com/2017/10/the-bitcoin-boom-asset-currency.html> (2017). Access 20 Feb 2020
17. Fehrenbach, F: Tokenization: opening illiquid assets to investors. Available at <https://www.bnymellon.com/us/en/our-thinking/tokenization-opening-illiquid-assets-to-investors.jsp> (2019). Access 20 Feb 2020
18. Nori Gerardo Lietz: WeWork—The IPO That Shouldn't? Available at <https://hbswk.hbs.edu/item/wework-the-ipo-that-shouldn-t> (2019). Access 20 Feb 2020
19. Dooleym B.: SoftBank Takes a \$4.6 Billion Hit From WeWork. Its C.E.O. Remains Defiant. Available at <https://www.nytimes.com/2019/11/06/business/softbank-loss-wework.html> (2019). Access 20 Feb 2020
20. Len Sherman: Can Uber Ever Be Profitable? Available at <https://www.forbes.com/sites/lensherman/2019/06/02/can-uber-ever-be-profitable/#3a7137e95785> (2019). Access 20 Feb 2020