

## Intangible value drivers of technology companies in the epoch of digitalization: the necessity for further research

*The purpose of this article is to establish the reasons for the relevance of the study of intangible assets of technology companies. According to estimates of various consulting companies («Interbrand», «Forbes», «Brand Finance», «Kantar»), 40–60 % of the Top 10 most valuable global brands of 2020 are technology companies. The most valuable technology brands (14 technology companies from the Top 20 most valuable technology brands of 2020) are located in the United States. There is a paradox of the relevance of the reporting data of technology companies on intangible assets and the fact that in parallel these companies are leaders of total intangible value. This problem is due to the current rules of accounting and preparation of relevant reports (for example, internally-generated intangibles (information about this is missing in the report), approved accounting policy, etc.). One such example is «Apple», which has no intangibles assets in its report for 2018, 2019, and 2020, although according to the Brand Finance GIFT™ report, in 2020 «Apple» overtook «Amazon», «Microsoft» and became the company with the highest total intangible value (\$2151 billion). The range of users of reporting data is quite wide. Therefore, the reporting quality can lead to incorrect argumentation of management decision-making processes, which will subsequently determine the effectiveness of the measures taken to achieve the set objectives. And, finally, the limiting effects of the COVID-19 pandemic have led to an even greater need for high-quality services and products provided and created by technology companies.*

**Keywords:** digitalization; intangible assets; brand; market value; technology company.

**Topicality.** Coronavirus, as an unexpected catalyst for digitalization, has forced companies to reconsider their communication strategies and accelerated adaptive changes to remote promotion. Digital services are currently on the rise. And through the prism of the division of catalysts, which contribute to the rapid development and spread of digitalization in all spheres of human existence, into expected and unexpected, we must give due role to the leading technology companies.

A clear example of recent changes in the field of digitalization is Facebook calls to change their guidelines for further development. On October 28, 2021, Facebook CEO Mark Zuckerberg announced that the social media giant will change the name of its holding company to «Meta Platforms, Inc.». In recent earnings reports, the company announced its virtual reality segment had grown so substantially it would now report its revenue separately, dividing its products into two categories. Those categories include a «family of apps» including Facebook, Instagram, Messenger and WhatsApp, and the «reality labs» products including augmented reality (AR) and virtual reality (VR) as well as any related hardware. According to M. Zuckerberg, he expects the metaverse to reach a billion people within the next decade, through the implementation of futuristic plans to create a digital world, in which users will feel they are with one another and have a «sense of presence» despite being far apart [11].

It is clear that «Meta Platforms, Inc.» (formerly «Facebook, Inc.») uses diversification techniques to diversify its activities. This leads, firstly, to minimizing the potential risks associated with the development of the first area (Facebook, Instagram, Facebook Messenger, WhatsApp), secondly, to the understanding of management that products such as augmented reality (AR) and virtual reality (VR) will be the future of digital development, and third, to minimize the effects of a number of public relations crises faced by the company.

This case of rebranding was not the first in the technology sector. On October 2, 2015, «Google» was restructured into a new holding company «Alphabet», placing subsidiaries including «YouTube», online video sharing and social media platform, and «Waymo», an autonomous driving company.

The major role in creating value for technology companies belongs to intangibles. The management total intangible value of technology companies as a driving force is not only in creating added value but in creating a unique competitive advantage in the epoch of digitalization. Therefore, it is necessary to understand the reasons for the relevance of research on intangible assets of technology companies and the processes of formation of the intangible component of their value.

**Analysis of current research and publications, which the author rests upon.** The issue of establishing links between intangibles and the market value of companies has been raised in many articles [1–2; 5–6; 8; 14–16; 18; 20–22; 24]. For example, Buzinskiene & Rudyte's study [6] investigates and measures the effect of intangibles on the company's market value in Lithuania. The results provide empirical evidence that the value of intangible assets is divided into two kinds of value, financial and nonfinancial information, which have different effects on the market value of companies. The purpose of Qureshi, M.J., & Siddiqui's study [22] was to examine the degree to which intangible assets affect financial performance and policy of the technological sector. In turn,

such researchers as V.Ievdokymov, T.Ostapchuk, S.Lehenchuk, D.Grytsyshen, G.Marchuk [16] aimed to determine the impact of intangible assets on the market value of European companies (Germany, France, UK) using intellectual data analysis. The above studies prove the need to understand the reasons for such attention to intangible assets as value drivers of companies.

**The aim of this study** is a more detailed list of some arguments that update the study of intangible assets in terms of their impact on the market value of technology companies in current conditions of digitalization.

**Presentation of the main research material.** According to the Standard and Poor's 500, today 90 % of the company value is in intangible assets. The structure of business value assets has changed radically over the past 45 years. The share of tangible assets in 2020 decreased to 10 %. The share of intangible assets increased by 17 % (1975) to 90 % (2020). Therefore, the focus of researchers is precisely on intangible assets and information sources in which information about them can be found.

It is necessary to list in more detail some of the arguments updating the study of intangible assets in terms of their impact on the market value of technology companies in current conditions of digitalization.

Firstly, the relevance of the study of intangible assets of technology companies is primarily due to the fact that these companies are the brand leaders. The technological sector is the leader in total world brand value, which is \$ 986,5 billion in 2020. In percentage terms, this is 14 % of total brand value of 500 companies analyzed by «Brand Finance» [4]. Taking into account different approaches to brand valuation by leading consulting companies that specialize in independent brand valuation, and avoiding the subjectivity of one suggested opinion, we propose several options for ratings of top brands. Table 1 presents the Top 10 most valuable global brands of 2020 according to different estimates by «Interbrand», «Forbes», «Brand Finance» and «Kantar».

Table 1

The Top 10 most valuable global brands of 2020

Interbrand list		Forbes list		Brand Finance list		Kantar list	
1	<b>Apple</b> (\$323 billion)	1	<b>Apple</b> (\$241,2 billion)	1	Amazon (\$220,8 billion)	1	Amazon (\$415,9 billion)
2	Amazon (\$200,7 billion)	2	<b>Google</b> (\$207,5 billion)	2	<b>Google</b> (\$159,7 billion)	2	<b>Apple</b> (\$352,2 billion)
3	<b>Microsoft</b> (\$166 billion)	3	<b>Microsoft</b> (\$169 billion)	3	<b>Apple</b> (\$140,5 billion)	3	<b>Microsoft</b> (\$326,5 billion)
4	<b>Google</b> (\$165,4 billion)	4	Amazon (\$135,4 billion)	4	<b>Microsoft</b> (\$117,1 billion)	4	<b>Google</b> (\$323,6 billion)
5	<b>Samsung</b> (\$62,3 billion)	5	<b>Facebook</b> (\$70,3 billion)	5	<b>Samsung</b> (\$94,5 billion)	5	Visa (\$186,8 billion)
6	Coca-Cola (\$56,9 billion)	6	Coca-Cola (\$64,4 billion)	6	ICBC (\$80,8 billion)	6	Alibaba (\$152,5 billion)
7	Toyota (\$51,6 billion)	7	Disney (\$61,3 billion)	7	<b>Facebook</b> (\$79,8 billion)	7	<b>Tencent</b> (\$151 billion)
8	Mercedes-Benz (\$51,6 billion)	8	<b>Samsung</b> (\$50,4 billion)	8	Walmart (\$77,5 billion)	8	<b>Facebook</b> (\$147,2 billion)
9	McDonald's (\$42,8 billion)	9	Louis Vuitton (\$47,2 billion)	9	Ping An (\$69 billion)	9	McDonald's (\$129,3 billion)
10	Disney (\$40,8 billion)	10	McDonald's (\$46,1 billion)	10	<b>Huawei</b> (\$65,1 billion)	10	MasterCard (\$108,1 billion)

\* generalized on the basis of [4, 13, 17, 19];

\*\* technology companies are grayed out

The visual presentation of the most valuable brands in the world proves that technology companies occupy the highest levels in the rankings. According to «Interbrand» the Top 10 most valuable global brands of 2020 includes four, according to «Forbes» and «Kantar» – five, according to «Brand Finance» – six technology companies. The summarized information of the lists allows us to generalize that 40–60 % of the Top 10 are technology companies. Moreover, the concentration of technology companies at the Top 5 ranges from 80 % («Brand Finance», «Forbes», «Interbrand») to 60 % («Kantar»). The undisputed leaders in the value of brands are 3 technology giants as «Apple», «Google» (parent company «Alphabet»), «Microsoft», the brand value of which exceeds the mark of \$100 billion according to estimates of various consulting companies.

It should be pointed out that the world's largest online marketplace «Amazon» sometimes classified as a technology company, but in most cases, it is noted as a retailer («Brand Finance») determines sector of «Amazon» as retail, «Kantar» – as retail (category), «Stock Analyses on net» – as a general retailer (sector), consumer services (industry)). According to Dada's view, Amazon.com is not a technology company, it is a retail company, as it makes money primarily by selling goods in physical and electronic formats (i.e. kindle, audible). As with most retailers, technology is an important component for Amazon's retail business and a key enabler of competitive advantage. That is different to being in a tech company [7]. The situation is similar with «Alibaba». Therefore, we do not consider «Amazon» and «Alibaba» as technology companies in our research.

There are also ratings exclusively for technology companies and the value of their brands. For example, Table 2 presents the Top 20 most valuable tech brands of 2020.

Table 2

*The Top 20 most valuable tech brands of 2020 (according to «Kantar»)*

№	Company	Country	№	Company	Country
1	Apple	USA	11	Adobe	USA
2	Microsoft	USA	12	Samsung	South Korea
3	Google	USA	13	Salesforce	USA
4	Tencent	China	14	LinkedIn	USA
5	Facebook	USA	15	Huawei	China
6	IBM	USA	16	Oracle	USA
7	SAP	Germany	17	Cisco	USA
8	Instagram	USA	18	Dell Technologies	USA
9	Accenture	USA	19	Xiaomi	China
10	Intel	USA	20	Baidu	China

Source: [27]

Geographically, most of the technology companies on the list are concentrated in the United States, confirming that the 14 companies in this ranking are American.

To summarize the abovementioned, it should be said that the attention to U.S. technology companies is due to the fact that, the technological sector is the leader in total world brand value (14 % of total brand value of 500 companies with the most valuable brand), roughly half of the Top 10 most valuable brands in the world in 2020 belongs to technology companies and 14 technology companies of the Top 20 most valuable tech brands of 2020 are located in the United States.

Secondly, managers and other stakeholders of a company must be provided with complete and up-to-date information on intangible assets through appropriate information channels. The main sources of such information are reporting data. Due to their own nature, intangible assets have problems with identification, valuation and reporting, which raises doubts about the objectivity of the reports.

Table 3 presents the reported intangible assets of technology companies that are among the 100 U.S. stock market leaders for the first quarter 2021.

Table 3

*Reported intangible assets of U.S. technology companies (leaders by market capitalization for Q1 2021) for 2016–2020*

№	Company	Reported intangible assets, \$ mln				
		2016	2017	2018	2019	2020
1	Adobe Inc.	414	386	2069	1721	1359
2	Advanced Micro Devices Inc.	0	0	0	0	0
3	Alphabet Inc.	3307	2692	2220	1979	1445
4	Analog Devices Inc.	549	5319	4778	4217	3650
5	Apple Inc.	3206	2298	0	0	0
6	Applied Materials Inc.	575	412	213	156	153
7	Autodesk Inc.	98	55	281	207	199
8	Broadcom Inc.	15068	10832	10762	17554	16782
9	Cisco Systems Inc.	2501	2539	2552	2201	1576
10	Facebook Inc.	2535	1884	1294	894	623
11	Intel Corp.	9494	12745	11836	10827	9026
12	International Business Machines Corp. (IBM)	4688	3742	3087	15235	13796
13	Intuit Inc.	44	22	61	54	28
14	Lam Research Corp.	565	411	318	217	169
15	Micron Technology Inc.	464	387	331	340	334
16	Microsoft Corp.	3733	10106	8053	7750	7038
17	NVIDIA Corp.	104	52	45	49	2737
18	Oracle Corp.	4943	7679	6670	5279	3738
19	Qualcomm Inc.	3500	3737	2955	2172	1653
20	Salesforce.com inc.	1113	826	1923	4724	4114
21	ServiceNow Inc.	66	87	101	144	153
22	Texas Instruments Inc.	1264	946	628	340	152

\* generalized on the basis of [23]

On the basis of the data presented in Table 3, no general trends can be traced. We emphasize that Table 3 shows the reported intangible assets because there is a problem of transparent information in the reporting of all available intangible assets. This problem is due to the current rules of accounting and preparation of relevant

reports (for example, internally-generated intangibles (information about this is missing in the report), approved accounting policy, etc.). The inconsistency of the current reporting rules with the understanding that technology companies cannot, in principle, be without intangible assets, give rise to a number of paradoxes. One of these is the example of «Apple», which has no intangible assets in its report for 2018, 2019, and 2020.

According to the Brand Finance GIFT™ report ranks the world's most intangible companies and those with the highest levels of intangible asset disclosure for 2020, this year, «Apple» has overtaken «Amazon» and «Microsoft» to become the company with the highest total intangible value (\$2151 billion), besides all of Apple's intangibles remain undisclosed [3]. This report notes that the Apple net disclosed intangibles and net disclosed goodwill are zero, although Apple is the 2020 world leader in total intangible value.

Undoubtedly, the reporting is one of the main sources of information for the analysis and management of the company, but it is possible to verify the validity of the proposed reports. Therefore, the high level of relevance of information on intangible assets of technology companies is questionable.

Thirdly, the researchers have raised a number of questions about the relevance of information on intangible assets in financial statements [12, 25–26]. IAS 38 «Intangible assets» regulates the principles of accounting for intangible assets, but was created in 1998, which leads to its inability to consider all aspects of intangible assets of modern technology companies. The stumbling block of accounting and reporting of intangible assets is the question that arises for the manager during studying the financial statements, namely, «Can the presented data be trusted?».

The range of users of such reporting is quite wide. Therefore, the quality of such data can lead to incorrect argumentation of management decision-making processes, which will subsequently determine the effectiveness of the measures taken to achieve the set goals.

Fourthly, such an unpredictable modern challenge as the COVID-19 pandemic has become not an obstacle, but rather an incentive for the development of information technology, which is the main activity of technology companies. The limiting effects of the COVID-19 pandemic have led to an even greater need for high-quality services and products provided and created by technology companies.

Value is increasingly derived from digital platforms, software and other intangible investments rather than physical assets like real estate, oil wells or other capital. This growth has intensified this year (2020) as the pandemic has shifted interactions from in-person to virtual. Zoom Video Communications (ZM) – Get Report is an example of a business that benefited from the COVID-19 pandemic [10]. The Covid-19 pandemic has led to an unprecedented rise in the use of information and communication technologies and digitization in almost all areas of life [25]. Accordingly, the position of technology companies has improved, as evidenced by the growing number of such companies in the list of 100 U.S. stock market leaders (table 4).

Table 4

Technology companies from the list of 100 U.S. stock market leaders

<i>The first quarter of 2020</i>		<i>The first quarter of 2021</i>	
<i>№</i>	<i>Company</i>	<i>№</i>	<i>Company</i>
1	Adobe Inc.	1	Adobe Inc.
2	Alphabet Inc.	2	Advanced Micro Devices Inc.
3	Apple Inc.	3	Alphabet Inc.
4	Applied Materials Inc.	4	Analog Devices Inc.
5	Broadcom Inc.	5	Apple Inc.
6	Cisco Systems Inc.	6	Applied Materials Inc.
7	Facebook Inc.	7	Autodesk Inc.
8	Intel Corp.	8	Broadcom Inc.
9	International Business Machines Corp.	9	Cisco Systems Inc.
10	Intuit Inc.	10	Facebook Inc.
11	Microsoft Corp.	11	Intel Corp.
12	NVIDIA Corp.	12	International Business Machines Corp.
13	Oracle Corp.	13	Intuit Inc.
14	Qualcomm Inc.	14	Lam Research Corp.
15	salesforce.com inc.	15	Micron Technology Inc.
16	Texas Instruments Inc.	16	Microsoft Corp.
		17	NVIDIA Corp.
		18	Oracle Corp.
		19	Qualcomm Inc.
		20	Salesforce.com inc.
		21	ServiceNow Inc.
		22	Texas Instruments Inc.

\* generalized on the basis of [23];

\*\* newcomers are grayed out

As of the first quarter of 2020, the current list of 100 U.S. stock market leaders includes 16 technology companies. Over the year, this number increased by 5 companies, while 16 companies from the previous list remained in the Top 100. Newcomers to this list were companies such as «Advanced Micro Devices Inc.», «Analog Devices Inc.», «Autodesk Inc.», «Lam Research Corp.», «Micron Technology Inc.», «ServiceNow Inc.». That is, the fact that technology companies do not change in the list, but are only supplemented by new ones, indicates that these companies are ousting companies from other industries from this list of 100 U.S. stock market leaders.

Considering the above, the COVID-19 pandemic, which forced many companies to adapt quickly to avoid collapse, in a peculiar way contributed to the faster development of technology companies, which led to their growth.

**Conclusions and prospects for subsequent research.** Digital platforms compete with each other for users. The user is «oil» for companies that pursue serious policies for joining the list of leaders and maintaining their positions. The main participants in such competition, undoubtedly, are technology companies. The major role in creating value for technology companies belongs to intangibles. The management total intangible value of technology companies as a driving force is not only in creating added value but in creating a unique competitive advantage in the epoch of digitalization. Therefore, we explain the relevance of research on intangible assets of technology companies for the following reasons. The relevance of the study of intangible assets of technology companies is primarily due to the fact that these companies are the brand leaders. According to estimates of various consulting companies («Interbrand», «Forbes», «Brand Finance», «Kantar»), 40–60 % of the Top 10 most valuable global brands of 2020 are technology companies. The most valuable technology brands (14 technology companies from the Top 20 most valuable technology brands of 2020) are located in the United States. There is a paradox of the relevance of the reporting data of technology companies on intangible assets and the fact that in parallel these companies are leaders of total intangible value. This problem is due to the current rules of accounting and preparation of relevant reports (for example, internally-generated intangibles (information about this is missing in the report), approved accounting policy, etc.). One such example is «Apple», which has no intangibles assets in its report for 2018, 2019 and 2020, although according to the Brand Finance GIFT™ report, in 2020 «Apple» overtook «Amazon», «Microsoft» and became the company with the highest total intangible value (\$ 2151 billion). The range of users of reporting data is quite wide. Therefore, the reporting quality can lead to incorrect argumentation of management decision-making processes, which will subsequently determine the effectiveness of the measures taken to achieve the set objectives. And, finally, the limiting effects of the COVID-19 pandemic have led to an even greater need for high-quality services and products provided and created by technology companies.

The topic of future research should be related to establishing a correlation between intangible assets and market capitalization of technology companies on the basis of relevant reporting data and data from stock exchanges. It is also important to identify patterns of impact of intangible assets on the market capitalization of technology companies in terms of the division of such assets into human, organizational and customer capital.

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