
NEW TECHNOLOGIES IN THE 21ST CENTURY - ADOPTION, ACCEPTANCE AND IMPACT ON BUSINESS MODELS

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Abstract

The human race has always innovated, and in a relatively short time went from building fires and making stone-tipped arrows to creating smartphone apps and autonomous robots. Today, technological progress will undoubtedly continue to change the way we work, live, and survive in the coming decades.

Technology is a driver for business. The (technological) innovative power as a result of wide availability and rapid development accelerates economic cycles, changes labor markets and business models - with corresponding consequences for corporate management, planning and monitoring. New products and services, markets and players emerge that extend their business model to traditional economic sectors. This has an immense impact on the traditional strategy process. While technology was often a lever for implementation in the past, it is now a strategy driver.

To investigate resulting impacts, we draw on the existing business models and deduct specifics for the 21st century technologies. Building on this, in order to reach the aims of the paper the authors will use a descriptive research method (a case study), a quantitative research method (online questionnaires) and a qualitative research method (face to face interviews). The data gained will be analyzed to understand what 21st century technologies are, what technologies are seen as perspective to be developed in the next 25 years and what industries will be most affected in the future.

Keywords

Technology, 21st Century, Business Model

JEL Classification

M19, O32

Introduction

Anyone who tries to read into an area of science or technology using a lexicon usually has to surrender. The cross-reference cat and mouse hunt are more exhausting than teaching. Especially when an area is developing as rapidly as technology.

In the film "I, Robot" Will Smith is faced with a huge army of robots, all ready to take over the world and in "Matrix" man is only a tool, the machines control him completely. There are scenes from Hollywood films and messages such as "80 percent of all jobs are taken over by robots" that are often associated with 21st century technologies in the world and which cause one thing: fear. Fear of the future, fear of no longer being used, fear of being replaced by a machine, fear of change and fear of the speed that technology is evolving.

Technology in the 21st century has enabled us as humans to make strides our ancestors could only dream of (Diggory, 2018). And yet, nagging doubts remain that technology is taking over our lives. Love it or loathe it, technology affects almost everything we do today and it also influences most of our plans for the future. Whether we experience the benefits of a hearing aid or a hearing implant, use a mobile phone, listen to music and radio, surf the internet for news or turn the GPS on in our car, we are constantly enjoying the benefits of a hi-tech life (Diggory, 2018). Technology making our lives healthier, more convenient and more entertaining. The focus is clear: utilize technology that makes your life easier (Diggory, 2018).

Since the beginning of the new millennium, the world has witnessed the emergence of social media, smartphones, self-driving cars, and autonomous flying vehicles. There have also been huge leaps in energy storage, artificial intelligence, and medical science. All this together are creating new companies and new ways of doing business, technological advances providing opportunities to innovate and develop successful businesses (Young and Sauter, 2020).

Business models are fundamentally linked with technological innovation generally and digital innovation in particular, yet the business model construct is essentially separable from technology. The business model system describes cause and effect relationships, and is both cognitive and real (Cass Business School, 2020). It can be used to understand the economic dynamics of firms and industries, and it is also a 'device' that can assist managers and policy makers in thinking about their world. Challenging many widely held views about business models because it stresses the model dimension, is intellectually robust and is built on firm philosophical and practical foundations (Cass Business School, 2020). In the 21st century technology and business models are like "brother" and "sister" – they are independent, but have to evolve together.

The first part of the paper will present what 21st technologies are, current literature findings and that business models evolved with the help of technology.

Further, in the second part of the paper, the results of an exploratory study will be presented. The aim of this study is to answer the following questions: What modern technologies are used in companies? What operations / technologies are present in the daily activities? What technologies are seen as perspective to be developed in the next 25 years? What industries will be most affected in the future?

Literature Review

If we look at the discourse landscape on the subject of 'new technologies' from afar, two surveys that characterize the picture emerge: on the one hand we see a massive discourse that starts directly with the new technical phenomena and fluctuating between science and fiction. Tendencies of current research extrapolated so that the picture of a technologically completely dominated and permeated world emerges (Kogge, 2008).

On the other hand, there are the critical commentators who revise the technological discourse. They examine concepts and figures of thought, and show in which historical contexts the

current concepts, such as the molecular machine, and the underlying figures of thought of atomism, reductionism and determinism stand (Kogge, 2008).

Considering the two perspectives, in the end we know that new technologies are changing everything around us, from the way we live, work, communicate, travel or solve problems and invent new things (Tohanean et al., 2018).

The contribution of new technology to economic growth can only be realized when and if the new technology is widely used (Hall and Khan, 2004).

Donald Trump, one of the richest men in the world, was asked on a TV show what would he do if he lost everything overnight and suddenly became poor? He said without hesitation that he would go to an internet café and create a network marketing company in a very short time by sending countless emails. The subsequent laughter from the audience were acknowledged by Donald Trump and with a look at the people, in perfectly calm sentence he answered: "That's why I'm sitting up here, and all of you down there" (Trump, 2006).

Technology is not sitting, it is changing, and it does very fast. Same applies to companies, to classic ways of doing business or to define the term "business model". Michael Lewis refers to the phrase business model as "a term of art" (Lewis, 2000). And like art itself, it's one of those things many people feel they can recognize when they see it but can't quite define. That's less surprising than it seems because how people define the term really depends on how they're using it. Lewis, for example, offers up the simplest of definitions — "All it really meant was how you planned to make money" — to make a simple point about the dot.com bubble, obvious now, but fairly prescient when he was writing at its height, in the fall of 1999. The term, he says dismissively, was "central to the Internet boom; it glorified all manner of half-baked plans ... The "business model" for Microsoft, for instance, was to sell software for 120 bucks a piece that cost fifty cents to manufacture ... The business model of most Internet companies was to attract huge crowds of people to a web site, and then sell others the chance to advertise products to the crowds" (Ovans, 2015).

Business Models of the 21st century may vary to a lot of terms like: digitalization, big data, nanotechnologies, electric vehicles, industry 4.0, 3D printing, augmented reality, social media or blockchain. In each series of lectures on "Digitization" or "Industry 4.0" companies like Amazon, Google, Airbnb, Uber, which are almost like prayer wheels, are listed as dazzling examples of the changes from the classical business model to a new one (Muller, 2018). 21st century related technologies are not only changing the nature and role of companies. They also change the interaction with customers and have an impact on society (Morgan, 2018).

The relationship between businesses and consumers will change from a one-way street to a freeway on which data is exchanged in both directions. While consumers were previously primarily passive users of products and services, their data now contributes to the companies functioning and continuous business model development (Morgan, 2018).

This development enables companies to have continuous innovation and development. However, this requires a trusting, partnership-based relationship between the actors that goes far beyond the purely functional value of products. Common goals and values will shape the relationship between the company and the individual customer much more strongly in the future (Morgan, 2018). This requires the right management in the company, the correct technical tools to evolve and the courage to change / adapt the existing business model or to create a new one (Tohanean, 2019).

Research Methodology

The authors use a descriptive research method, namely the case study, a quantitative research method for online questionnaires and a qualitative research method, namely face to face interviews.

The case study presents a complex analysis of a contemporary phenomenon. The literature of the past shows several types of this research method. Yin (1994), as cited in Tellis (1997),

mentioned three categories: descriptive, exploratory, and explanatory. Yin's approach is closely aligned with a realistic-positivistic approach, since he conceptualizes this research method as a form of social science (Harrison et al., 2017).

The case study was used to understand and learn about a company's process and actions when “new technologies” occur. In order to gain a comprehensive understanding of the case, the data was collected by examining various documents such as “The Global Innovation Index 2019”, “The Best Business Model In The World” (Forbes, 2019), “The Art and Science of Key Risk Indicators: A Case Study Analysis” (Poole College of Management, 2019), “The Global Entrepreneurship Monitor 2019/ 2020” (Global Entrepreneurship Monitor, 2020) or “The Global Competitiveness Report 2019” (World Economic Forum, 2020).

The individual interview is a valuable method of gaining insight into people's perceptions, understandings and experiences of a given phenomenon and can contribute to in-depth data collection (Frances et al., 2009).

To achieve the goals of the paper and verify the literature we apply a series of offline interviews with a few of local entrepreneurs, from technology-based companies or domains such as ALTRAN, Amerilex, National House of Public Pensions, The Bucharest University of Economic Studies and RO Distribution 2000. Online surveys were more than 100 respondents from international business market, such as BRD, Continental, Deloitte, Duvenbeck, IBM, Microsoft, OMV, Oracle and Renault – from all over the world: Romania, Germany, Belgium, United States of Amerika or India. All of them answer to a series of questions regarding innovation, acceptance of technology, knowledge of the concept of modern technology and other relevant subjects which shows us the level of usage of modern technology, implication of digital transformation, the level of digital knowledge in every level of a company.

The interviews were conducted over a period of 6 months from September 2019 to February 2020. Part of the interviews took place personally at the company's headquarters, but the majority were found online via Skype or phone.

The size of the companies interviewed according to the number of employees is as follows: 28,9% (1 to 50 employees), 8,9% (50 to 100 employees), 24,4% (100 to 500 employees) and 37,8% (more than 500 employees).

The interviewed companies according to the field of activity is as follows: 31% (IT), 13% (Consultancy), 11% (Manufacturing), 9% (Healthcare), 7% (Transportation, Logistics, Automotive, Education and Banking) and 3% (Government, Public Administration and Research).

The results are used to understand the adoption or acceptance of new technologies, to analyze different aspects of modern technologies and how it is impacting business models.

Results - Modern Technologies and their Impact on Business Models

The history of technology is as old as mankind. The earliest achievements include fire and the hand ax. After humans switched from hunting and gathering to agriculture and animal husbandry at the end of the Stone Age, technology also began to develop more rapidly. Tools and weapons were soon made of bronze, large cities emerged from stone buildings and the wheel made transport easier.

In Greco-Roman antiquity, people went about using iron. They also began to investigate technology and found the lever law and developed the pulley system. The late antique waterwheels form the transition to the Middle Ages, where they were then supplemented by the windmill to do work. Here, agriculture made greater progress with the wheel plow, the horseshoe and the collar, which increased the usable traction of horses. In the military field, armored knights also used the horse and had castles built.

In the Renaissance, cannons and forts took a high peek. During this time, letterpress printing, the discovery of porcelain production, the construction of clocks, microscopes and telescopes, and the associated flourishing of the natural sciences, also took place.

In the Industrial Revolution, spinning and weaving machines were created, which were driven by steam engines, which were heated by hard coal and also made railways and steam ships possible. In the 19th and 20th centuries, machines, film and photography, electricity, plastics, television, computers, and aerospace were created. Most common and used technologies of the 21st century can be seen in table no. 1., considered very important by companies.

Table no. 1 Technologies of the 21 Century

Technology	Big Data	Nanotechnology	Electric Vehicles	3D Printing	Social Media	Blockchain
% of Usage	64%	35,60%	46,70%	75,60%	26,70%	55,60%

Source: Author's own creation

Technology is transforming business models. The topic of business transformation is an old shoe in the business world. It is therefore right to ask the question to what extent technology or digital change represents something new. Indeed, in the past there have been some major developments that have brought about global business models, but each time based on physical products. This is the big difference from what we have seen recently and what we call technology change: we are dealing with an information revolution.

Business models change because they are driven by information. Uber and Airbnb are common but apt examples. The information factor has left its formerly supportive role and has transformed itself into a significant trade and production good. This has changed the whole paradigm of business IT alignment. IT is no longer subordinate to the business model, but a relationship "Business is IT" is created. Business models have changed scientifically in the past years, with focus on product, solutions or services. Figure no. 1 highlights the main evolution steps.

Having this as a starting point, we want to highlight the use of modern technologies in current companies, what operations are present for the daily activities, what technologies are seen as perspective to be developed in the next 25 years and what industries will be most affected in the future.

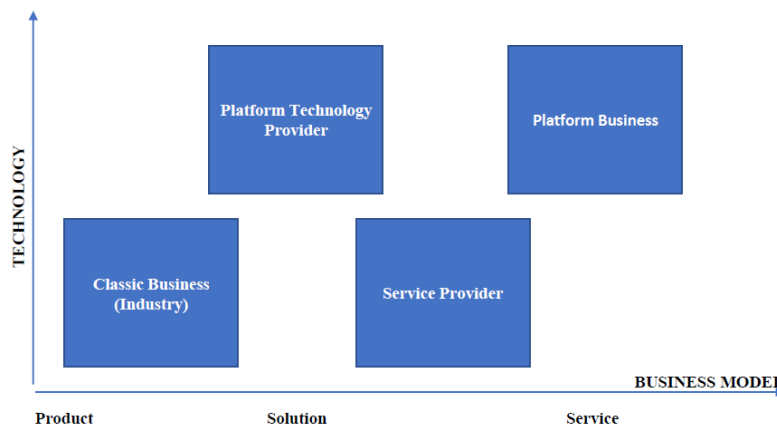


Fig. no. 1 The business model changes through technology

Source: Author's own creation

From robots to modern office equipment like laptops or tablets help companies to progress. Table no. 2 shows the operations that influence the daily work in a company

Table no. 2 Technological aspects that influence the daily work in a company

Operations / Processes / Technologies / Gadgets	Part of daily work		
	a lot	little	not
Robots	13,33%	11,11%	75,55%
Internet	88,88%	8,88%	2,22%
Telework	62,22%	22,22%	15,55%
Automated Processes	33,33%	40%	26,66%
Online Communication (Email, Social Media, Chat Services etc.)	88,88%	6,66%	4,44%
IT Hardware (Laptop, Smartphone, Tablet etc.)	93,30%	4,44%	2,22%

Source: Author's own creation

A clear aspect that has to be underlined is the fact that the knowledge and presence of technologies is a key benefit to business models. Terms “digitalization” or “digital transformation” are familiar in each company, only 6,7% do not understand the concept. More den 53% of the interviewed companies prefer to work online, more direct prefer a digital business model and 98% consider that technology brings a competitive advantage when used in the company. Technology grows every day and is adapting quick. Figure no. 2 shows the technology development of the next 25 years.

In our opinion, the complete transformation of the existing business world is still in its infancy. Exceptions prove the rule. However, the full potential of technological or transformation is far from being exhausted.

What we can currently observe much more are new players in different markets. New business models open up new markets in which the time and structural inhibitions are significantly lower than in traditional sales areas. A good example is music distribution: a classic company needs a local office with shop rental, employees, suppliers and other factors. Business models like Spotify's enable fully digital sales and turn the industry upside down. Due to the lower entry hurdles, these market participants can act more volatile, but are also shorter-lived.

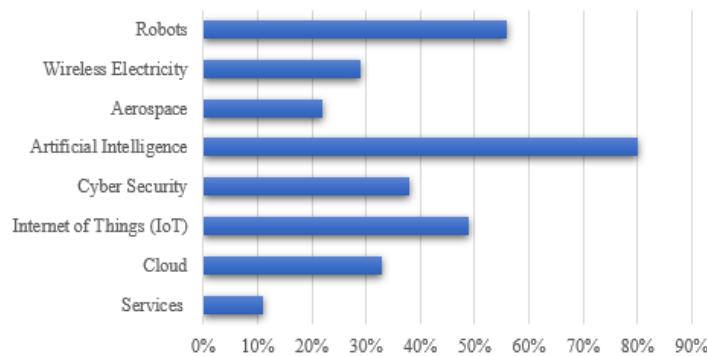


Fig. no. 2 Technology development over the next 25 years

Source: Author's own creation

In this context, existing companies almost instinctively emphasize their traditional core competencies. Since a new business model cannot be implemented overnight, this reaction is

also the simplest and best alternative, at least in the short term. In a long term many domains and industries will be affected by technology and change. Figure no. 3 shows an overview of such impact.

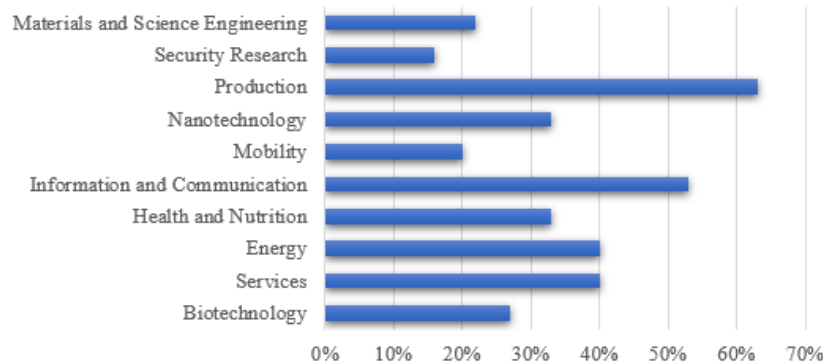


Fig. no. 3 Industry / domain will be most affected by technology in the future

Source: Author's own creation

How can it be determined that the business model in its current form is no longer sustainable? Of course, there are always several indicators, but: Whenever a company no longer grows or cannot grow in its customer base, stagnation occurs. Standing still here is a step backwards and a clear sign that the business model is no longer future-proof and has to be updated or changed to a more technology oriented one.

Conclusions

Changing business models are also inherent in changing company types. This requires flexibility and will lead to companies increasingly having to reform themselves into temporary interest and cooperation associations. The relationship between these associations is largely determined by their merchandise: information. The entire value chain will soon increasingly make a decentralized contribution to the product itself, which in turn has extremely dynamic and short-cycle effects.

Future laws and ordinances have to be adapted to this, since they face the challenge of reconciling virtual information trade with physical reality. The key question will be whether traditionally organized entities such as governments, institutions and regulators are capable of timely change - and whether they even have the need for digital transformation in mind. Technology is here, it changes every day, it is impacting all companies, changing and creating new business models – we are responsible how we answer to it.

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References

- Cass Business School, 2020. *About Business Models and Technology*, [online] Available at: <<https://www.cass.city.ac.uk/faculties-and-research/centres/business-models-technology>> [Accessed 14 April 2020].
- Forbes, 2019. *This Is the Best Business Model in the World*, [online] Available at: <<https://www.forbes.com/sites/erikkobayashisolomon/2019/07/31/this-is-the-best-business-model-in-the-world/#19dcae605d4b>> [Accessed 14 April 2020].

- Frances, R., Coughlan, M. and Cronin, P., 2009. Interviewing in qualitative research. *International Journal of Therapy and Rehabilitation*, 16(6), pp.309-314.
- Global Entrepreneurship Monitor, 2020. *GEM 2019 / 2020 Global Report*, [online] Available at: <<https://www.gemconsortium.org/report>> [Accessed 14 April 2020].
- Hall, V. and Khan, B., 2004. *Adoption of New Technology*. NBER Working Papers 9730, National Bureau of Economic Research, Inc. [pdf] Available at: <<https://www.nber.org/papers/w9730.pdf>> [Accessed at 9 February 2020].
- Harrison, H., Birks, M., Franklin, R. and Mills, J., 2017. *Case Study Research: Foundations and Methodological Orientations, FQS - Forum: Qualitative social research. 18 (1)*. [Online] Available at: <<http://www.qualitative-research.net/index.php/fqs/article/view/2655/4079#g341>> [Accessed 17.03.2019].
- Kogge, W., 2004. Technologie des 21. Jahrhundert. Perspektiven der Technikphilosophie. *Deutsche Zeitschrift für Philosophie*, 56(6), pp.935-956.
- Lewis, M., 2000. *The New New Thing: A Silicon Valley Story*. New York: W.W. Norton.
- Muller, T., 2018. *Warum neue Geschäftsmodelle und Technologien unzertrennlich sind*, [online] Available at: <<https://www.industry-of-things.de/warum-neue-geschaeftsmodelle-und-technologien-unzertrennlich-sind-a-739171/>> [Accessed 15 April 2020].
- Morgan, B., 2018. *Five Trends Shaping the Future of Customer Experience in 2018*, [online] Available at: <<https://www.forbes.com/sites/blakemorgan/2017/12/05/five-trends-shaping-the-future-of-customer-experience-in-2018/>> [Accessed 14 April 2020].
- Ovans, A., 2015. *What is a Business Model?* [online] Available at: <<https://hbr.org/2015/01/what-is-a-business-model/>> [Accessed 20 April 2020].
- Tellis, W.M., 1997. Application of a Case Study Methodology. *The Qualitative Report*, 3(3), pp.1-19.
- Tohanean, D., Toma, S.G. and Dumitru, I., 2018. Organizational Performance and Digitalization in Industry 4.0. *Emerging Trends in Marketing and Management*, 1(1), pp.282-288.
- Tohanean, D. and Ceausu, I., 2019. Trends and Challenges of Business Models in the Era of Internet of Things: A Case Study Between Western and Eastern Europe. In *5th BASIQ International Conference on New Trends in Sustainable Business and Consumption*. Bari, Italy, 29 May – 1 June.
- Trump, D.G., 2006. *The business model of the 21 century*, [online] Available at: <<https://www.netcoo.com/netcoo/editorials/das-geschaeftsmodell-des-21-jahrhunderts/>> [Accessed 9 February 2020].
- World Economic Forum, 2020. *Global Competitiveness Report 2019: How to end a lost decade of productivity growth*, [online] Available at: <<https://www.weforum.org/reports/how-to-end-a-decade-of-lost-productivity-growth>> [Accessed 9 February 2020].
- Yin, R.K., 2009. *Case study research: design and methods*. 4th ed Applied social research methods. Los Angeles, Calif: Sage Publications.
- Young, A., Sauter, M., 2020. 3D printing, *E-cigarettes among the most important inventions of the 21st century*, [online] Available at: <<https://eu.usatoday.com/story/money/2020/01/09/21-most-important-inventions-of-the-21st-century/40934825/>> [Accessed 15 April 2020].