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FinTech after COVID-19 –the future of the technology of financial services?

Spring semester 2020

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Abstract

The new coronavirus has disrupted the financial world, which was already in the movement. As the technological advancements of recent years in the information and communication technologies (ICT) became industrial-grade, companies have shown more interest in applying them in production.

Amidst such circumstances, humanity was forced to plan and deploy a digital transformation in the range of weeks, if not in a shorter timeframe. This scenario has provided much more eagerness both on the side of decision-makers and the majority of people, including those not particularly fond of modern technologies – as they had no other viable option.

Reflecting on the pandemic situation, this work intends to review how COVID-19 has transformed the FinTech industry, i.e., the technology-driven branch of financial services. The authors put the current crisis in a broader context while also providing an in-depth analysis of the trends to help to identify the future generation of FinTech innovations.

1. Introduction

The year 2020 will be remarkable for FinTech (a shorthand for financial technology, incorporating companies utilizing novel technological innovations for financial applications) solutions. There was never a such urgent, external incentive present to enforce people to seek the solutions of modern information and communications technologies (ICT) in order to minimize the risk of an infection by the new coronavirus COVID-19.

Increased use of digital banking, higher penetration of contactless payments accompanied the pandemics. Still, it is an open research question whether changes will be permanent and, more importantly, for financial companies: what are the trends needed to be followed, or even defined to ensure the long-term success of FinTech solutions.

Nonetheless, for defining the proper strategy for future FinTech innovation, it is crucial to understand the current situation from a financial, economic, sociological, and psychological point of view. As the phenomenon intertwines with all walks of life; thus, it would only lead to erroneous conclusions if our consideration would leave out any important aspect.

Besides focusing on an extensive analysis, it is also essential to analyze the technological aspect as well. Hence, based on the overview of possible trends, we will point out technological solutions – without unnecessarily going into technical details – and their successful applications.

For the sake of a complete analysis, first, we will review the effect of COVID-19 on the world economy and conclude by identifying key aspects and risks, while not neglecting the intent of governments and regulatory bodies. Second, mainly based on the implications of the pandemics – nonetheless, not ignoring previous and longer reaching trends – we intend to identify the needs of both businesses and consumers. Based on that, we will review FinTech innovations in context; last, we conclude our work with the main findings, whereas also including some further considerations.

2. The effects of COVID-19

COVID-19 has brought a clear paradigm shift into our lives. Undoubtedly, everything needed to change: from our travel habits to how we work, study, and even – and most importantly - how we interact with each other. As these factors define our needs, economies needed to accommodate the current situation to exploit the situation and generate profit – or, if they were incapable or legally bound, to accept their losses.

An overview of recent findings of the literature concerning the risk and financial management of COVID-19 can be found in (Chang *et al.*, 2020), providing a scientific evaluation of topics like healthcare, virology, politics, which are well beyond the scope of this work.

2.1. The nature of the crisis

However, first, a clear indication is required to express the utmost challenging nature of the current crisis. The reason for this is the fact that in the last decades, **crises were usually not driven by severe healthcare issues** such as the current pandemic, but by inflating bubbles. E.g., as in 2008 due to the subprime mortgage crisis on the US real estate market, or the Dotcom bubble at the beginning of the third millennium. Thus, fiscal and monetary politics, as well as financial institutions, could prepare for them to a certain extent – at least better than to the current crisis that was caused by pandemics.

A further difference was that in several cases, overproduction was an issue and origin of the crisis (as in 1929). In contrast, in other cases (e.g., in 2008) mainly there was an issue of a shock on the demand side, as purchases decreased significantly. This time, **both supply and demand have experienced a shock**: as people were not allowed to leave their homes, factories were shut down, and several branches of the economy followed suit, such as restaurants, theatres. Thus, both the consumption of people was restricted in several walks of life, whereas supply also suffered from the standstills implied by government measures. There were some winners of COVID-19 as well (in the sense of revenues and profit) like teleconference, e-education platforms.

2.2. Economical context

A detailed study of (Ozili and Arun, 2020) analyzed the spillover effect onto different branches of the economy. Nonetheless, the focus will be on the effects affecting the financial industry, which we shortly review here for developing a better understanding of the context.

As people were not allowed to leave their homes, the travel, hospitality, and sports industry suspended operations. This has raised several issues: first, some countries experienced **unprecedented levels of unemployment**, such as the US. In this case, statisticians were forced to rescale the charts to be able to plot more than 20 million unemployed people (the maximum was in April 2020 23.1 million or 14.7%), as shown in (Bureau of Labor Statistics, 2020). The above phenomenon has increased the default probability for both private customers as well as businesses (Ozili and Arun, 2020).

As the same analysis shows, stock markets were not left without effect; the S&P500 has experienced the fastest 30% selloff wave in history. Nevertheless, at the beginning of June, signs of an almost full recovery are shown. Despite this fact, this may create space for FinTech innovation in terms of risk management and the analysis of stock price movements.

As the scientific community responded very quickly to the pandemics, the first kind of these analyses is already published, such as (Agosto and Giudici, 2020) that analyses the correlation of the growth rate of the number of new coronavirus cases and the return of the Shanghai Stock Exchange composite index (SSE) return. For their methods, the authors utilize a log-linear autoregressive process, whereas they specify the conditional distribution of new cases with the Poisson distribution. As their findings are statistically significant on past data, the research outlook seems to be promising, the results of which could be utilized by, e.g., hedge-fund managers or brokers.

2.3. Crisis management

As a result of COVID-19, governments in several countries have declared a state of emergency, which was followed by measures by the actors. I.e., not only the **fiscal policy was revised** in several countries, but central banks also opted for **different monetary means**. Nonetheless, it is not to forget how individuals as part of the society reacted to the new situation, as these phenomena could start/accelerate processes resulting in the broader adaptation of FinTech innovations.

In the following, the actions mentioned above will be discussed according to whether they were fiscal, monetary, or societal ones. In each section, we also emphasize relationships w.r.t. financial innovations.

2.3.1. Fiscal measures

There were mainly two types of fiscal measures governments made as a response to the epidemics: **direct spendings were increased, and loans/loan guarantees were provided** (Ozili and Arun, 2020). Besides that, some countries experimented with quite unusual fiscal instruments, e.g., the US government provided helicopter money to its citizens. Thus, governments neglected the original targets w.r.t. country debt to avoid a more profound economic crisis. Nevertheless, it is still in question in some countries, **whether to save the economy or people first**.

From a **FinTech** point of view, fiscal measures can only be quantified as an **opportunity** if we focus on their logistic side. E.g., checking eligibility for loan discounts or decreased tax fares requires a sophisticated infrastructure, which is interconnected with enterprise/tax/etc. registers.

2.3.2. Monetary measures

According to the analysis of the same study (Ozili and Arun, 2020), the central banks reacted in quite the same manner. The rates of monetary policy were cut to **incentivize investment** (and thus to increase demand). Nonetheless, e.g., the Central Bank of Hungary maintained its interest rate at 0.90 basis points. Asset and FX deals were also carried out to control liquidity and exchange rates.

However, care should be taken during the analysis of monetary measures in some countries as the conflict between Russia and OPEC countries (mainly Saudi Arabia) - which has driven the oil price to historical lows – implied effects that could not be left unanswered. I.e., some interventions – although carried out during the pandemics – were not strictly related to COVID-19.

From the FinTech point of view, these measures hardly open a niche market for FinTech innovation in the B2C segment in the opinion of the authors. However, anticipating and being able to **predict monetary actions** could be a crucial aspect for portfolio management – especially in active trading and FX trades.

2.3.3. Societal impact

We left the probably most exciting aspect of the pandemic response, i.e., that of individuals as the last one being discussed. As these reactions were not systematic – although this does

not mean that there were no trends to observe – but an effect of self-organization, they sometimes were not totally reasonable. E.g., the amount of cash held by citizens significantly increased in Hungary (HVG, 2020), although this materialized form of means of payment had a non-negligible probability of transferring the coronavirus. Thus, central banks had the duty to sanitize cash to eliminate the danger of using it.

As a consequence, we identify the following fact as an important lesson: **what people do and want is not every time the same as what they really need** - as it was shown, e.g., in the work of Nobel prize laureate Daniel Kahneman (Kahneman, 2011)-, and financial matters are no exception from that. However, this fact of increased cash use seems to be of small concern; we are believed that identifying these trends and creating new ones is the critical factor for FinTech innovation.

Of course, sometimes innovation trends, companies' and societies' needs coincide. Such a trend could be observed as a direct implication of COVID-19, which resulted in **increased utilization of mobile banking** applications, as it was shown in a recent study (Fu and Mishra, 2020). That is, a product of FinTech innovation helps banks to reduce their operating costs and makes the administration of financial matters more comfortable while increasing compliance with social distancing measures - a definite win-win situation for all in times of a severe healthcare issue.

Fortunately, **regulators also recognized the importance of promoting digital solutions** as a means to fight the coronavirus. In Hungary, e.g., the limit of contactless payments was increased from 5000 to 15000 HUF (Magyar Közlöny, 2020), according to the proposal of the Central Bank of Hungary. Thus, hopefully, the current momentum of accelerating the adoption of FinTech innovation will be intact. Besides having studies such as (Fu and Mishra, 2020) showing analysis of the trends during the pandemic, **countries also have plans pointing forward** after it. Such as the intent of the Hungarian government to make electronic payment a must for enterprises equipped with online cash registers (Egri, 2020) -, clearly showing engagement for financial innovations.

3. Identifying needs and trends

In this chapter, we expand the scope of investigation of the previous chapter. Thus, we also intend to collect and systematize trends present already before the new coronavirus. Besides that, customer needs are also presented.

Nonetheless, we acknowledge the fact that **sometimes disruptions like COVID-19 are required to accelerate the spreading of innovations**, i.e., to overcome the chasm between early adopters and early majority, as stated in (Moore and McKenna, 1999). Besides relying on recent advancements in innovation adaptation, as indicated, e.g., by (Fu and Mishra, 2020), we will rely on mainly the literature of FinTech and on that of **technology foresight** (Georghiou, 2008).

If we investigate the Technology Vision 2020 report of Accenture (Accenture, 2020), we can state that the main trends are centered around the same technologies in the last three years of the report. I.e., **artificial intelligence (AI), Internet of Things (IoT), robotics, data security, and personalized solutions**. This means that these technologies will define the playground for FinTech as well, meaning that innovation concerning these areas will most probably turn out to be the most successful according to current expectations and market analysis.

Nonetheless, **technology is only one aspect of future FinTech innovation; the other one is the banking/finance landscape**, regarding which the Financial Services Technology 2020 report of PwC gives us a detailed view (PwC, 2020). Additionally, during the analysis of likely future trends, we will also rely on the report of (McIntyre, 2020), which was done for Accenture as well.

The common factor of the above-mentioned technical analyses is the fact that they intertwine needs and technology. Despite acknowledging the fact that this approach is definitely advantageous for executive officers who are developing strategies for their company; nonetheless, it is highly probable that by not decoupling problems from solutions, something (some issue or even the optimal solution for a given problem) may be left out. As – the authors believe – focusing only on a narrow field, some parts of the big picture may be left unnoticed.

Thus, in the following, we will only **define issues that need to be addressed** (constraining to mention technological aspects only if they had a significant role in creating/maintaining/accelerating the trend itself); after that, we will provide a

comprehensive analysis of possible technology development directions. This way, we do not miss the possibility to provide more general solutions, which may scale better or provide a solution to multiple issues.

3.1. Staying connected

People's need to keep up with events of entertainment, economy, their personal lives is experiencing unprecedented penetration. The reason for this is the rapid technological advancement which was happening in recent decades and is continuing even now. As new technological products were introduced to the market, people accommodated to this toolbox of new appliances, resulting in a transformation of one's needs.

A natural process is to be observed: as people experience a beneficial solution in one domain of life, a need arises in them to have those characteristics in other products/services as well. A perfect example of that is the case of smartphones. As it became natural to possess a multipurpose device with a comparably enormous computational capacity and with a stable internet connection – backed by the quickly developing ICT technology -, the ways of quickly accessing messages, specific applications resulted in a need to have the same for financial matters too. The consequences are clear to see, COVID-19 only accelerated the process, as shown in (Fu and Mishra, 2020).

Besides – and in connection with – smartphones, the other driving force of this trend are connected devices known as the Internet of Things (IoT). The reasons for success have the same root: quick access of information about the environment (via e.g., temperature or humidity sensors) or personal health (e.g., heart rate monitors).

Although the notion of **connectedness** usually refers to **smart devices** in case of technological analyses, the traditional aspect should also be considered and investigated, as it experiences a significant trend which could be exploited by financial technologies. Besides providing a “more tight” contact with digital customers, unbanked people need to be taken into consideration as well (often referred to as **financial inclusion**).

For financial exclusion is present (Salampasis and Mention, 2018), banks need to address this issue. First, it has a rational reason: the more people can be included, the more profit can be potentially realized (if economies of scale can be exploited). Besides that, **incentivizing and converting current customers into digital ones** would also mean that structural

rationalizations could be carried out, e.g., resulting in a decreased number of brick-and-mortar banks and more emphasis on digital solutions. Hence, this could ease administrative burdens and provide customers what they really need, but they were not able to access. This is mainly an issue in developing countries; nonetheless, it is also an issue in rural/less developed areas of Europe, where there is a tendency in recent years that service providers close their local branches due to high costs.

Nevertheless, the main takeaway of this trend is – from a FinTech innovation point of view – that it is **essential to recognize the needs of customers**. I.e., to answer the question of whether there is any aspect of their finances where currently there is no (widespread) option present for enabling integration and inclusion.

3.2. Personalized solutions

People always have sought optimal solutions for themselves and to express their individuality. Nonetheless, this was an **infeasible** solution in some domains, among others in case of finance, as it would have been required a **high involvement of human resources**. As scalability was preferred by service providers, personalization was not a widespread phenomenon; only the wealthiest people/companies were eligible for that, as in that case, costs were lower than the possible revenue.

As demand still exists – and is much more significant, as in more and more walks of life, it is the baseline -, satisfying the needs of customers regarding personalized financial solutions belongs to the mainstream line of future FinTech innovation, as shown in (Accenture, 2020).

As personalized solutions tend to belong to the meaningless buzzwords of recent years, let us elaborate in more detail on what this could mean for FinTech companies. For that, we should review the financial services one may seek personalized solutions in. Those services could be the management of savings, loans and mortgages, insurance policies, or information about financial matters (terms and conditions). In these categories, the question to be answered is: what does the customer may want?

In the case of savings, lots of people are not even aware of the possibilities. Thus, it could be a part of future FinTech policies to **increase savings penetration based on personal details**. This would create a **win-win situation**: involving small amounts from a significant number of customers would be worth for the service provider as well (and in an automated manner, it

could be feasible). On the other hand, help could be provided to customers to start sparing money. Among others, the issue of impulse purchases belongs to this category as well; thus technological solutions need to address this issue as well. Offering savings instruments could be personalized as well, based on the amount, temporal horizon, and risk appetite.

The important point regarding this aspect is that the case of savings is not necessarily a trend generated by the affected – e.g., by the millennial generation who have a not promising financial outlook, not to mention savings, as an analysis shows the situation in the US (Hoffower, 2020. 02. 27). Nonetheless, recognizing this issue can result in a prosperous business situation, as mentioned above. Furthermore, solutions incentivizing savings could also be in the interest of governments to create a stable pillar for social care.

The case of loans/mortgages has some differences. As **assessing the credibility** of a possible future debtor is essential for banks to be able to meet the risk criteria of their portfolio and to determine the price for the loan, there was an often **lengthy process** involved before signing loan contracts, especially after the subprime crisis of 2008. Notably, the lengthy credibility-assessing procedure is not advantageous, neither for the customer, nor the bank itself. Striving for the temporal reduction of this process coincides with one of the trends predicted for 2020 in (McIntyre, 2020); nonetheless, this can only be carried out by the banks. Still, there is much potential for providing aid for them with innovative technologies.

Recognizing this trend and developing automated means would aid this process – however, **regulatory aspects** shall be taken into consideration. Among others, one of the most noteworthy of its kind is the **General Data Protection Regulation (GDPR)** of the European Union (EU, 2016), which entitles the customer to require an **explanation in case of automated decisions**. In our evaluation, this is one of the critical aspects FinTech companies need to master to acquire a stable position in the market.

There is a whole separate business branch for innovative insurance solutions termed **InsurTech** (Yan *et al.*, 2016), which signalizes on its own the potential in the insurance industry. Similar to the case of loans discussed above, in the case of insurances, personalized solutions are utmost viable. Insurance providers could benefit from **collecting more relevant data** from the customers; in this way, the **risk assessment would be more accurate**. From the customer side, more chiseled information would also mean that unique claims can be taken into consideration (which may contribute to, e.g., discounts as well).

Banks invest a significant amount of maintaining their infrastructure – not just real estate and technology is included, but employees as well. Having a **good quality customer service** increases trust and functions on its own for several customers as an incentive for choosing a given provider. Nonetheless, there is a wide range of possibilities if banks begin to think out-of-the-box. As the first point of this section (interconnectedness) has shown, **people want answers fast**, and for that, they are often willing to forgo about human interaction. Besides that, although the authors are not aware of any formal statistics, it is utmost possible that a fair amount of questions are similar, as assumptions of people tend to be similar in a given society/culture. Thus, in this case, a possible way for innovation would be to **manage customer requests automatically and to intervene only if necessary**.

As shown in the analysis above, the development of personalized solutions has an excellent potential for innovators, as it could create considerable added value by tailoring standard services for the needs of customers. Nonetheless, this step cannot be made without the help of the massive involvement of technology, automatization is required, as financial institutions do not possess so many human resources.

3.3. Aiming for simplicity

Besides seeking personalized solutions, customers also require a user-friendly way of utilizing financial services. Therefore, they expect to increase an accelerated procedure (e.g., in case of administrative procedures or customer service contacts) and lower costs.

By striving for simplicity, one option would be to **avoid intermediaries** – or, from the service provider's point of view, **shortening the supply chain** –, which is a goal on both sides, as it contributes to lower fees, higher profit, and less administration. Of course, how this trend could materialize on both sides is different, both regarding needs and possible solutions.

On the customer side, the **rise of sharing economy** has gained shares within financial matters as well (PwC, 2020). As the analysis shows, the trust created by technology companies transfers in a one-by-one fashion, even in case they are offering financial solutions. Thus, the rise of FinTech innovation is – to a certain extent – encoded into the current customer behavior.

3.3.1. Peer-to-peer trends

The increased speed expectations of customers also contributed to a broader spread of **peer-to-peer (P2P)** solutions, where, e.g., lending occurs between non-bank entities (companies or natural persons); and, thus **sparing** the administrative and financial burden of **strict credibility checks**. Although this phenomenon itself (i.e., the lending of money between natural persons, especially acquaintances, friends, family) is not novel, formalizing it in a digital manner creates the opportunity for both private and institutional stakeholders in the financial sector to profit from it.

We are believed that this not only means profit in the economic sense but also in the regulatory as well. Namely, the turnover of those P2P lending services could be an indicator for analyses. Although it is known that the presence of debt on itself is not a sign of future liquidity/solvency problems for the financially prudent; nonetheless, societal analyses such as the previously cited (Hoffower, 2020. 02. 27) of US millennials shows that for the majority, it is (i.e., prudent financial behavior) unfortunately not the case.

Still, introducing P2P financial services can have a high impact, as it was already shown in some developing countries (PwC, 2020), where the presence of brick-and-mortar banks is not as dense as necessary to reach every societal layer with reasonable effort (from the customers' point of view).

The opinion of the authors is that a possible direction of FinTech innovation regarding – but not restricted to – peer-to-peer financial mechanisms is the education of customers via gamification (and active involvement), which is a prevalent trend in several walks of life, e.g., in education, (Accenture, 2020). This way, the service could experience a Pareto improvement for both lenders and debtors. As the probability of default is expected to decrease over time due to educating people about loans, their conditions, and assessment, investors could realize a decent profit with a decreased risk (as the majority of investors is risk-averse, this could embrace investment into the lending company). Thus, this approach could help to consolidate P2P providers in the long term by creating a safer environment.

Whereas, the customers would realize what they need (and what they can have without risking insolvency), and align their decisions according to that. For the companies themselves,

this policy change would result in more attractivity for the potential customers, and improved risk management aspects.

In the **B2B segment**, P2P solutions might also have advantages – nonetheless, the possible effect requires further analysis, as the topic is **highly sensitive**. Nonetheless, we mention this as being one of the most prominent question marks of the topic. As **instant payment** becomes the standard in several countries (Gomber *et al.*, 2018), **financial institutions face an issue to increase their liquidity to comply with the more frequent clearing of transactions**. At least, this is the case for **bilateral clearing**. Nonetheless, the implementation of **multilateral clearing** would definitely change the market environment: the liquidity of the banks would not be as high as in the case of bilateral clearing, whereas customers would experience the same high quality of service – a definite Pareto improvement.

Although the solution might seem to be self-evident theoretically, **implementation is definitely challenging**. Namely, an efficient multilateral clearing system would require a registry including all banks to facilitate multilateral settlement of transactions, not to mention concerns of an international governing/supervisory body and robustness.

Even if this might seem to be a viable solution, regulatory bodies shall consider this aspect to avoid increased risk, which is undoubtedly present in the case of introducing new (technological) solutions. Nonetheless, if innovative companies could provide a solution to this problem, it would turn out to be lucrative and advantageous for all stakeholders.

3.3.2. Made simpler through a better understanding

As it was identified in (McIntyre, 2020), a possible trend of 2020 in the banking industry is that of M&As (mergers and acquisitions). The reason why this is discussed in the section about – among others - avoiding intermediaries is the fact that flattening the supply chain of financial services would result in a more rational cost structure. In the opinion of the authors, **integrating an innovative company into an international firm could help to accept the need for a paradigm shift towards a fully digital ecosystem**.

Since M&As are complex and long-lasting procedures, FinTech innovation could help to enhance the quality of decisions regarding this matter. Namely, one of the most time-consuming processes of an M&A is that of **due diligence**, which incorporates a thorough analysis of the company under acquisition. As usually an enormous amount of documents

should be investigated; FinTech innovation could utilize recent advancements to support this process to provide a real image of the company in a time- and cost-effective manner.

There is one further aspect the authors identify as crucial to provide customers a smoother experience during the usage of financial products. That is the **interpretation of legal matters** in connection with, e.g., loan/insurance contracts. As people are often afraid to or not decided to make the effort of understanding legal texts - or, generally, complicated issues (Kahneman, 2011) -, this fact results in dissuading people from using financial services. The authors do not possess information about possible numbers (but we expect high ratios among less educated people, unfortunately); nonetheless, this could be a severe issue in terms of financial exclusion, a phenomenon investigated in (Salampasis and Mention, 2018).

Even in case of not causing financial exclusion in a high ratio, providing a **better understanding** of the terms and conditions of the given financial product would **increase user experience** by making the process – although not more straightforward – but more transparent. As this procedure would have required an immense investment in human resources, this could not be a viable option without the help of modern technologies.

The main reason why financial service providers need to keep up with new technologies is the fact that **customers tend not to use services they do not feel natural to handle**. Thus, the main goal should be to increase user experience, as it could help to decrease the imbalance that digital solutions have concerning external interactions, as shown in (Magyar Nemzeti Bank, 2020)

3.4. Seeking transparency and secure data handling

After having exploited the advantages of technological developments, customers (private and institutional as well) were forced to **acknowledge the importance of data security and privacy**. Thus, after several drastic data breaches of the last years – such as that of Facebook and Cambridge Analytica (Hern and Pegg, 2018. 07. 11) – it became a top priority for both service providers and users as well.

Fortunately, **regulatory bodies also acknowledged the importance of the topic**. Furthermore, they have acted from two points of view, namely, by enforcing data security and privacy and by increasing transparency during operations. For the above two topics, great examples are the **GDPR** (EU, 2016) and the **PSD2** (EU, 2018) regulations of the European Union. The former

provides a further layer of trust for the customers by requiring guarantees from the service provider for the usage, storage, and processing of user data in a safe manner and with the consent of the customer. The latter, i.e., the Revised Payment Services Directive, ensures access – if certain conditions are met – of financial data for third-party service providers, e.g., for payment initiation or analytics.

An important aspect to note is *“Open Banking in the EU was initially intended to increase competition by severing the link between transaction accounts and payments. Now, Open Banking is shifting from payments initiation to giving customers control over how their banking data is shared.”* (McIntyre, 2020).

As it was shown in (Magyar Nemzeti Bank, 2020), the tendency of adopting digital innovations is more widespread with respect to internal affairs (e.g., reporting) than concerning external interactions. Therefore, FinTech innovations should focus in the future on interactions between businesses and their customers with higher intensity. From that point of view, the above-mentioned EU regulations, especially PSD2, provides a sound basis in the financial sector.

As **interfaces** (APIs, Application Programming Interfaces) **are opened** to provide customer data to third-party companies with a license in a standardized manner, innovators and incumbent participants will have more significant incentives, as solutions developed for a specific partner will be interoperable in case of other institutions as well. In PSD2, two categories are defined, **Account Information Service (AIS)** and **Payment Initiation Service (PIS)**, these categories show the possible directions of Fintech solutions. I.e., the regulatory environment is capable of integrating account data analytics and even payment services by third-party companies into the traditional banking system.

To state the high synergies within possible innovation directions, regulations promoting safe and secure data access also contribute to a more unified landscape in the financial industry, given the predefined APIs.

As new opportunities are often accompanied by new threat sources, companies shall react in time to **prevent malicious attempts** aiming to intervene in the operation of the system. The risk is significant, as the financial sector occupies a critical role in modern societies. Thus, defensive strategies against cybercriminals is a must (Magyar Nemzeti Bank, 2020; Accenture,

2020). Nonetheless, providing data security does not necessarily turn out to be sufficient in every case, for every provider.

Another aspect is the **anonymization of the available data**, first of all, in the case when data analytics is outsourced. On the other hand, innovative solutions in this field are also required for the development of efficient, sector-wide strategies, e.g., for the case of fraud detection or market manipulation. Therefore, if some goal is in the interest of the majority of the market players, the available amount of data could be joined among all actors.

Although the aspect of privacy and data security may seem to be a necessary burden to innovators, it should be acknowledged that this is the key to increase the trust of customers in a significant manner. Furthermore, the tool of cryptography can be considered as one key to the immense amount of data companies collect about users.

4. FinTech innovation

In the previous chapter, we have analyzed present and likely future trends involving financial matters. In this chapter, we will take a more practical approach to show how recent advancements in information technology can transform the financial sector to succeed in innovative solutions.

During that, we will **focus** on the question of **successful application from a business perspective**. Details of how different technological advancements work will only be included as much as necessary.

4.1. Blockchain

In our trends/perspective analysis, we put emphasis on **ensuring the trust of the customers**, which, we are believed, is crucial in providing robust operation. The prerequisite for this is a technical solution ensuring that requests (for payments, withdrawals, contracts) will be **authenticated**.

For this purpose, **distributed solutions** are the most suitable, as if the authentication process is centralized, the system remains vulnerable for attacks of cybercriminals. Besides that, influencing the central authority (e.g., politically) also makes the level of trust quickly diminish.

A possible solution to mitigate the above-mentioned problems is the use of blockchain technology, which relies on a so-called **distributed ledger**. A short overview of how the

technology works is provided in, e.g. (PwC, 2020). In this case, authentication is done by a distributed network of computers. Furthermore, the result of this transaction – if verified – will be appended to the blockchain, which is publicly available. Thus, it is highly resistant to attacks, whereas it is not under the danger of biased moves of a central body.

As the analysis of (Deloitte, 2016) has pointed out, blockchain technologies could provide effective means for **fighting money-laundering** as well. Furthermore, it could help to establish a central user database to eliminate the cost of maintaining multiple – possibly not synchronized – profiles in case certain customers use multiple financial services. Besides that, such kind of information sharing in the form of a distributed ledger system could contribute to **reduce compliance costs** as well (Deloitte, 2016).

Ant Financial, which has received the biggest investment in the world in 2018 with 14.5 billion USD (Magyar Nemzeti Bank, 2020), belongs to the successful applicants of the blockchain technology. As they formulate the essence of the technology and its multipurpose usage: *“Blockchain provides a new trust mechanism to transactions. Over the past two years, Ant Financial has used it to improve the transparency of charities, strengthen the trust of insurance contracts, ensure the authenticity of house rental contracts, and improve the traceability of e-commerce supply chains”* (Qi and Xiao, 2018, p. 67)

Here, we should make a small note, as cryptocurrencies are strictly tied to the blockchain technology; the first practical representative of which was Bitcoin. Nonetheless, blockchain is more general than cryptocurrencies are. As pointed out in the presentation of Clement Acri (Ancrì, 2016), blockchain can be facilitated to decrease the role of intermediaries in the exchange of financial assets – thus, for clearing. Thus, blockchain could be a possible answer for a worldwide (or national) **multilateral clearing system**, as it satisfies the requirements of transparency, robustness – efficiency is a factor companies - e.g., Ant Financial (Qi and Xiao, 2018) - are currently working towards.

Although there were initiatives regarding the introduction of blockchain-based digital currencies, such as the Libra of Facebook, they were concerns that need to be investigated (Magyar Nemzeti Bank, 2020). The market situation is well described by the analysis of the report compiled for Accenture, and also published in the online version of Forbes: *“Despite aggressive boosterism, digital currencies remain a sideshow in mainstream financial services, functioning mostly as a speculative asset class. Stable coins might have a moment in the sun*

as a settlement mechanism for cross-border transactions, but widespread adoption of digital currencies is still tiny. 2020 could change that.” (McIntyre, 2020)

The same report states that the People’s Bank of China is close to introducing their own, centrally managed currency. Even though it would bear the advantage of being able to be cleared immediately, it would short-circuit the role of commercial banks, which may fit the policy of China; nevertheless, it seems not to be suitable for other countries. Still, there are experiments with the introduction of central bank-issued digital currencies, such as that of the e-krona of Sweden (Fulton, 2020. 02. 20).

Thus, blockchain could turn out to be the basis of trust in the near future, while it can transform current financial systems to more robust ones. Therefore, FinTech companies should strive for developing ideas for a **scalable, robust, and standardized, industrial-grade blockchain solution**, as it would be the most straightforward means to promote its use in (not only) the financial sector.

4.2. Artificial Intelligence solutions

Studies are consistently pointing out the vital role of **artificial intelligence (AI)** concerning FinTech innovation (Accenture, 2020; PwC, 2020), as recent advancements in the field have led to **near-human** or, in some cases, even **superhuman performance**. As shown in (Qi and Xiao, 2018), with the help of AI, it is possible – among others - to build an impressive product portfolio. Therefore, it is essential to understand the critical aspects of this technology to be able to integrate AI-driven solutions into a financial enterprise.

4.2.1. Explainability

Before diving into the details of specific technological solutions, one aspect needs to be addressed, namely, that of **explainability**. The reason for this topic is the natural desire of both customers and service providers to **understand the arguments in favor of or against a decision**. Humanity has often difficulties with relying on solutions not well understood. To answer this question, the field of XAI (Explainable AI) was founded and is in the focus of intense research interest (Gunning, 2017).

The main goal of XAI is to develop automated, **intelligent solutions able to provide reasoning that is interpretable for humans** as well. Thus, XAI-based decisions **could be relied on even in case of risky decisions**, when a large number of assets or lives are considered (such as in

finance, autonomous driving, or healthcare) – as they could be checked based on their “arguments,” i.e., the factors XAI solutions have determined to use for formulating a specific decision. Thus, decision-makers can understand and personally assess the consequences of a decision suggested by an XAI system.

4.2.2. Algorithmic trading

Nonetheless, there are cases where performance is preferred to explainability – however, this is the decision of a given company. For example, in the case of **algorithmic trading**, and especially in the case of HFT (high-frequency trading), speed and prediction accuracy matter. Although technology is far from perfect, recent years experienced significant improvements. E.g., the authors of (Sirignano and Cont, 2018) have shown that some kind of **universal features can be extracted from stock price movement** with the help of deep neural networks. The main takeaway of this result is that it is utmost possible that FinTech companies will develop such AI-driven trading solutions, which can be generally applied.

This approach has been **extended to limit order books** as well; furthermore, some authors considered only historical data and neglected economic indicators to provide an **end-to-end AI-solution** (Niño *et al.*, 2019; Nousi *et al.*, 2019; Sirignano, 2018). However, these models were trained to predict future price movements without interaction with the stock market.

Nonetheless, **interaction is also possible** by utilizing a specific branch of AI, namely, that of **reinforcement learning**. As shown in (Deng *et al.*, 2016), an agent can learn from experience during interaction with the stock market. As real interaction could result in severe losses, either **simulator** environments could be used, or the fact could be utilized that if trading volumes generated by the algorithm do not represent a significant market power, then historical data can also be used (as the decisions of the agent will not influence market prices). This is an essential aspect for the successful training of such solutions, as the **training process** itself **requires an enormous amount of data** - but only historical data is present in such high volumes. Nevertheless, simulated environments could be utilized to finetune reinforcement learning models.

4.2.3. Leveraging natural language

The other key aspect for utilizing AI technologies is that of natural language-related tasks - also known as natural language processing (NLP) -, including, e.g., question answering, neural

machine translation, or conversational AI. One main characteristic of those solutions – such as chatbots, the use of which is not unprecedented in financial institutions, e.g., refer to (Okuda and Shoda, 2018) – is generally that they require a large corpus with text examples in the given domain.

Therefore, creating a successful (and hopefully, general-purpose regarding financial matters) service would require a significant investment in the preparation (data acquisition, labeling, imputation) phase. **Transfer learning** (the process of training a neural network in a similar task with a large amount of accessible data and then only finetuning it with a smaller amount of task-specific information) could be an option. However, still, data collection cannot be spared (thousands of entries are required even in this case for every task).

This clearly has provided a **bottleneck** for wide-range applicability, until the end of May 2020, when OpenAI has released their newest results in the field of NLP: the model called **GPT-3** (Brown *et al.*, 2020), which consist of 175 billion parameters – an unprecedentedly high number. Thus, it has very peculiar capabilities as well. The authors have shown that neural language models act as so-called **few-shot learners**. I.e., it is possible that – after training with an immense amount of data as in case of transfer learning – **the model is capable of doing tasks not related to the training data, even after providing it with a few (sometimes only one or even zero) examples**. Thus, in this case, there is no finetuning in the transfer learning sense, as there are no hundreds or thousands of data items fed into the neural network, just a few. Henceforth, it opens up a new range of possibilities; however, as GPT-3 was trained to be quite general, it should be specialized to reduce parameter numbers - and, thus, operational costs – to have a scalable model.

Accomplishing these finetunings and operational optimizations mentioned above (model specialization to the financial domain, reducing parameter numbers for the more specific tasks, speeding up the computation process), FinTech companies should be able to revolutionize the customer service of financial institutions. Even, it seems possible to use language models like (a smaller, more specific version of) GPT-3 to provide explanations, further details about legal matters, terms and conditions to customers. The main advantage of the model family of few-shot learners is the fact that it can **generalize to multiple tasks**, which can be exploited by FinTech companies in the following way: by using GPT-3-like models as a platform to glue together other intelligent solutions.

For example, **recommender systems** (Aggarwal and others, 2016) – learning systems capable of learning user behavior and recommending products/services based on personal traits – can be invoked automatically by an AI-driven customer service agent during a conversation (written or oral) with a customer. This was not impossible before as well (if the agent was provided enough data to react to questions like “Could you recommend me a ...?”), but as the needs of customers could be particular, the capability of few-shot learner models are invaluable, as generalization comes almost out-of-the-box. This way, recommender systems could be leveraged in suggesting personalized insurance policies (based on sensory data the user provides) or even savings portfolios.

Furthermore, as recommender systems are capable of incorporating the main traits of user behavior, they also could be utilized as automated and intelligent advisors in case of financial decision making. For example, portfolio managers – who need to follow both company policies and regulations – could profit from getting input from recommender systems, as the artificial intelligence behind could help to catch important points wr.t. a given policy before initiating deals.

4.2.4. Anonymization by AI

Thus, the technology is available – to a given performance level – for being deployed, and to make the user experience smoother by providing quick response and ease of use. Nonetheless, AI is even capable of more: recent advancements can also contribute to the anonymization of data. As it was shown in (Feutry *et al.*, 2018), a specific type of deep neural networks (i.e., **adversarial networks**) is **able to learn anonymized representations**. I.e., collected data can be transformed into a latent feature space, which models all the data the model was fed with. Thus, the model is able to generate samples from that feature distribution that have the same statistical properties; nonetheless, they have never existed in the real world.

This approach could turn out to be very **useful** in case of **sharing data** between service providers for cooperation, e.g., with respect to fraud detection – as the **real data would be protected** due to its confidential nature, but **statistical conclusions could be drawn** based on it. The authors are believed that this use case would benefit societies; they hope that regulatory bodies and associations of companies will consider this possibility. This way, they

can utilize their position to fight crime and to get sector-wide insights without negatively affecting privacy.

4.3. Robotic Process Automation

In the case of intelligent solutions, robotic process automation (RPA) is the other domain besides artificial intelligence, which is expected to gain market share rapidly (Magyar Nemzeti Bank, 2020; Accenture, 2020). Nonetheless, both solutions intend to decrease the need for human intervention; their essence is somewhat different: **whereas AI usually interacts with data** collected by and stored by the given company **without any user interface**, **RPA solutions mimic human behavior using the interface humans do** (van der Aalst *et al.*, 2018).

Despite (or even because of) this significant difference, robotic process automation could be of great advantage for several companies. Namely, **RPA targets tasks where traditional process automation** (solely rule-based, with no stochasticity and with seldom-occurring exceptions) **is not feasible**; nonetheless, the frequency of the task is high enough to consider some sort of automatized procedure (van der Aalst *et al.*, 2018). As the authors of (van der Aalst *et al.*, 2018) argue, the distribution of the tasks for positioning RPA follows a Pareto-distribution with a long tail.

In this case, the partition in the middle is of the highest interest for RPA solutions, as in that case, developing traditional automation would not be feasible, but there is a need from the side of companies to develop solutions for those tasks, as they occur frequently enough; thus, they require an enormous investment of human resources. A good overview is provided in (Asatiani and Penttinen, 2016), which highlights the main aspect of the probable future success of RPA. Namely, **in contrast to Enterprise Resource Planning (ERP) software**, the integration of which could last several months or even more than one year, **RPA is much faster to integrate**. The reason for this is the fact that by modeling human behavior, no APIs need to be provided for the robot agent, as it utilizes technologies like screen scraping (and predefined rules to a certain extent as well) to collect the required information to interact with a given software.

As several studies have pointed out (Geyer-Klingenberg *et al.*, 2018; Moffitt *et al.*, 2018), standardization of data should be strived for, as it would further ease the integration of multiple RPA agents. Furthermore, while the robotic agent makes its decision, it is also highly

desired to have a standardized format (e.g., for reports the agent interacts with). Nonetheless, as no technology exists on its own, it is utmost possible that other modern technologies such as AI are applied (or invoked) by the RPA agent to mitigate data inconsistencies.

Although there will be tasks where RPA will be found to be the optimal solution for; nevertheless, introducing RPA has advantages pointing beyond its scope. Namely, introducing RPA could provide an advantage for the company to strengthen its market share or to conquer new markets or segments. Furthermore, it **would serve as the anteroom for more sophisticated technological solutions** such as end-to-end artificial intelligence, the integration of which inevitably takes more time, but could provide further competitive advantages and cost savings.

From a decision-makers' point of view, RPA shall be viewed as a further **means to reduce repetitive** work done by humans; and, thus, an **opportunity to widen the scope of business** with or to emphasize tasks where human expertise and creativity are required. The further aspects, new technologies may have, are discussed among others in (Mendling *et al.*, 2018). If we investigate the current landscape, it turns out that RPA could also be successfully applied in auditing (Moffitt *et al.*, 2018) as well, which could also ease the financial decision-making process.

As shown in this section, RPA has enormous potential for FinTech companies, as by developing such solutions, several tasks can be automated, and a favorable environment can be set up for the long-term as well, by preparing the infrastructure for the integration of more complex technologies, whereas also ensuring temporal advantages compared to other companies, given the short integration time of RPA agents.

4.4. Further considerations

Before concluding this work, a further aspect needs to be addressed in the form of a short remark, since **success in terms of innovation includes that implementation, deployment, and operation is successful as well**. For that, the business model should be chosen with great care, as it can accelerate but also decelerate growth.

Regarding selecting business models, (Asatiani and Penttinen, 2016) provides a comprehensive comparison in Table 2 of the cited reference, in that case, for RPA, although the idea is quite general. As making an optimal decision is essential for success, the target

customer segment should be analyzed thoroughly (for that, intelligent solutions could also be utilized). In this case, the analysis preceding the choice of business model should consider following aspects, among others: the current market situation, the needs and requirements of users, the expected length of service provider-customer cooperation, competitors, and regulation as well - as those influence how aggressively a company should enter a specific segment.

5. Conclusion

In our analysis, we have shown the effect of COVID-19 on the financial industries, whereas we were arguing in favor of the fact that the coronavirus pandemic is providing acceleration to the adaptation process of FinTech innovations. Nonetheless, it cannot be thought of as a starting point, for forces were in the movement already before the COVID-19 outbreak.

After having provided a contextual overview of the direct effects of the pandemics regarding monetary, fiscal, and societal aspects, we have turned towards analyzing the current and possible future trends which can drive FinTech innovation. We identified it as an essential point that what people need and what they want sometimes differ; thus, companies should carry out a thorough analysis before investing in the development of a particular technology or service. Nevertheless, providing simple, transparent, and secure solutions for financial matters belong to the primary target both for business and private customers.

To support and to enable the realization of products fulfilling the above-mentioned goals, several technological solutions were discussed. Among the many, we identified blockchain as the main enabler for providing secure and transparent transactions and privacy solutions. Whereas, according to our analysis, artificial intelligence and robotic process automation will turn out to be the proper toolbox for addressing the simplification, automatization, and personalization in the financial branch.

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DÉKÁN

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**Budapesti Műszaki és Gazdaságtudományi Egyetem
Gazdaság- és Társadalomtudományi Kar**

4/2020. (V. 05.) számú Dékáni Utasítás

MNB-BME kiválósági ösztöndíj felhívás

Hatályba lépés napja: **2020. május 05. napján**

A hatályba lépéssel egyidejűleg hatályon kívül helyezett szervezetszabályozó eszköz(ök) módosítások nyomon követéséhez: --

Felülvizsgálat:

⇒ szakmai megfelelés: **Gazdaság- és Társadalomtudományi Kar dékánja**

⇒ jogi megfelelés: **Jogi Igazgatóság**

Felelős: **Dr. Koltai Tamás dékán**

Kiadmányozó: **Dr. Koltai Tamás dékán**





DÉKÁN

PÁLYÁZATI FELHÍVÁS

1. AZ OKOSVÁROSOK ÉS A FENNTARTHATÓ ÉLETMÓD

**2. PLATFORMGAZDASÁG: MESTERSÉGES
INTELLIGENCIA, ROBOTIKA ÉS ZÖLD
TECHNOLÓGIÁK**

**3. FINTECH A KORONAVÍRUS UTÁN – A PÉNZÜGYI
SZOLGÁLTATÁSOK TECHNOLÓGIÁJÁNAK JÖVŐJE?**

**4. ZÖLD PÉNZÜGYI KÉRDÉSEK: KÖZÉPPONTBAN A
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**KUTATÁSI VERSENYRE ÉS KIVÁLÓSÁGI
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**A MAGYAR NEMZETI BANK ÉS A BME
EGYÜTTMŰKÖDÉSE KERETÉBEN**

a BME Térítési és Juttatási Szabályzat 37. § alapján





PÁLYÁZATI FELHÍVÁS

1. AZ OKOSVÁROSOK ÉS A FENNTARTHATÓ ÉLETMÓD
2. PLATFORMGAZDASÁG: MESTERSÉGES INTELLIGENCIA, ROBOTIKA ÉS ZÖLD TECHNOLOGIÁK
3. FIN-TECH A KORONAVÍRUS UTÁN – A PÉNZÜGYI SZOLGÁLTATÁSOK TECHNOLOGIÁJÁNAK JÖVŐJE
4. ZÖLD PÉNZÜGYI KÉRDÉSEK: KÖZÉPPONTBAN A ZÖLD FINANSZÍROZÁSI MÓDOK

A Budapesti Műszaki és Gazdaságtudományi Egyetem (a továbbiakban: **BME**) a nemzeti felsőoktatásról szóló 2011. évi CCIV. törvény 85/C. § d) pontja, valamint a BME Térítési és Juttatási Szabályzat 37. §-ában adott felhatalmazás alapján – a BME és a Magyar Nemzeti Bank (a továbbiakban: **MNB**) közötti együttműködés keretében – a felhívás szerinti fenti négy témakörben kutatási versenyt és ehhez kapcsolódóan egyetemi ösztöndíj pályázatot (a továbbiakban együtt: **Pályázat**) hirdet az alábbiak szerint:

I. A Pályázat célja

A BME és az MNB közös célja, hogy ösztönözze a BME hallgatóit a pénz jövőjével kapcsolatos, világszerte folyó közgazdasági kutatások megismerésére, továbbgondolására, illetve saját kutatásuk megkezdésére, szakmai véleményük megfogalmazására, továbbá elismerje ezen erőfeszítéseiket.

II. A kutatási témák

A Pályázat által támogatott kutatási témák és az azokban érinthető – teljesség igénye nélkül vázolt – kérdéskörök az alábbiak:

1. AZ OKOSVÁROSOK ÉS A FENNTARTHATÓ ÉLETMÓD

Az intelligens technológiák terjedése átalakítja a városi életet is. Az okosváros egyszerre jelenti az ott élő okos embereket, a mindenhol jelen levő digitális eszközöket, intelligens technológiákat, az információkezelés új technikáit, egy új, teljesen integrált, ezer szálon összekapcsolódó adatinfrastruktúra kialakítását, az új, a részvételen, bevonódáson, befogadáson alapuló gazdaság- és társadalomszervezési elvek megjelenését, elterjedését, a gazdasági és társadalmi folyamatokkal kapcsolatos fenntarthatósági elvárások érvényesítését. Az okosvárosok felokosítják az anyag-, energia- és információszállító csatornákat, infrastruktúrákat, a város földrajzi és épített környezetét, a város lakói közti interakciók és tranzakciók bonyolult és szerteágazó rendszerét.





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Várjuk azokat az elemzéseket, ötleteket, javaslatokat, terveket, amelyek városaink okosabbá, élhetőbbé, fenntarthatóbbá válását segíthetik.

Hogyan lehet az okos emberek városává tenni az okosvárosokat? Milyen részvételi technikákkal, milyen döntéselőkészítési módszerekkel, döntési mechanizmusokkal lehet biztosítani az okos kormányzás megvalósulását. Hogyan lehet a városok közlekedési rendszereit okosabbá tenni, mik lehetnek az okos mobilitás technikái? Hol, mit, hogyan kell megváltoztatni a városon belül és kívül, hogy a városi környezetünk élhetőbbé, fenntarthatóbbá váljanak, a városban lakók életminősége javuljon? Mit tehetünk az okos, fenntartható gazdaság érdekében? Hogyan mérhető „forintban” mindezek haszna, hogy beruházási döntéseket tervezhessünk?

Mivel tehetjük élhetőbbé, lakhatóbbá otthonainkat, szórakozási, közlekedési, munkavégzési tereinket, épületeinket, és a mindezeket kiszolgáló technikai rendszereinket?

2. PLATFORMGAZDASÁG: MESTERSÉGES INTELLIGENCIA, ROBOTIKA ÉS ZÖLD TECHNOLOGIÁK

A platform üzleti modellt a közgazdaságtanban gyakran kétoldali piacnak vagy kétoldali hálózatnak nevezik. A világ 100 legnagyobb vállalatából 60 bevételeinek túlnyomó részét platformhálózatok működtetéséből realizálja; a platformok tőkeértéke globálisan több mint 4000 Mrd dollár. A platform alapú innovációs stratégia kihasználja az IKT fejlődési dinamikáját azzal, hogy nem kész megoldásokat, hanem azok kidolgozását lehetővé tevő felhasználói és fejlesztői környezetet teremt, kihasználva ezzel a szereplők aktivitását, kezdeményezőképességét.

Az ipari platformok kutatási kérdései közül a következők a legjelentősebbek gazdasági és társadalmi szempontból: a) a B2B és B2C piacok összekapcsolásának vizsgálata, b) kereslet-kínálat összekapcsolása a platform szereplői között, az ún. üzleti ökoszisztéma optimalizálása, c) komplex hálózati hatások vizsgálata a kétoldalú piacok rendszerében. Elemzéseket várunk a digitális transzformáció hatására (mesterséges intelligencia, robotika) létrejött pénzügyi innovációk vizsgálatával kapcsolatban, mint például a közösségi finanszírozás, crowdfunding, vagy a blokklánc (blockchain) technológia hatása.

Ebben a témakörben várjuk azokat az eseteket és a hozzájuk kapcsolódó tudományos igényességgel bemutatott elemzéseket, amelyek a platformtechnológiák szerepét és lehetőségeit mutatják be a zöld innovációk és termékek bevezetésében, illetve gazdaságos működtetésében.

3. FINTECH A KORONAVÍRUS UTÁN – A PÉNZÜGYI SZOLGÁLTATÁSOK TECHNOLÓGIÁJÁNAK JÖVŐJE

Abban minden közgazdász egyetért, hogy a koronavírus lefutása után más világ lesz, de abban szélsőségesen eltérnek, hogy mi fogja dominálni ezt az új globális helyzetet. Az elmúlt hónapok karanténja világossá tette, hogy a korszerű információtechnológia alkalmazásának igénye





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felgyorsul, különösen az ún. „érintésmentes megoldások” jelentősége megnő. A szakértők egyetértének abban, hogy a „FinTech” hatása a járványt megelőző várakozásoknál sokkal jelentősebb lesz a pénzügyi szektorra, annak szereplőire, kiemelten a végfelhasználói igények vonatkozásában. A bankok érzékenysége dominánsabb lesz az innovatív fizetési megoldások kihívásaira, illetve az azokra adandó alternatív stratégiák kidolgozására.

Felhívásunkban ebben az új kontextusban várjuk olyan tanulmányok benyújtását, amelyek a digitalizáció hatását és lehetőségeit elemzik a személyes pénzügyek kezelésében vagy a pénzügyi szektorban használt döntéshozatal támogatásában. Kiemelten olyan dolgozatokat várunk, amelyek áttekintik az innovatív fizetési megoldásokat, a robotizált folyamatautomatizációt (Robotic Process Automization - RPA) vagy a felhő technológia releváns területeit. Benyújtható természetesen a gépi tanulási vagy BigData elemzési módszerek technológiája és szerepe a pénzügyi döntéshozatalban, az árazásban és a kockázatkezelésben.

Fontos ugyanakkor az a kritérium, hogy a tanulmányok lépjenek túl a technológia működésének bemutatásán, és térjenek ki azok üzleti vonatkozásaira is, mutassák meg a FinTech ökoszisztéma szereplőit, hogyan alkalmazzák, vezetik be, illetve vihetik sikerre az ezekre épülő új üzleti modelleket. Kimondottan keressük ebben a vonatkozásban a sikeres FinTech innováció lehetséges irányait.

4. ZÖLD PÉNZÜGYI KÉRDÉSEK: KÖZÉPPONTBAN A ZÖLD FINANSZÍROZÁSI MÓDOK

A fenntartható fejlődés koncepciója a vállalati gazdálkodás és pénzügyek számos területén megjelent az utóbbi évtizedekben. Egyre több vállalat veszi figyelembe a környezeti és a társadalmi szempontú felelősséget a projektértékelési folyamataiban, így a beruházásaiban. Megjelentek a „zöld” vagy társadalmilag felelős befektetési alapok, fenntartható bankok, biztosítók, sőt a fenntarthatóság mellé álló kockázati tőkések is. Ezek a fenntarthatósági alapelvek pénz- és tőkepiaci penetrációját jelzi.

Felhívásunk a hagyományos pénzügyi szektor fő szereplőinél (jegybankok, kereskedelmi bankok, biztosítók, alapkezelők és más tőkepiaci intézmények) a fenntarthatósági szempontok megjelenésének bemutatására, mérésére, szabályozására irányul. A pályázatok irányulhatnak általános tendenciákra, egyes pénzügyi szektorokra, vagy akár speciális termékekre, de különösen bátorítjuk azokat a pályázatokat, melyek valamilyen újszerű, innovatív, még akár kiforratlan, de potenciálisan Magyarországon is meghonosítható pénzügyi megoldásokat elemeznek

III. A pályázat benyújtására jogosultak köre





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Pályázatot nyújthat be valamennyi, a 2019/2020. tanév 2. (tavaszi) félévében a BME bármely Karának teljes idejű vagy részdíjs alap-, mester-, osztatlan képzésében részt vevő aktív hallgatói jogviszonnyal rendelkező hallgatója (a továbbiakban: **Pályázó**). Pályázatot nyújthat be az a hallgató is, aki a 2019/2020. tanév 2. (tavaszi) félévében kezdi meg tanulmányait a BME bármely, korábban megjelölt szakán.

IV. A pályázat feltételei

Egy Pályázó témakörönként egy tanulmányt (a továbbiakban: **Pályamű**) nyújthat be. A pályázati felhívás nem zárja ki a közös művek benyújtását. A pályázati felhívásra nem nyújtható be olyan Pályamű, amely más pályázati felhívásra az e pályázati felhívásban megjelölt pályázati határidő lejártát megelőzően már benyújtásra került.

V. A pályázaton elnyerhető ösztöndíj

A Pályázatra annak előírásainak megfelelő Pályaművet benyújtók a BME Térítési és Juttatási Szabályzat (a továbbiakban: TJSZ) 37. § szerinti ösztöndíjra jogosultak az alábbiak szerint:

- a) A Pályázat tartalmi, formai és minőségi előírásainak megfelelő Pályaművet benyújtók pályaművenként egyszeri, 50.000 Ft összegű kiválósági ösztöndíjban részesülnek.
- b) Az a) pontban megjelölt díjazástól eltérően, a Bíráló Bizottság döntése alapján az egyes kutatási témákban benyújtott pályaművek az alábbi egyszeri díjazásban részesülhetnek:
 1. helyezett 500.000 Ft
 2. helyezett 350.000 Ft
 3. helyezett 250.000 Ft
- c) Közös mű esetén a pályázat benyújtásakor nyilatkozni kell arról, hogy a szerzők milyen szerzőségi arányban vesznek részt a pályázatban. Amennyiben nem tesznek nyilatkozatot, szerzőségük egyenlő arányban kerül megállapításra, és az a), illetve b) pont szerinti díjazás egyenlő arányban megosztásra kerül a Pályázatban megjelölt társszerzők között.
- d) Kiíró fenntartja a jogot, hogy a pályaművek minőségére tekintettel bármely helyezést ne ítéljen oda.

Kutatási témánként a helyezettek lehetőséget kaphatnak publikálásra, szükség szerint átdolgozás után.

A pontozás során a bírálók az alábbi szempontokat veszik figyelembe:

- A versenydolgozat koncepciója, téma, célok kijelölése





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- A vizsgált probléma elméleti, szakmai megalapozása, a szakirodalom feldolgozása
- Alkalmazott elméleti vizsgálati módszerek
- A versenydolgozat eredményei, teljesség, eredetiség, gyakorlati alkalmazhatóság
- Alakítás, stílus, nyelvezet

VI. A Pályázat benyújtása, a pályázat érvényessége

A Pályázat benyújtásának határideje: **2020. június 14. 23:59 óra.**

Pályázni a jelentkezési lap és a Pályamű alábbiak szerinti elkészítésével és kizárólag a Neptun rendszerben történő benyújtásával lehet, a Pályázat benyújtása késedelmesen, hiányosan vagy formailag hibás módon érvénytelen. Hiánypótlásra csak a pályázat benyújtásának határidejéig van lehetőség

Kizáró okok:

- Nem vehet részt a versenyen az a III. pontban meghatározott pályázati feltételeknek egyébként megfelelő hallgató, aki az MNB-vel munkavégzésre irányuló jogviszonyban áll. Ennek ellenőrzése céljából Pályázó a pályamű benyújtásával hozzájárulását adja, hogy neve, születési helye és ideje megküldésre kerüljön az MNB számára.
- Kizárásra kerül az a Pályázó, aki ugyanazon témakörben több tanulmányt nyújtott be.
- Kizárásra kerül az a pályamű, amelyben a VII. pontban pályázati követelményként megfogalmazott bármely, tartalmi vagy érdemi formai elem hiányzik, illetve hibás.
- Kizárásra kerülnek azon pályaművek, amelyek olyan közös munka keretében készültek el, amelyekről a Pályázó, illetve Pályázók nem nyilatkoztak a pályázat benyújtásakor a kötelezően beadandó pályázati nyilatkozaton.
- A pályaművek szoftveres plágiumvizsgálaton is átesnek, a plagizáló pályamunka automatikusan kizárásra kerül.
- Nem a meghatározott témakörben benyújtott pályamű nem díjazható.

A Pályázó a Pályaműve feltöltésével benyújtásával kötelezettséget vállal arra, hogy az MNB erre irányuló felhívására felhasználási szerződést kössön a pályamű vonatkozásában. A felhasználási szerződés alapján a Pályázó csapat valamennyi tagja a pályamű tekintetében az MNB számára a szerzői jogról szóló 1999. évi LXXVI. törvény (Szt.) 17. §-ában meghatározott módokon történő felhasználásra határozatlan időtartamra szóló, nem kizárólagos, harmadik személynek átengedhető felhasználási jogot enged, azzal, hogy a Pályázó a pályaművét részben vagy egészben a szakdolgozatához és bármely más publikációjához felhasználhatja, átdolgozhatja és nyilvánosságra hozhatja. Amennyiben a pályamű más szellemi tulajdonjogi oltalomra (különösen szabadalmi, formatervezési, használatminta-oltalomra) is alkalmas lehet, az annak az oltalomnak az MNB javára történő megszerzéséhez szükséges jogokat a Pályázók a pályázat benyújtásával szintén biztosítják az MNB számára. E felhasználási engedély alapján az MNB jogosult különösen





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arra, hogy ellenszolgáltatási és/vagy tájékoztatási kötelezettség nélkül a pályaművet részben vagy egészben felhasználja, átdolgozza, többszörözze, internetes felületén, valamint saját kiadványaiban a szerzők nevének feltüntetése mellett nyilvánosságra hozza, terjessze, vagy ezeket harmadik személyekkel végeztesse el.

VII. A Pályaműre vonatkozó tartalmi és formai követelmények

A Pályamű témájának meg kell felelnie a II. pontban meghatározott témakörök egyikének.

A Pályamű nyelve magyar vagy angol lehet, két nyelv vegyes használata nem engedélyezett a hivatkozások, idézetek és forrásmegjelölés kivételével.

A Pályamű A4-es formátumú, a margók mérete egységesen 2,5 cm.

A borítón a szerző(k) nevét, szakját, a beadás tanulmányi félévét és a pályamű címét 14-es betűmérettel, Calibri betűtípussal kell feltüntetni, középre rendezve.

A Pályamű terjedelme legalább 20 oldal, amelybe beleszámít a minimum 800, maximum 1000 karakter terjedelmű absztrakt. A dolgozat főszövegében ábrák elhelyezésére nincs lehetőség, az ábrák elhelyezése a 20 oldal terjedelmen felül, külön mellékletben lehetséges.

A Pályamű 12-es betűméretű, Calibri típusú betűkkel, 6pt térközzel és 1,5 sorközzel, sorkizártan, .pdf vagy .doc / .docx formátumokban nyújthatóak be.

Oldalszámozás a lap aljára, külső oldalra kerüljön. A számozás a bevezetéssel, az 1. oldalszámmal kezdődik.

A Pályaműnek legalább 10 szakirodalmi forrásra kell hivatkoznia, ebből összesen legalább 5 forrásnak nemzetközinek kell lennie a Harvardi hivatkozási rendszernek megfelelően. Kizárólag Harvard hivatkozási forma elfogadott, egyéb hivatkozási forma nem. Nemzetközi szakirodalomnak számít minden idegen nyelven szerzett mű (magyar és külföldi szerzőktől egyaránt), ide nem értve azokat a műveket, amelyek azonos szerzőktől azonos tartalommal magyarul is elérhetők (pl. olyan könyvek, amelyeket a szerzők több nyelven is kiadtak és azok közül van magyar nyelvű).

A Pályamű javasolt felépítése a következő: borító, tartalomjegyzék oldalszámokat tartalmazva, táblázatok jegyzéke (amennyiben táblázat szerepel a dolgozatban), ábrák jegyzéke (amennyiben ábra szerepel a dolgozatban), absztrakt, bevezetés, főszöveg, összefoglalás, irodalomjegyzék, mellékletek, ábrák (amennyiben ábrát tartalmaz a dolgozat). A Pályamű bevezetésének, főszövegének és összefoglalásának jól elkülöníthetőnek kell lennie, továbbá a főszövegnek legalább a terjedelem 90 százalékát kell adnia.

A főszöveg jól strukturált, a fejezetek élén vastag betűs címek állnak. Az alcímek, fejezetcímek számozása decimális számokkal történjen. (1. Elsőrendű, 1.2. Másodrendű, 1.2.3. Harmadrendű)

A szövegben a tartalmi kiemelést dőlt vagy félkövér betűkkel lehet jelezni. Aláhúzást, más megoldást kiemelésre tilos használni.





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Az ábrákat, táblázatokat számozni és címmel kell ellátni, az adatok forrását az ábra, illetve táblázat alatt fel kell tüntetni. Saját készítésű táblázat és ábra esetén forrásmegjelölés nem szükséges.

A főszöveghez kizárólag táblázatokat lehet használni észszerű mértékben, csak olyan esetben, amennyiben azok szoros kapcsolatba hozhatók a főszöveggel. Amennyiben ilyen összefüggés nincs, vagy terjedelmük indokolja, úgy a táblázatok mellékletbe helyezendők. Ábrák minden esetben csakis a mellékletben helyezhetők el.

VIII. A pályaművek elbírálása, az elbírálás határideje, főbb szempontjai, a pályázati eredményről történő értesítés módja

A pályaműveket kutatási témánként két bíráló értékeli szakmai szempontok alapján. Az általuk adott értékelésekből a kialakított sorrendet a kutatási témánként felállított Szakmai Bizottság alakítja ki. A bírálókat a kutatási téma jellegére tekintettel a GTK dékánja kéri fel a témakörben pályázatot benyújtó hallgatók Karainak oktatói közül.

A kutatási témánként felállított Szakmai Bizottság két tagja a BME oktatója, akiket a GTK dékánja kér fel. A Szakmai Bizottság további tagja az MNB által delegált két szakértő. A Szakmai Bizottság többségi szavazással hoz döntést. Szavazategyenlőség az MNB javaslata a döntő.

A Szakmai Bizottság az alábbiakban meghatározottak szerint dönt:

- a) a Pályázat beadására előírt határidő lejártát követő legfeljebb 15 napon belül kizárja azon pályázókat, akik jelentkezésüket hiányosan vagy határidőn túl nyújtották be, továbbá a VII. pontban megfogalmazott követelmények értelmében formailag és/vagy tartalmilag nem megfelelő tanulmányt nyújtottak be, valamint
- b) dönt a helyezettek kiválasztásáról és sorrendjéről.

A pályázat eredményéről a pályázók a Neptun rendszeren keresztül kapnak értesítést 2020. június 30-ig.

A sikeres pályázóknak az ösztöndíj a jelen pontban meghatározott döntést követően 60 napon belül kerül folyósításra.

IX. Adatvédelem

A Szakmai Bizottság az ösztöndíj pályázatok elbírálásához szükséges adatokat a hatályos adatvédelmi és egyéb jogszabályoknak megfelelően kezeli, a mellékelt adatkezelési tájékoztató szerint. A pályázó a pályázat leadásával beleegyezik a személyes adatai mellékelt tájékoztató szerinti kezelésébe.

X. Jogorvoslat





DÉKÁN

A pályázati eljárás során hozott döntések ellen a BME Térítési és Juttatási Szabályzatban meghatározott eljárásrendben élhet jogorvoslati kérelemmel a hallgató.

XI. Tájékoztatás

A Pályázatról további felvilágosítás Dr. Nemeslaki Andrásról (nemeslaki@finance.bme.hu) illetve Juhász Zsombortól (juhasz.zsombor@finance.bme.hu) kérhető.

Budapest, 2020. május 5.




Dr. Koltai Tamás
dékán





Befejeződött az MNB és a BME által közösen kiírt ösztöndíj pályázatok bírálata



Sikeresen lezárultak a 2019/2020 – as tanév tavaszi félévére, az MNB és a BME együttműködésében kiírt tanulmányi pályázatok. A két meghirdetett ösztöndíjra – „MNB-BME Kutatási pályázat” és a „Kiváló szakdolgozat, diplomamunka és TDK dolgozat”-ra az egyetem összes Karáról érkeztek be pályaművek.

A pályaműveket az Egyetem oktatóiból és az MNB munkatársaiból álló szakmai zsűri bírálta el, amely alapján az alábbi eredmények születtek:

MNB-BME Kutatási pályázat

Okos városok és a fenntartható életmód

1. hely Gyenge Ákos (GPK) – Takács Donát (GPK)
2. hely Czunyi Boglárka Fanni (GTK)
3. hely Barsi Márk (VIK)

Platformgazdaság: mesterséges intelligencia, robotika és zöld technológiák

1. hely Rádóti Balázs (GPK)

2. hely Horner Zoltán (VIK)

.....koronavírus után – A pénzügyi szolgáltatások technológiájának jövője



1. hely Debrecenszki Péter Pál (GTK)
2. hely Juhász Vivien (GTK)
3. hely Reizinger Patrik (VIK)

Zöld pénzügyi kérdések: középpontban a zöld finanszírozási módok

1. hely Stempler Balázs (GTK)
2. hely Ráth André (GPK)
3. hely Pulay Kata (GTK)

Kiváló szakdolgozat, diplomamunka és TDK dolgozat

Digitalizáció, Mesterséges intelligencia és adatkorszak

1. hely Hegyfalvi Csaba (GTK)
2. hely Faragó Bálint (GTK)
3. hely Módos Dávid (TTK)

Különdíj: Tolnai Márk (VIK), Thúróczy Bertalan (VIK), Hajnal Ádám (GTK)

Zöld pénzügyek, zöld gazdaság

1. hely Pap Tímea (GTK)
2. hely Szűcs István (GTK)
3. hely Kertai Ádám (GTK)

Különdíj: Regős Imola (GTK)

Ezúton is gratulálunk a hallgatóknak az elért eredményekhez és eredményes pályázást kívánunk mindenkinek a következő félévre!

Kapcsolódó posztok



július 2, 2020

„DIGITÁLIS KOMPETENCIÁINKAT ERŐSÍTI A TÁVOLLÉTI OKTATÁS”

☐ Tovább



június 8, 2020

Jó gyakorlatok a távoktatásban – BME GTK konferencia beszámoló

☐ Tovább



június 5, 2020

VIRTUÁLIS TUDOMÁNYOS KONFERENCIA AZ ÚNKP KERETÉBEN

☐ Tovább



MUNKATÁRSAINAK

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SZOLGÁLTATÁSOK

Könyvtár

Periodica Polytechnica

Keresés

Keresés

