

Ministry of Education and Science of Ukraine
Sumy State University
Academic and Research Institute
of Business, Economics and Management
Financial Literacy Center

***ASPECTS
OF FINANCIAL LITERACY***

Proceedings
of the International Scientific and Practical
Conference
March 22-23, 2021

Sumy
Sumy State University
2021

Aspects of Financial Literacy

Collection of Studies

Editors: Yuliia Serpeninova, Zsolt Pál, Larysa Hrytsenko

Publisher: **Sumy State University**, Academic and Research Institute of Business, Economics and Management



Published in cooperation with:



This collection of studies is published digitally and is available free of charge.

Sumy, 2021.

ISBN 978-966-657-887-0

330.3:005(063)
S62

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S62 Aspects of Financial Literacy: Proceedings of the International Scientific and Practical Conference, Sumy / edited by Yuliia Serpeninova, Zsolt Pál, Larysa Hrytsenko. – Sumy : Sumy State University, 2021. – 417 p.

Proceedings of the International Scientific and Practical Conference "Aspects of Financial Literacy " are devoted to finding a systemic solution to multidisciplinary problems in the field of modern development, management, administration of various systems, corporate social responsibility, innovation management in various fields of environmental management.

For scientists, scientists, students, graduate students, representatives of business and public organizations and higher education institutions and a wide range of readers.

330.3:005(063)

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Aspects of Financial Literacy – Grable-Lytton risk attitude among Generation Z in Hungary ¹

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Abstract

In our study, we surveyed risk attitudes governing individual investment decisions based on primary research conducted on a large sample size among university students. When surveying risk attitudes, we presented university students studying in Hungary with (some of them) questions of a test published in an international journal article by John Grable and Ruth H. Lytton (Grable – Lytton, 1999). Between early December 2020 and 15 January 2021, more than 2,000 persons filled out our questionnaire. The results of the questionnaire show that risk attitude values among Hungarian university students are in line with international experiences. Primary data collection will continue in the spring of 2021, and it will subsequently allow a comparison to be made between the attitudes to risk and investment of university students from different fields of study. The composition of the questionnaire's respondents will make it possible to survey and compare the 'Z generation's attitude with that of other generations.

Introduction, literature review

The database we created is the summary result of a questionnaire querying more than 2,000 students learning in higher education. Grable and Lytton's test measuring the level of financial risk tolerance

¹ With the support of GINOP-2.2.1-18-2018-0010

assesses the financial risk attitude of respondents by assigning scores. The particularity of our database is that respondents were Hungarian students participating in economics studies. The timeframe for filling out the questionnaire was between December 2020 and January 2021, which allows us to assess the financial literacy of Hungarian economics students during the economic crisis resulting from the coronavirus pandemic.

The questions of our test do not deviate from the questions included in the study referenced above which the co-authors published in 1999. The revised version of the text published in 1999 assessing risk attitude has of course been used subsequently as a foundation for several scientific studies. Professional literature has widely discussed the assessment of risk attitudes and the examination of the drivers behind it. Kuzniak et al (2015) performed a new test of the corrected, revised model based on their primary research, conducting a year-long retrospective review.

Outreville's study published in 2014 examined individual components of risk aversion, risk behavior, and attitudes to insurance segment and services, in a broad system of correlations. Hannah Schildberg-Hörisch's study published in 2018 attempts to find an answer to the overarching question, i.e. how stable in time may risk attitudes and preferences be considered. According to the essence of her study, the general understanding in economics that individuals' risk preferences are stable needs to be revised, as it is more typical, based on her findings, that individuals, following specific life situations, are sometimes more open and sometimes less open to making high-risk decisions. Meanwhile, when assessing financial risk tolerance, considerations must also be made for the role that the so-called biopsychosocial factors and environmental factors play in creating risk attitude (Grable-Joo, 2004). These factors, according to the authors, may include age, gender, race, birth order, self-esteem, personality type, sensation seeking, financial satisfaction on the biopsychosocial

side; and income, net worth, financial literacy, homeownership, educational attainment, family status on the environment side. Only after these factors have fully been surveyed can we establish a stable assessment of financial risk tolerance.

In their work, Magendans et al 2016 examined psychological factors which financial market regulators should pay attention to when assessing risk tolerance. They found that the so-called buffer savings created to cover losses may serve as a starting point for future studies as this was what they associated the highest significance with during their primary research. Another study (Kannadhasan, 2015) looked at retail investors exclusively to determine which factors from the gender, age, marital status, income, occupation, and qualification of the investors may have significance concerning risk tolerance, these factors are very similar to the biopsychosocial and environmental factors presented earlier.

The reviewed literature items we introduced above, therefore, introduce in general the motivations and drivers behind financial risk attitude, and they draw up a general picture by applying statistical analytical methods, descriptive literature review methodology, and behavioral economics paradigm to the question. An expanding literature base indeed means that authors of individual studies only elaborated on some of the sub-questions. Such factors may include national affiliation and gender, social, demographic status, too.

Jianakoplos and Bernasek (2006) examined risk-taking levels on an international sample based on age cohorts, distinguished by year of birth. Lawrenson and Dickason-Koekemoer's study published in 2020, for example, worked out a theoretical model for assessing the specific financial risk tolerance of South-African female investors. The main finding of the study is that male investors are significantly more risk-tolerant than female investors, furthermore, educational attainment

level is also a not insignificant factor that does not depend on biological sex.

National affiliation is another important factor that creates identity in people's lives, this may, of course, impact risk attitude, too. A study carried out on an Egyptian sample called to our attention the significant role played by financial literacy (Shusha, 2017). A study analyzing a Chinese sample looked at how the willingness of individuals to take risks changes in that national medium under the influence of pressure, performance pressure (Li et al, 2015), in that study university students were asked to fill out two tests, titled: Emotion Regulation Questionnaire and the Grable and Lytton Risk Tolerance Scale test. Another co-authored study (Grable et al, 2009) undertook to measure an interesting intercultural risk attitude. It examined the financial management behavior of persons of Korean nationality living in the United States of America. Koreans reached higher, more reliable scores in terms of responsible financial management behavior than Americans. All in all, according to the study, financial knowledge showed a positive correlation with responsible financial behavior, Koreans were better in this respect. The location of the survey and the size of household income did not show a significant correlation with responsible financial behavior. A study by Rodrigues et al (2019) applied the Grable-Lytton test to a Brazilian sample, distinguishing between respondents of a Portuguese or English language background. According to the study, risk attitude is mostly linked to savings- and consumption-related expenses. A study examined Romanian financial risk-taking attitudes during the periods directly preceding and directly following the global financial crisis (Cristian, 2012). The conclusions drawn based on the Romanian sample were the followings: the crisis encouraged every social layer and age group to avoid risks, persons with more in-depth financial knowledge responded more quickly to the crisis, women investors responded to the crisis more swiftly and with greater sensitivity, willingness to take risks decreased with the age.

Several authors assessed risk tolerance explicitly among university students (Gilliam et al. 2010; Hayhoe et al, 2000; Martinez, 2016; Nonis et al, 2015; Ramudzuli – Muzindutsi, 2018). Bayar et al, in their study published in 2020, surveyed the drivers behind individual investment decisions also in a university setting. In that work, demographic, income-related, qualification-related, and socio-cultural factors behind risk attitudes were surveyed in the entire personnel of USAK university.

Our database, which stands out from the literature because of the high number of its respondents, follows this line of literature research.

Grable-Lytton survey results

A total of 1,258 people - from the 18-23 age group - completed the questionnaire, which allows reliable, unbiased conclusions to be drawn. Regarding the gender distribution of the respondents, 693 men (55%) and 566 women (45%) completed it. As for the distribution by place of residence: most (38%) completed the questionnaire from the capital. In second place are cities (32%), followed by county seats (17%) and the smallest group are those living in villages (12%).

Summarizing the responses of Generation Z, the most populous group became those with moderate risk tolerance. Within this, most of those who score 26 points, which is in the second half of the medium-level risk tolerance, are thus closer to the group of those who take a high level of risk than to the group of those with a low and moderate level of risk. (Graph 1.)

There are 271 people in the group of low and moderate risk-takers, and 654 people in the middle level, ie the most populous group. 333 people have higher risk tolerance. 242 of them are high and the remaining 91 people are highlighted as high risk-takers. Based on a percentage distribution, this is as follows: low-rated and measured risk-takers 22

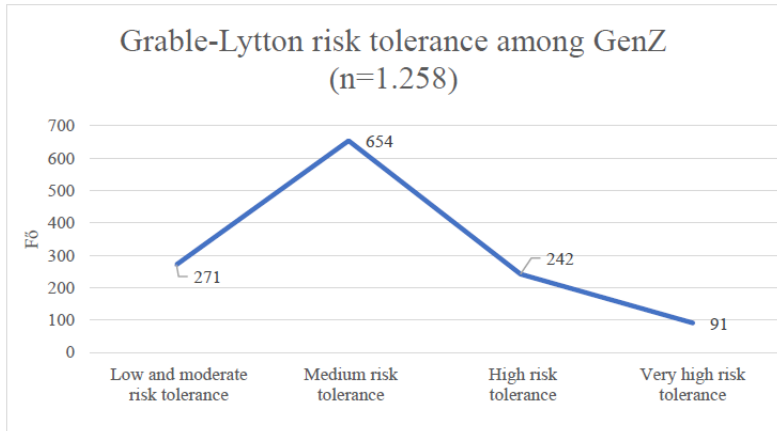
percent, medium-risk takers 52 percent, and those with above-average risk tolerances 26 percent.

Of those who completed the questionnaire, women proved to be much more cautious than men in most cases. This is confirmed by the question of what you mean when you hear the word risk. Here, almost as many men chose the "opportunity" answer (42%) as they had "uncertainty" (47%). In contrast, women were the most likely to receive uncertainty (66%).

Overall, Generation Z in the questionnaire has the highest number of mid-level risk-takers. If the members of the group want to keep their savings in investment forms with the same risk level as the risk tolerance attitude achieved on the G&L scale, stable financial knowledge is important, as this category no longer includes Hungarian government securities and low-risk investment units with stable returns, but also a variety of corporate bonds, stocks, medium and high-risk funds (Pintér – Bélyác, 2005)

The other very populous group is the group of those who take higher risks than moderate risk tolerance. In their case, investment opportunities of a similar level are as follows: high-risk takers: leveraged ETFs, turbo warrants, call options, etc., exceptionally high-risk takers: option call, futures, investment credit, CFD, leveraged currency, etc. These options already require extremely broad and secure financial knowledge.

Based on all this, we could expect that young people have stable financial knowledge, otherwise most of their money and savings will be at risk.



Graph 1: Risk tolerance levels

Source: Survey on Financial Literacy-Financial knowledge-Digital attitude by Pintér, É.-Bagó, P. (2020)

Surprisingly, 45 percent of young people gave themselves a grade of 3 on their financial knowledge and knowledge-based on self-reports, and only 6 percent rated their knowledge as outstanding. Considering gender, it can be said that men are much more confident in their knowledge than women. On the positive side, financial knowledge and experience increase with age.

Another question related to financial knowledge was "Who does / would you give financial advice to?". Of concern is the fact that 65 percent of young people who gave grades one and two to their financial knowledge, give financial advice to others. Of those who rated themselves as mediocre, 78 percent "help" others. And 89 percent of those with higher levels of financial literacy provide financial guidance to others.

It is also surprising that 25 percent of those with the least financial knowledge (grade 1, 2) make their financial decisions independently.

Most of them decide on their finances with their families and few with a bank clerk or financial advisor. Those with higher financial literacy are more likely to make their own decisions and rely less on their families but are more likely to turn to professionals for advice.

We consider it important to examine the values given to the respondents on their financial knowledge and their score on the Grable-Lytton scale, as many things can be deduced from these. In terms of the results, remarkable and unsettling correlations emerge.

Twenty-five percent of those with low-risk tolerance gave themselves four and 4 percent gave themselves five.

For mid-level risk-takers, respondents are distributed as follows: 2 percent gave grade one (inadequate), 17 percent two, 48 percent three, 28 percent four, and 5 percent five.

However, in the case of those who took high and special risks, 2 percent gave grade one, 11 percent gave grade two to their knowledge, and 40 percent rated it as grade three. However, investment opportunities with a similar level of risk would require the consumer to have an even higher level of financial knowledge than a three, otherwise, they are exposed to very high financial risk.

Summary

Research findings indicate that most young people today assume a trade-off between financial literacy and digital attitudes, and very few perceive the need for continuous development in both areas (Pintér, 2017). Not only the transfer of experience to the family and parents, but education and the development of financial culture have and will play a big role shortly. Without it, financial services innovation will not achieve its goal for both banks and consumers.

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Accounting, tax, IT – towards literacy

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Introduction

As a result of the changes in various tax regulations in Hungary, the processing of accounting information has also changed, of course. A new accounting adherence is beginning to emerge, of which IT is an integral part. IT capabilities not only speed up data processing, but also regulate tax behaviour through tax regulations.

Accountants and accounting must also adapt to the changes. A process has begun that holds many dangers and opportunities. Whoever is able to adapt will be given preference. A literacy needs to be developed.

Tax in Hungary

In Hungary, the obligation to provide electronic data has developed significantly over the last 20 years. The possibility of electronic tax filing was first introduced among the TOP100 companies in 2001, and then in 2007 it was extended to all companies. According to the regulations, data providers:

- the employer,
- the payer,
- the employer,
- the public employment organization,
- the church
- the social cooperative,
- employing a vocational school student on the basis of an apprenticeship contract, and
- the Hungarian representative of the foreign employer.

However, this was just the beginning. It came with e-invoicing, e-cash register and online invoicing...

In Hungary, the Online Invoicing Program recommended by the National Tax and Customs Authority will be available to everyone free of charge from July 2018, which will take huge burdens from the shoulders of users and taxpayers, and will also facilitate the work of the tax authority. Thanks to the built-in data reporting automation, the number of compliant taxpayers can also increase, it means significant administrative simplification, and it allows a much more transparent and smooth control process.

E-invoice: An e-invoice is nothing more than an invoice with a content defined by tax law or a simplified invoice issued in electronic form. You must have at least an advanced electronic signature and timestamp.

E-cashdesk: An online cashdesk/cash register is practically a new generation cashdesk/cash register that is capable of an online data connection to the server of the National Tax and Customs Administration and sends the specified data through this data connection on a regular basis.

Online Invoice 1.0: The details of all invoices issued must be reported to the tax authorities. Since 1 July 2018, many taxpayers have been affected by this obligation, as all invoices issued to other domestic taxpayers and the content of the transferred VAT is at least HUF 100,000 must be forwarded to the tax authority.

Online Invoice 2.0: The most significant change is that from 1 July 2020, data on all invoices issued to domestic taxpayers will have to be provided to NAV, and this data will be provided online. The value limit of HUF 100,000 defined in the first version was thus abolished, and the obligation to provide data is independent of the value limit. The obligation even extends to exempt economic operators.

Online Invoice 3.0: Compared to the previous version, the range of stakeholders has expanded, all invoices must be reported to the tax authority. Anyone who has applied the 1.0 or 2.0 scheme so far is required to switch by April 2021. From now on, the tax authority will receive all invoices issued in real time.

Tax versus Accounting

Electronic administration also had an impact on accounting.

The data for each tax return is provided by the accounting system. Due to the structure of tax returns, the structure of accounting databases has also changed and expanded. Due to the online invoicing system, accounting workflows have changed. Electronic data must be received, there is no need to record the data. Because of this, economic events can be recorded almost immediately. The efficiency of accounting information and the quality of reports may increase. Of course, there are also victims of this: several accounting programs are unable to receive data online.

Obviously, IT provided the opportunity. The online world has moved into taxation and accounting. Automations are more controllable. The question is, when will there be IT accountants? Of course, the question is only prosaic, but basic IT knowledge is absolutely necessary to do accounting. In practice, all data is now available in electronic form for accounting. The accountant, on the other hand, needs to be able to manage, import, and export the various databases.

Modern data processing technologies make it possible to expand the physical limitations that arise during the audit, thus, in the case of examinations according to certain aspects, it is even possible to perform comprehensive audits. The digital download of the data included in the system in a specific format is supported by more and more administrative and accounting programs, which primarily want

to meet the criteria of the direct users, so the audit aspects are not the primary ones.

Data export is a service software that can be downloaded from databases programmatically or on an individual basis for unspecified investigations. As a result, data imports can be widespread, serving the purposes of IT and internal audits, as well as independent audits. Auditors can utilize exported data during audit system tests and data testing, and the use of predefined data structures and formats facilitates programmed processing that includes audit considerations.

In addition to specific studies, there are additional benefits to digitizing archiving and conducting studies that may be required afterwards. The systematization and preparation of the received data can lead to results through the joint validation of IT knowledge and auditing aspects.

As for the innovative development of the current accounting information system, the environment is already in place, as it has already been shown above that there are electronic applications that are primarily used to produce accounting information, and their interconnection with the accounting information system should not be a problem.

It is also well known to everyone that the economic events that have occurred must be recorded in an appropriate system in accordance with the accounting regulations and legislation, so that the individual tax returns are prepared based on the data of the accounting information system.

The accounting information system can be connected to all electronic systems quite closely:

- when the e-invoice is issued, the data content of the invoice to be issued can be automatically adapted to the accounting information system, as each data is available for accounting recording when the e-invoice is issued, so they can be transferred between the systems immediately;
- based on the concept of the e-cash register, if the monitoring of cash register movements is solved for the tax authority, then the information necessary for accounting recording is available, so this data can be taken from the e-cash register system immediately, without human intervention and data recording. information system;
- using the data of the accounting documents to be recorded, the data of the given periodic declarations and the values of the data series can be exported from the accounting information system, they can be generated on the basis of the descriptions of the declaration templates, so automatically completed declarations can be made;
- the data file of the accounting information system can be automatically matched taking into account the descriptions of the audit file, ie the general ledger extracts and the complete accounting data of the given period can be exported to the audit programs.

Tax versus Accounting versus IT

The development of IT is not only felt in the case of the online invoicing obligation, but it has also encouraged accounting programs to comply with strong requirements, forcing them to improve. By requiring taxpayers to report all incoming invoices in the VAT return, regardless of the value of VAT, the work of accountants has significantly increased for returns starting in July 2020. Thus, the amount of workload increased depending on the preparedness of the applied IT program.

Basically, there would be no problem, as the database of accounting programs contains all the information needed to perform the data services, however, the accountant as a user may not be able to solve the automated translation of this data into declarations required. This wouldn't even be a big problem, as whichever vendor wants it can solve it in a relatively short amount of time.

However, the tax authority also allowed taxpayers to know the parameters of an online invoice registration technical user to query incoming invoices referring to the taxpayer's tax number. Of course, if this database is available to us, we hardly have to book, that is, we should rather put it in a way that we can book without data recording. This is also important because the data can enter the accounts from a central database to which we have to provide data. As a result, the possibility of error is reduced to almost zero when sending the return and checking it with the tax authority.

At the same time, the online invoicing system has the positive effect that a significant part of the accounting documents, ie their data content, can be available to the accountant even on a daily basis, so there is no need to wait for the client.

Development of Literacy

It is clear that the online invoicing system is leading to an adherence in taxation, accounting and IT. No more invoices found, late receipt. The tax authorities see everything. This allows the accountant to see everything as well, even immediately. This allows the accountant to see everything as well, even immediately. The accountant has a huge opportunity. You get a more complex picture of how the business works, you can better coordinate your tasks. There are no empty times as the data is available. You can keep up with the bookkeeping of businesses, much less time wasted. However, in order to recognize and deal with this, we need to move on, follow the processes, develop our own accounting literacy.

It is time for accountants to be able to control economic processes. We need to develop effective communication with customers, we need to train ourselves. It is necessary not only to develop professionally, but also at the level of communication. We need to be able to talk to customers, we need to be able to help them. The manager manages and the accountant assists in this.

A change of approach is needed so that we can improve processes and make data delivery faster. Companies will be able to respond faster and make decisions more effectively based on the data.

Conclusion

We need an accounting literacy. A reliable and good accountant will be the focus again in the future.

In Hungary, thanks to the regulations, a data concentration is realized that helps not only the tax authority, but also companies.

The opportunity is before us, it just needs to be recognized and used. There are databases available to accountants that greatly assist in data

processing. With the help of these, we can make our work even more efficient. If we want ...

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Self-assessment of financial knowledge in generation Z - What does the mirror show? ²

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Abstract

The study presents a slice of the first results of a questionnaire survey launched in 2020 among students studying in Hungarian higher education. Of the 11 dimensions of research, the study focuses exclusively on the financial knowledge dimension. Breaking with tradition, we did not assess financial knowledge by problem-solving, but based on respondents' self-assessments and compare this with the results of research conducted by others. Among the respondents, we analyzed the responses of the members of the "Z" generation.

Introduction

One of the dimensions of domestic and foreign financial literacy research, which often appears in Hungary under the term "financial culture", is the mapping of the financial knowledge of the studied population. The most common method of research is a questionnaire. Within this, by examining the level of financial problem solving and financial knowledge through open and closed questions, they form an overall picture of the financial knowledge of the

² With the support of GINOP-2.2.1-18-2018-0010

examined population. This method is common practice, but the results have been criticized in many ways.

Our research, launched in 2020, focuses on exploring the complex financial, risk, and digital attitudes of students in Hungarian higher education. One of the 11 dimensions of research is the dimension of financial knowledge. In this context, surveying the financial literacy and financial awareness of the crowd was an unavoidable area. However, unlike the focus of “mainstream” research, we did not focus on controlling objective knowledge. We asked the members of the examined population to evaluate their financial knowledge. As a control for self-assessment, we asked only one fundamental question, which flashed a related segment of financial knowledge and mathematical knowledge.

In the present study, we analyzed the responses received from members of “Generation Z” regarding self-assessment of financial knowledge from questionnaires completed by February 19, 2021.

The knowledge

Many have already asked the question of what knowledge is, but so far there is no acceptable, exact answer to this question. The researchers gave as many definitions as they looked at in context.

According to René Descartes (1992), the foundations of our knowledge we're born with us, man can think logically-rationally. This was one of the basic assumptions of rationalism. Representatives of empiricism, such as John Locke, argued that man acquires his knowledge by studying the outside world through experience.

Mihály Polányi (1994) distinguished two types of knowledge, tacit knowledge and explicit knowledge. Explicit knowledge can be expressed, shared, and easily transferred between individuals. In

contrast, tacit knowledge is invisible, difficult to formalize, and appears in the actions and experiences of individuals. According to him, this tacit knowledge is the basis of all knowledge.

Pedagogy and psychology define knowledge across the cognitive, affective, and psychomotor domains.

A taxonomy was set up and published by Bloom, an American educational researcher and colleagues (1956), who is decisive in the systematization of knowledge. This taxonomy categorized 6 levels of development of knowledge.

A modified version was published by Bloom co-worker Krathwohl in 2002, whose two dimensions are the knowledge and the cognitive process dimension.

Knowledge has thus become an independent dimension, within which four categories have been distinguished:

- „Factual Knowledge – The basic elements that students must know to be acquainted with a discipline or solve problems in it.
- Conceptual Knowledge – The interrelationships among the basic elements within a larger structure that enable them to function together.
- Procedural Knowledge – How to do something methods of inquiry and criteria for using skills, algorithm techniques, and methods.
- Metacognitive Knowledge – Knowledge of cognition in general as well as awareness and knowledge of one’s own cognition.” (Krathwohl, 2002, p.214)

Based on this, a two-dimensional table to help with assessment, called the Taxonomy Table, can be set up.

„The Knowledge dimension would form the vertical axis of the table, whereas the Cognitive Process dimension would form the horizontal axis. The intersections of the knowledge and cognitive process categories would form the cells.” (Krathwohl 2002, p.215)

HIGHER ORDER THINKING SKILLS		
BLOOM'S TAXONOMY	EVALUATION	CREATING
	SYNTHESIS	EVALUATING
	ANALYSIS	ANALYSING
	APPLICATION	APPLYING
	COMPREHENSION	UNDERSTANDING
	KNOWLEDGE	REMEMBERING
LOWER ORDER THINKING SKILLS		
BLOOM'S REVISED TAXONOMY		

Figure 1. Bloom's Taxonomy and Bloom's Revised Taxonomy

Source: (Bloom et al. 1956) , (Krathwohl 2002)

„In combination, the Knowledge and Cognitive Process dimensions form a very useful table, the Taxonomy Table. Using the Table to classify objectives, activities, and assessments provide a

clear, concise, visual representation of a particular course or unit.” (Krathwohl, 2002, p.218)

Financial knowledge

Every field of knowledge, including finance, has its vocabulary, methods, issues, and problems. Anyone who is an expert in a given field of knowledge has acquired a wide range of knowledge in the given field of knowledge and thus has a better understanding of the problems that have arisen there, and finds solutions to it faster. We have seen above what a complex approach to knowledge requires.

„Four process categories have been defined in PISA’s financial literacy domain: identify financial information, analyze information in a financial context, evaluate financial issues and apply financial knowledge and understanding. While the verbs used here bear some resemblance to those in Bloom’s taxonomy of educational objectives (Bloom, 1956), an important distinction is that the processes in the financial literacy construct are not operationalized as a hierarchy of skills.” (PISA 2018, p.142)

Financial knowledge was also defined differently by researchers. In his article, Remund (2010) examined the definition of financial literacy in studies on the subject since 2000. „Knowledge is the most obvious – and most common – component of the many conceptual definitions of financial literacy. To effectively manage money, one must first know something about money.” (Remund 2010, p. 279)

Lusardi (2012) interprets financial knowledge as one of the inputs to financial literacy.

Hungarian research related to financial knowledge also plays a significant role within Hungarian financial literacy research. For

example: Kovács (2018), Németh (2020), Denich (2020), Pintér – Deutsch (2011), Pintér (2004), Deutsch et al (2012) etc.

Measuring knowledge

Not only the concept of knowledge but also its delimitation and measurement has provoked and provoked a lot of debate in professional circles to this day. And in the school system, everyone enriches their own experience of knowledge assessment, thus being able to articulate their pros and cons in this regard. As early as 1964, in his book “How children fail,” and then in 1967, “How children learn,” John Holt also pointed out the contradictions we all experienced and the uncertainties that weighed on assessment.

Regarding the evaluation of knowledge, Frank (2017) highlighted five points in his study,

- evaluation responsibility,
- evaluation his / her contribution to self-image, ie his / her psychological role,
- evaluation confidence,
- evaluation its role in facilitating alignment with stage standards,
- evaluation subjectivity.

We can evaluate knowledge in some kind of benchmarking system. To carry out the evaluation, the evaluator must know what is considered ideal and value in the given system. The full reality of the assessment is still not ensured. It is far from certain that the acquired “inner knowledge” becomes a measurable, evaluable “external knowledge” in a given assessment situation. In addition to the above, the complexity of the evaluation situation and environment can also be interpreted as a disturbing factor.

Measuring or evaluating a body of knowledge related to a field of interest poses even more problems than less complex sets of knowledge. In their study, Tang and Baker (2016) pointed out that the acquisition of objective financial knowledge does not automatically result in inappropriate financial behavior. In a given financial decision-making situation, financial behavior is determined by an individual's subjective financial knowledge, which is also influenced by that person's self-esteem. The difference between objective and subjective financial knowledge is partly due to a person's self-esteem.

The parallel between the findings of Tang and Baker (2016) and Polányi (1994) is clear. Objective financial knowledge can be equated with explicit knowledge, while subjective financial knowledge can be equated with tacit knowledge. The evaluation of subjective financial knowledge raises new issues to be solved, which Holt (1964) has already drawn attention to in his work.

Rieger (2020) compared different measurement and evaluation methods used in financial awareness research and found that the reliability of some of them is very low.

During self-assessment, the person evaluates their knowledge. In this case, some of the problems listed in the external evaluation, such as the possible destruction of self-image, the problem of trust, are eliminated. But there are new ones that have to be faced. Individuals are socialized in different environments, have different values, have different bases of reference, and may not be realistic in seeing their knowledge.

The latter pointed to a problem in a study by Kruger and Dunning (1999). The self-assessment of university students was examined and it found that there is a significant difference between the perceived and correct level of competence of students in the case of less competent students. During the self-assessments, everyone gave themselves an assessment above the average of the actual

competence level. However, those with above-average competence underestimated their exact competence. The authors see an explanation for this in a kind of cognitive bias.

It follows from the above that the delimitation and evaluation of knowledge, including the knowledge acquired in a given field, means a complex solution set of problems.

Constantly changing circumstances require people to continuously adapt, acquire new skills and abilities, as a result of which knowledge and its evaluation and measurement cannot remain constant.

The research

Our research was inspired by the initial definition of joint international research by the OECD (2020) / INFE. According to this definition:

„A combination of awareness, knowledge, skills, attitude, and behavior necessary to make sound financial decisions and ultimately achieve individual financial wellbeing.“

In our research, we focus on students studying in Hungarian higher education. We set the goal of establishing a complex financial, risk, and digital attitude profile of this population.

During the research preparation, we reviewed the domestic and international research that has already taken place in the fields of financial culture, financial awareness, financial knowledge, financial risk-taking, and financial decision-making. We also examined sociology, marketing, telecommunications, fintech, digitization, and trend and generation research surveys, which research will become stronger in the future (Pintér – Bagó, 2020a), (Pintér – Bagó, 2020b). We reviewed the research questions, the research methodology, the achieved results. After, we identified 11 research dimensions that are

needed to explore the complex profile of the population. Data are collected using a questionnaire. The first query was from 20 November 2020 and is still in progress.

Our research group consists of 7 people. 4 members are researchers at the Corvinus University of Budapest, 2 members at the Budapest Business School, and 1-1 member at the University of Miskolc and the University of Pécs. The name of our research group was compiled from the initials of the members' names, making it PBD Research.

The questionnaire

To create the questionnaire, we used a five-step iteration process. It with the help of which 51 questions were finally defined after two iteration rounds. Our questionnaire contains closed questions, but in some cases, we also used multiple-choice questions and a 5-point Likert scale.

To query the questionnaire, we used Qualtrics Online Questionnaire Software, which, despite a large number of questions, provided respondents with the opportunity to complete them quickly - approximately 20-25 minutes.

The Sample

From the start until 19 February 2021, 2071 responses completed. Most parts of the respondents were all first-year students studying in higher education at institutions located in Budapest. As the respondents were only in the first semester at the time of the response, they can be considered a homogeneous population in this respect.

Of the 2071 completed questionnaires, in this study, we will examine only those completed by „Generation Z” representatives. The members of the “Z” generation are children of the digitized world, the world without a computer is unknown to them. According to the

literature, the delimitation of this generation is not uniform. Some researchers defined Generation Z as people born like 1995-2009, 1995-2012, and 1996-2007. or like as people born between 1995 and 2015.

Whichever classification we choose, it is clear that members of students between the ages of 18 and 24 who are currently studying at a university certainly belong to „Generation Z”. In 2020, 741,094 people in Hungary belonged to this age group, of which 48.41% were women and 51.59% men. (KSH 2020) In the 2020/21 academic year, based on preliminary data, 187.4 thousand people (KSH 2021) studied in basic, master's, or full-time higher education, which is 25.4% of those in this age group.

The majority of respondents to the questionnaire in the period under review, 1944 members of the „Generation Z”, 1.04% of students in higher education.

Data processing

The data of the online completed questionnaires were retrieved in Excel file format from the Qualtrics Online Questionnaire Software interface, and then the data was cleaned and filtered. All of the questionnaires completed by the „Generation Z” respondents proved to be fully completed and analyzable. We used Microsoft Excel and IBM SPSS Statistics 25 to process the data. Descriptive statistics we used in the data analysis.

The sample characteristics

Table 1. Sample characteristics

Characteristics	Proportion / Average	N
Gender		
Female	52 %	1008
Male	48 %	936
Age	19,89	
18	12 %	242
19	36 %	702
20	25 %	488
21	12 %	227
22	8 %	148
23	4 %	85
24	3 %	52
By place of residence		
Capital	36 %	693
Center of county	15 %	291
City	34 %	670
Village	15 %	290

52% of the respondents were women and 48% were men. This differs minimally from the gender distribution for the age group, where the proportion of men was higher. The gender distribution of students in higher education is not known at the time.

It can be seen from Table 1. that the majority of respondents are age 19, with a share of 36% within the total sample. However, the share of 18-20-year-old respondents, 73%. This is because the questionnaire was mostly completed by first-year students.

36% of the respondents live in the capital, 34% in the city, 15 % in the centers of the county, and 15 % in a village. Overall, the proportion of city living respondents is 85%.

Self-assessment of financial knowledge

Respondents were asked to rate their financial literacy on a scale of 1 to 5, in the same way as in the school.

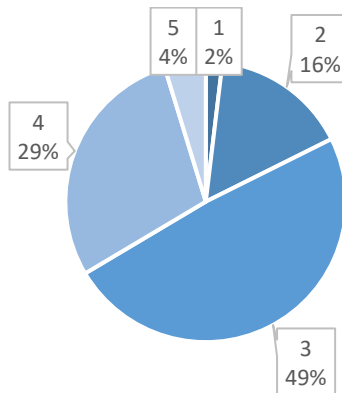


Figure 2. Classification of financial knowledge

The pie chart (Figure 2) shows that nearly half of the respondents, 49%, rated their financial knowledge as the medium (3).

Relatively few, only 4%, rated themselves as excellent (5) and also had a low, 2% was the fail (1). The average self-assessment is 3.19. The data of the evaluation by gender were shown in Figure 3. The bar charts draw a bell-shaped curve that indicates a normal distribution. Men rated their financial literacy higher than the sample average, averaging 3.34, and women rated it lower, 3.05.

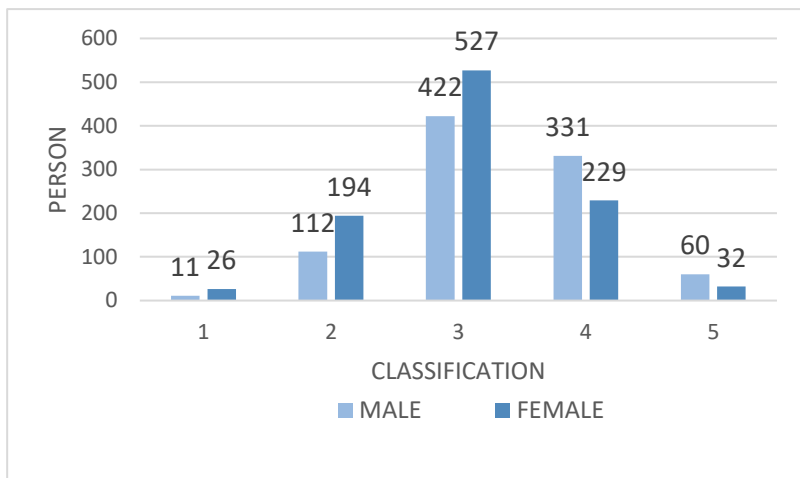


Figure 3. Classification of financial knowledge by gender

How realistic is self-assessment?

Take a look at the diagram of the answers to the control question. The question was: What is the return if the interest on a 1000 HUF investment is 7 HUF? Figure 4 shows the proportion of incorrect answers to this question. We do not want to draw a far-reaching conclusion from the figure, this requires further analysis, but it is also an indication that almost the most basic question has received such incorrect answers.

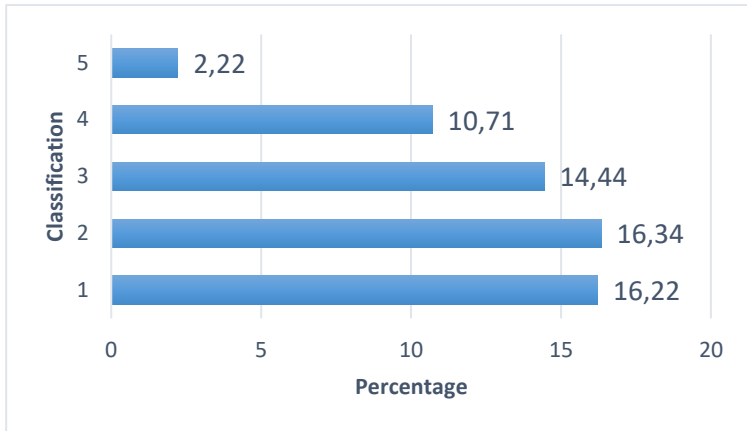


Figure 4. Error rate

The OECD and INFE conducted joint research in 2020 to assess the financial awareness of the adult population. The study (OECD 2021) includes data for 12 OECD countries, including Hungary.

The research tested the financial knowledge of the respondents with short counting tasks. The financial knowledge was evaluated on a Likert scale from 1 to 7. That was one component of measuring financial awareness.

The average result of the Hungarian respondents was 4,6. That is converted to a scale from 1 to 5 is 3,29. The average score for women was 4,5, which is converted to 3,22. The average score for men is 4,7, which is converted to 3,36.

The same study included an average figure for young people (18-29 years old) of 4,7. Using the previous conversion method, it is also 3,36.

Conclusion

In the OECD (2021) survey's averages for both gender and the total population exceed the data in our research. In this comparison, we can see that the students surveyed were cautiously self-assessed themselves. They slightly but underestimated their financial knowledge compared to the OECD (2021) survey.

Summary

The study focused on the delimitation of knowledge, financial knowledge, and its evaluation. The aim was not to fully explore the background of the literature, but rather to shed light on the main elements of the line of thought and thinking on the topic and the related problems. All of this was done to provide a theoretical background for presenting a dimension of ongoing research.

The element of our research that fits into the line of “Generation Z” research examined the self-assessment of financial knowledge and its reality in a first approximation. Of course, based on the available data, it is not yet possible to draw far-reaching conclusions, which will be done in a research report prepared after the processing of the entire data set.

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Bank card fraud and misuses from the aspect of Generation Z banking habits³

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Abstract

Today, several studies prove that a high level of the financial culture of the population also contributes to the stability of the financial system. As a result, it is in the interest of both financial institutions and the state to create a higher level of financial culture, which has a beneficial effect on all actors in the economy.

That is why we consider it very important to examine how Generation Z can cope in this fast-paced, ever-changing financial world, how much risk they are exposed to, and how stable their financial literacy is. The target group chosen is also very interesting because they are the first members of the “digital generation” who are now starting to make independent financial decisions, to break away from their parents.

³ With the support of GINOP-2.2.1-18-2018-0010

Introduction - Banking trends and risks associated with forms of payment

When we explored the characteristics of Generation Z financial literacy and digital attitudes, we began with a few questions to which we sought answers.

Questions:

What are the future banking trends?

What solutions the Gen Z will use in banking?

What is the most important for Gen Z in financial solutions? What are the dangers of the new trends?

In recent years, the Hungarian financial market has been characterized by digitalization. Nothing proves it's better than the fact, that we can expertise directly the spread of innovative payment solutions. It is enough to think of cashless festivals, or the fact, that we can pay by card in small shops. These tendencies are confirmed by data because 92.883.615 purchases were made with domestically issued payment cards in the first half of 2010 in Hungary, while this value was 444.114.587 in the same period of 2019. It means an increase of 478 percent. (MNB; 2020)

Due to the spread of digitalization, online and PayPass payments, we can assume, that the number of misuses has increased too. Despite this assumption, the data show otherwise. This fear is not realistic, because the number and the value of misuses are low compared to the total turnover.

The number of domestic payment card misuses reached almost 20.000 in the third quarter of 2020. It means an increase of more than 20

percent compared to the same period of 2019. Despite this tendency, the value of the damages decreased more than 11 percent. Between 2016 and 2019 the number of misuses increased, while the amount per misuse decreased. However, these values are still low compared to the total turnover. (MNB, 2020)

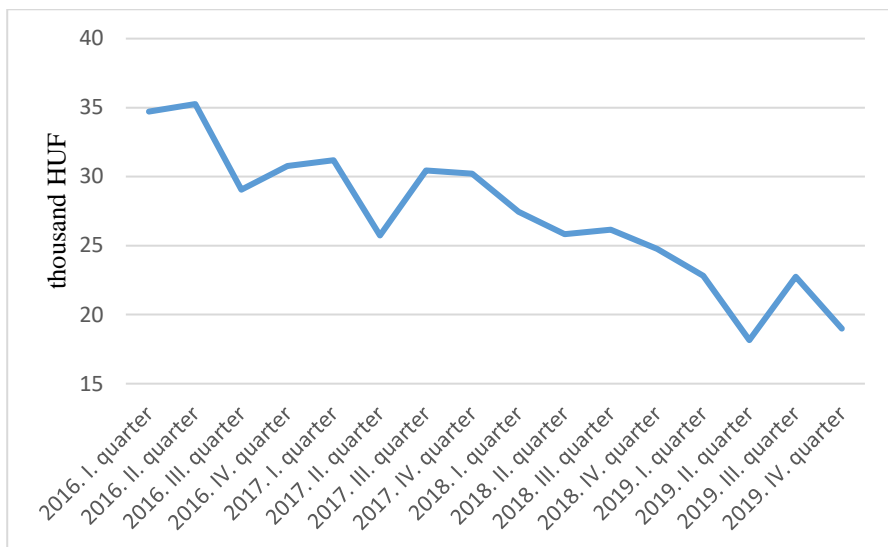


Figure 1: Average amount of misuses with domestically issued payment cards

Source: MNB, 2021

The spread of online commerce has brought the malignant and pirate software and online cheaters with itself. So nowadays the most affected type of misuse is the internet traffic that does not require the physical presence of the card, especially cross-border transactions are affected. However, thanks to the strong customer authentication and

the user's attention, the value of misuses is still low compared to the total turnover.

A lot of people thought that the number and value of misuses will increase, because of the PayPass. Examining the data, it appears that although the number of misuses increased, their value decreased. However, compared to the growth rate of PayPass transactions, the number and value of misuses are still low.

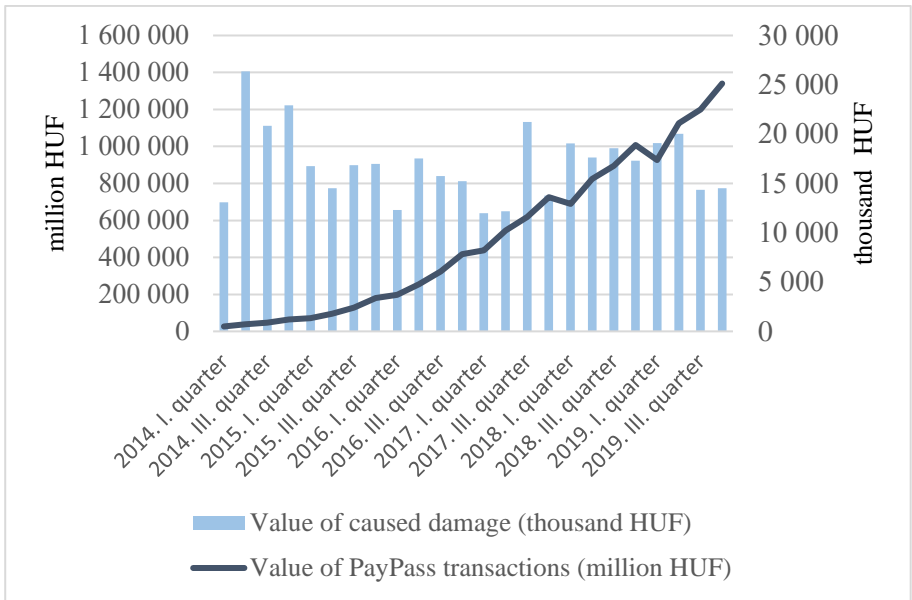


Figure 2: Caused damage with lost / stolen cards and the value of PayPass transactions

Source: MNB, 2021

The tendency, that the number of misuses increases, while their value decreases, is due to the fact, that the amount where it is not necessary

to use PIN code is very low. The limit was previously 5.000 HUF. However, in the Spring of 2019 because of the coronavirus pandemic the Hungarian Nation Bank increased this amount to 15.000 HUF. According to the data of the central bank, the limit raising did not increase the number of misuses, therefore it is still justified to maintain this higher limit. (Portfolio, 2020) SMS and other push notifications also play a huge role in reducing the value of misuses.

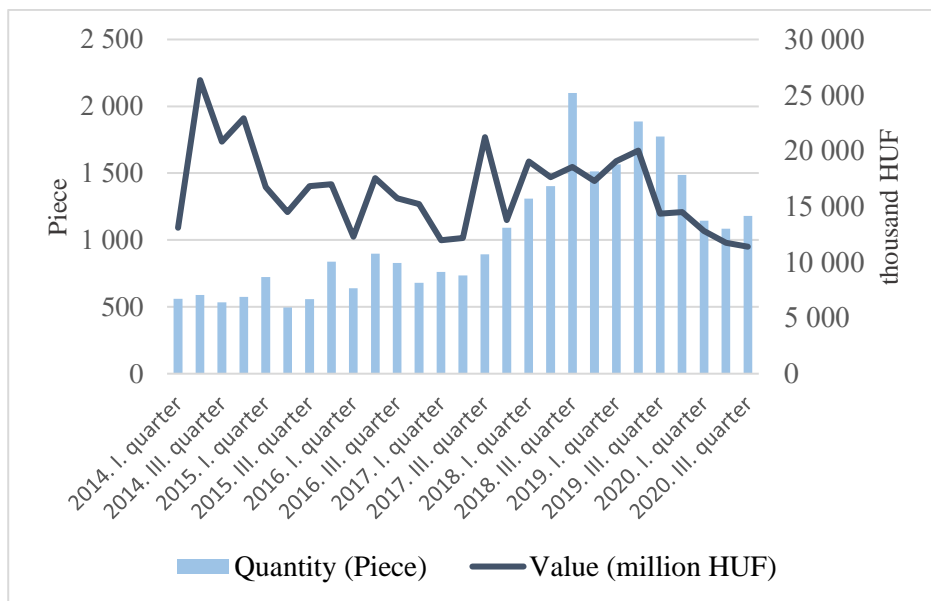


Figure 3: Value and number of damage caused by lost or stolen cards

Source: MNB, 2021

The change in the number and value of misuses is connected not only with the changing consumer habits, but also connected with the trends of the available income and saving of the population.

The net financial wealth of households had stagnated between 2002 and 2005 in Hungary, despite the increasing real income. Then,

between 2005 and 2009, the value of real income and savings also declined. The turning point was in 2009. Since the net financial wealth of households has increased. The real income started to grow in 2013 and it is still growing. (Nagy, 2020)

10 percentage between 2016 and 2017, 12 percent between 2017 and 2018, and 11 percent between 2018 and 2019 increase were in household's net financial wealth. Most of the household's savings were held in stocks, shares, deposits, and cash during this period. (KSH, 2020)

It is important to consider the rate of inflation when we examine the change of the household's financial wealth because this alone could explain the growth. The wealth of the Hungarian people increased more than the amount of inflation between 2010 and 2019. So, there was a real increase in financial wealth. (Nagy, 2020)

Changes in a household's net financial wealth are also appeared on examining consumption. After the global economic crisis, consumption started to rise again. Household expenditures increased by an average of 41,7 percentage per capita in real value between 2010 and 2019. In 2019 household consumption grew by 5.3 percent in real terms compared to the previous year. (KSH, 2020)

Attractive changes in banking for generation Z

The banking industry is one of the engines of Fintech solutions and the industry is in constant change. Current trends regarding internet usage, mobile phones, and banking applications are all pointing towards a future, where banking happens in the online space. Among the various solutions and limitless opportunities, the only barriers to a full-scale online banking solution are the safety of platforms and the regulation of the industry.

Nowadays we can do everything online and with our current knowledge we cannot see the ways where the industry could grow more.

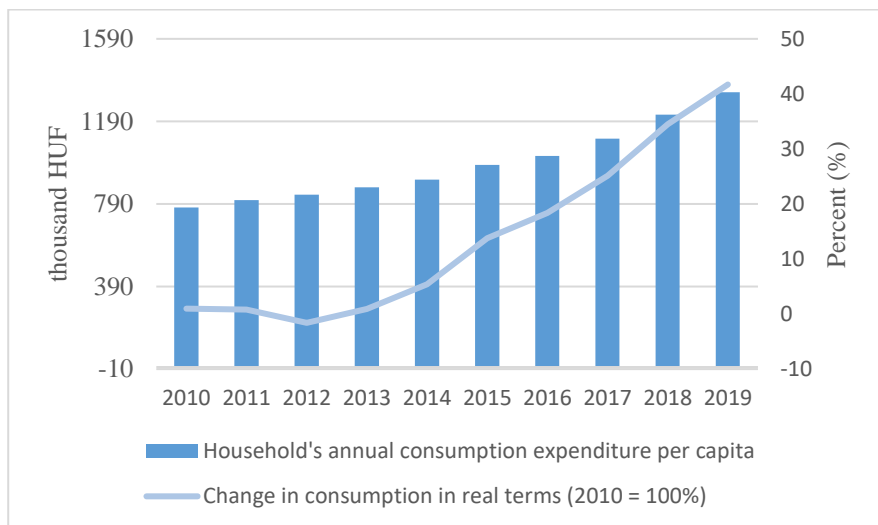


Figure 4: Changes in per capita expenditure of Hungarian households

Source: MNB, 2021

Or can we? In this short publication, I tried to collect the major trends and opportunities, and visualize the industry in 10-15 years with a focus on GenZ.

It is obvious that the expectations for online banking are not getting smaller, and everybody expects maximum safety, so with the possibly growing opportunities, information security should continue to stay in focus. People with smaller incomes – especially in the emerging markets - would like to have access to online fintech solutions, and the

industry will give them the opportunity. Starting with microfinancing solutions this is a visible trend already.

The usage of Artificial Intelligence (AI) has a significant role in recent years but leveraging information from chat-bots and using customer purchase trends /customer profiles still has plenty of unrecognized potentials. Big data provides valuable insights to achieve a better understanding of customers. It has the opportunity to detect fraud easier and allows for more effective risk management, especially on credit risk.

Besides chatbots, voice-based technology is more common in the industry and voice-activated devices in the banking processes have a lot of potentials. Voice recognition combined with biometric authentication makes online banking much safer. Application Programming Interface (API) - allows two applications to talk to each other. In the banking industry, this would allow to break down banking applications into smaller sets of services, making the entire system safer from full disruption – in case a single process fails.

Physical, electronic, and mobile payments are currently co-existing, however, mobile payments are predicted to grow more significantly based on the current trends. From a payment and currency perspective blockchain and cryptocurrency will have a more significant role as well, especially as this decentralized technology has several benefits like better security and greater transparency. As the newest generations were already born in the digital world, digital-only banking (or neo banking) is getting more and more natural not only for them but for everyone.

GenZ banking habits

This generation, which never known a world without the internet is proving to be financially conscious from a very early age. In the first World, 20-25% of the population belongs to this generation (in World

total it can be even 30%) and they have a huge potential and also treats for any financial institution.

Generation Z - colloquially known as zoomers, is the demographic cohort succeeding Millennials who already had their first savings account and have begun saving for college. GenZ has smartphones, and they start to get huge curiosity and interest towards finance and savings. Zoomers feel empowered to ensure their financial stability, and 84% rely on parents and family for financial information. When deciding which bank to use, the majority of them went with the same bank as their parents.

Gen Z is cautious about debt, they are often extremely hesitant to take on any debt at all, but 60 percent of them expect to take out loans for college. Saving, rather than spending is the motto of this generation, that is The financial driver for them. Offering innovative savings products and services that for example automatically save money into accounts is key to the success of these young adults. They are more cautious of privacy and data protection than their parents. For GenerationZ neo-banking means traditional banking, and for them using cards and apps in financial platforms is the new normal. They are very comfortable using automated chat as a legitimate contact channel as well as the majority of this generation would use a new digital currency from a brand they trust—, especially tech companies. Marketing research firms conclude however that when it comes to finances GenZ loves personal contact, visiting the branches, have a chat with a friendly, social specialist while getting a free snack and a coffee.

This generation wants brands to be personalized and customized, so banks should strongly consider this fact to connect with this customer base on an emotional level. Due to our digitalized and fast-changing World, Zoomers tend to have a very short attention span and no patience for complicated applications, which is another significant

factor when they choose their bank. Banners and ads do not help, these are not the ways of marketing they want to see, however, these young adults want to experience what they get from the first moment. GenZ is all about customer experience and customer reviews. They might choose the banks their parents are using, however, to keep them as customers banks need to be prepared for a very different type of service. What they expect is a personal or video chat where a bank representative explains to them everything they need to know and understand, having their unique situation and interests in mind. From that point onwards, they expect easy-to-use applications working flawlessly, and contact whom they can call in case any question arises. This requires a qualitative approach in customer service, as any negative experience results in a negative review. Banks that adapt to this change in consumer behavior and digital technologies will not only survive but also succeed in the future digital environment.

Survey results

We created a questionnaire in 2020 that was completed by a total of 1,258 people. According to research, internet banking is very popular among young people. It is used by 92 percent of respondents (1,152 people). Similarly, many use the option of referral (1163 people). Mobile banking is used by 86 percent of respondents (1,080 people), which means that 87 percent of those own a mobile phone bank with a phone app. And 87 percent (1,094 people) use the account's information facilities. The use of group transfers alone shows a low value, which he thinks may be due to the fact that many still live with parents or in college. And in these cases, they have no fixed, recurring expenses.

Of those who completed the application form, 93 percent, or 1,161 people, trust electronic forms of payment. 914 orders from both domestic and foreign sites, 24 only buy from foreign, and the remaining 320 people only buy from domestic websites. Interestingly,

however, the figure is that 45 percent of young people who do not trust electronic forms of payment anyway buy from foreign and domestic sites, and 2 percent only from foreign sites.

Unsurprisingly, the data clearly show that students fully meet the criteria for Generation Z. The digital world, their tools, and possibilities are a part of their everyday life. This is demonstrated by the assets they possess, the capabilities they consider important, and the use of different financial opportunities.

In the questionnaire, most (478 people) pay with a mix of credit cards and cash. They are followed by those who pay alternately with cash, credit card, and smartphone (351 people). 57 people chose a paying by cash only.

Students were also asked about the different neobanks and the reasons for their use. The questionnaire included three FinTech companies; the Revolut, the N26, and the Monese. Revolut enjoys the highest popularity, but even this is surprisingly little used; of the 1258 people, only 434. Other providers are even less common. The N26 is used by five and the Monese by nine.

Why they would use neobanks they answered because of services they could not access at traditional banks. Even shopping aim was a popular answer.

Aside from the fact that neobank services are not popular among respondents, digitalization is felt in young people's payment habits. Although cash still plays a role in their transactions, it is clear that electronic payment methods are becoming more popular.

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Generation Z and their willingness to consult⁴

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Abstract

Following a theoretical approach to financial culture, counseling, and Generation Z, the study examines the financial counseling habits of Generation Z, currently between the ages of 18 and 24. The research involved first-year students of economic higher education institutions in Budapest. The questionnaire was filled in by 2071 students, 1944 questionnaires were included in the analysis after cleaning. Regarding the age group examined, a decisive proportion would give financial advice to friends, their partner, family and anyone. Comparing the students' perceived financial knowledge with the willingness to advise, it was found that the crowd has average (average) financial knowledge and would still be happy to give advice on finances.

Introduction - Counseling as a tool of financial culture

In the early 1900s, the term financial culture could be found in the literature. There is no concept of financial culture accepted by either researchers or professionals.

According to the definition developed by the Magyar Nemzeti Bank (MNB) in 2008, "financial culture is a level of financial knowledge and skills that enables individuals to identify the basic financial information needed to make informed and prudent decisions and then interpret it, and to make a decision on this basis, assessing the possible future financial and other consequences of their decision".

⁴ With the support of GINOP-2.2.1-18-2018-0010

If we examine a common set of definitions of financial culture defined in the literature, each definition includes information about finance and the ability to process this information, as well as the ability to make the best decision based on the information obtained (Kovács, Révész, & Ország, 2013). Budai (2020), (Pintér – Bagó, 2020a, b) interpret financial culture at the system level. It is in the interest of all economic actors to develop a financial culture.

According to Jakovác & Németh (2017, p. 2020), “the development of financial culture is mostly based on personal contact, be it school education, free telephone or in-person counseling, visiting families, or on-the-job or other training. Besides, of course, leading institutions make information repositories, searchable databases publicly available, develop applications, upload video content, use social media, etc. The tools for developing a financial culture are illustrated in Figure 1.

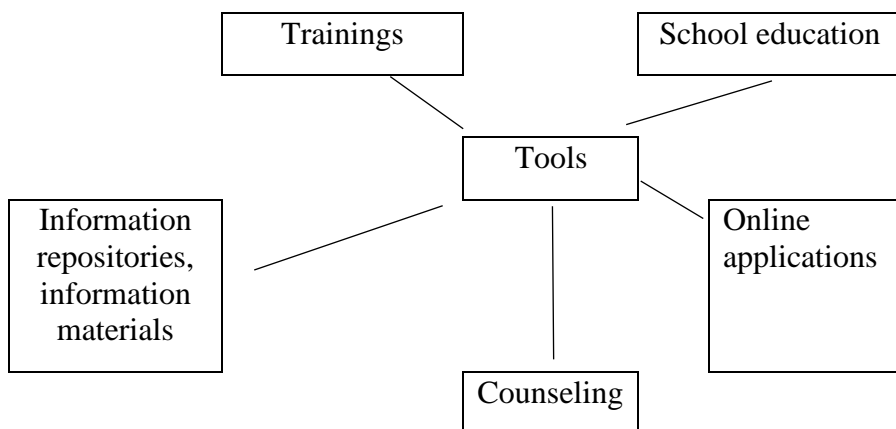


Figure 1: Tools for developing financial culture

Source: own editing based on the drawing of Jakovác & Németh (2017)

Among the tools of financial culture development in this study, the emphasis is on counseling from the perspective of Generation Z, in which I examine a specific line of counseling.

The Z generation

Howe & Strauss (1991) is associated with the most common explanation of generation theory. The theory is that people can be grouped into generations based on their year of birth, and these generations differ in basic characteristics. The current generations are the Quiet Generation, the Baby Boomers, the X Generation, the Y Generation, the Z Generation, and the Alpha generation. In the study, by Generation Z, I mean the 18 and 24 age group currently studying at university.

Besides, Mannheim (2001) pointed out that the similarity of time of birth is still insufficient for a group of people born in a single time band to be called a generation. In his view, there is also a need for group members to be touched by common events during the upbringing that can make them feel different from those born earlier and those born later. Generation Z thus includes those whose adult lives take place in the 21st century (Székely, 2012). Their national identity is determined by the experience of globalization, the disappearance of borders, and common experiences, which are inseparable from the emergence of an information network that is always and everywhere available to everyone (Barabási, 2003). This network allows communication between all actors connected to the network but is capable of more than that (Castells, 2007).

Generation Z interprets knowledge, learning, and counseling in a completely novel way: it favors search, navigation, and confirmation over fixed knowledge stored in the brain.

Advice - financial advice

The definition of counseling is, according to the European Counseling Society: "Counseling: an interactive learning process that takes place between the contracting counselor (s) and the client (s), be they individuals, families, groups or institutions, cultural, economic and / or emotional issues. " (EAC, 2002)

Combining the definitions of several authors in their book, Gibson & Mitchell (1990) summarize the definition of counseling as counseling is a relationship between two individuals with the participation of a qualified counselor that focuses on some aspects of the client's adaptation, decision-making, or developmental needs. The process is a relationship, respectively. provides a communication foundation that allows the client to develop self-knowledge, explore opportunities, and initiate change. To do all this, the counselor's skills and knowledge provide the framework and direction that maximizes the client's potential for positive outcomes.

The classical literature on counseling (Kubr, 2002; Poór, 2010) distinguishes between two counseling roles. In the role of expert (resource consulting) (Drucker, 1979: pp. 475-476), consultants help the client with their special expertise and experience: gather information, design new systems, propose solutions, convince the client of their correctness, if needed, help in implementation. Process consulting (Lewin, 1993) seeks to help an organization solve its problems: it passes on methods but does not suggest solutions. "The true process consultant, together with his client, diagnoses the problem (Schein, 1969: p.5).

A financial advisor provides financial advice or guidance to his clients for compensation. Financial advisors can provide a wide range of services, e.g. investment advice, tax planning, real estate investment. Financial advisors are increasingly acting as a so-called "one-stop-shop", from portfolio management to insurance products.

A counselor can successfully fulfill his / her task if he/she has some characteristic qualities and competencies, which are the qualities of the individual that are essential for the effective performance provided in the advisory role. Figure 2 summarizes the typical consulting qualities that build on each other in a kind of success pyramid based on Hoványi (1997).

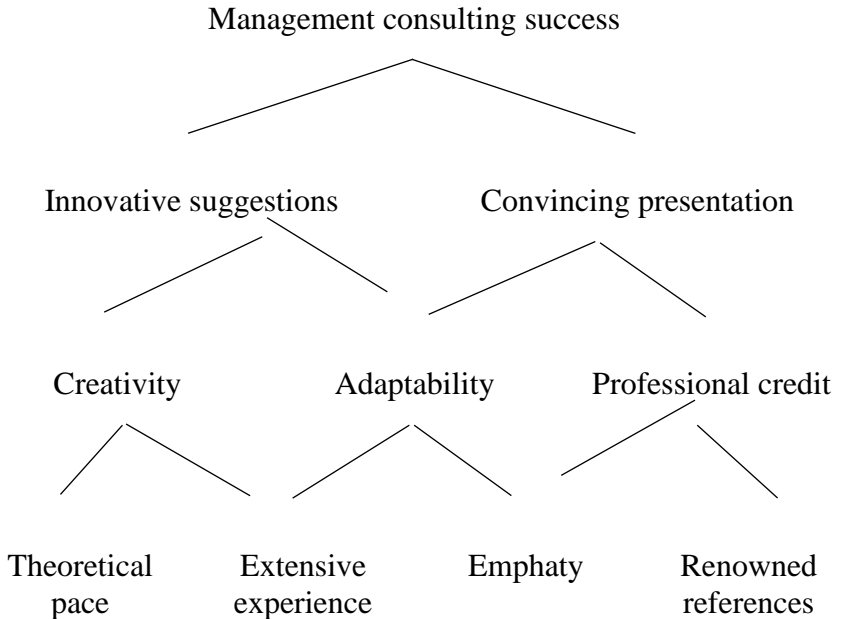


Figure 2: Advisory pyramid of success qualities. *Source: own editing*

Achieving counseling success requires not only objective knowledge - which includes both theoretical and practical knowledge and innovation - but also the ability to persuade, which, in addition to adaptability and professional credit, requires empathy so that the client can understand and apply, i.e. feel the suggestion.

Material and method

The target group of the research is young adults studying in higher education (ages 18 to 24). The participants in financial, risk, and digital attitude research are first-year students of economic higher education institutions located in Budapest.

The compilation of the research questionnaire was preceded by a review of the literature, which served quality assurance purposes on the one hand and to be suitable for performing measurements between different time points on the other hand.

The questionnaire consists of 11 dimensions, typically containing only closed questions as well as Likert scales. The questionnaire was interviewed between December 2020 and February 2021. The web-based questionnaire solution provided an opportunity for dynamic completion, where the given student only had to answer the question about him.

During the processing of the questionnaire, in addition to the descriptive statistical methods, I used cross-tabulation analysis. The calculations and diagrams were created using MsExcel.

RESULTS

Characteristics of the population

During the cleaning of the database, 2,071 covered questionnaires are available. The questionnaire was completed between the ages of 18 and 49 years. The majority of respondents are women, which is because the proportion of women in higher education has been increasing since the turn of the millennium.

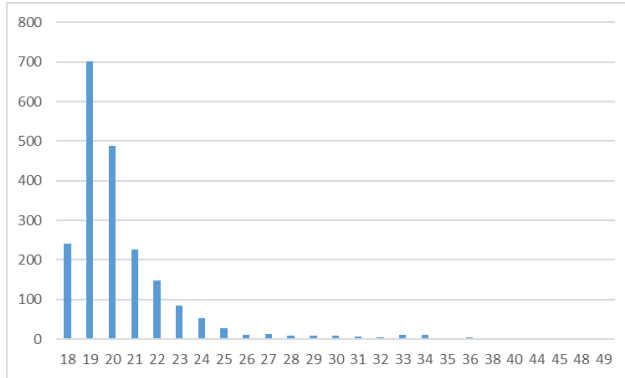


Figure 3: Distribution of the total sample by age. *Source: own editing (n=2071)*

The primary target group of the research is Generation Z, ie the age group between 18 and 24 in higher education, so there are 1,944 records after cleaning according to age, which is 93.8% of the cleaned database. The questionnaire was completed by most people in their 20s. Nearly half of the respondents filled in the questionnaire were women (51.9%) and men (48.1%).

Examining the development of the given financial advice

The development of financial counseling for students completing the questionnaire, where more than one answer could be given, is shown in Figure 5. Students would mostly give financial dances to friends, family, or couples. Furthermore, it can be observed that 20% of the students surveyed would not give any financial advice to anyone at all.

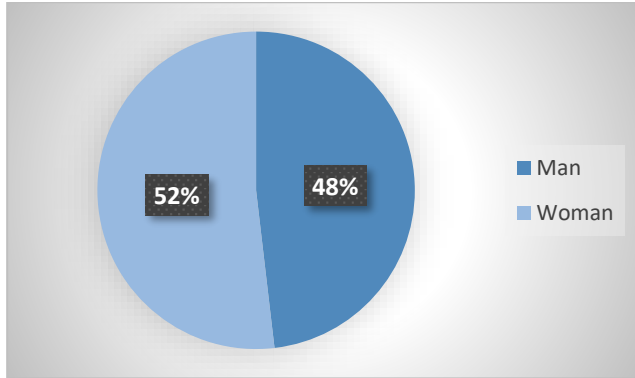


Figure 4: Gender distribution of the 18-24 age group (n=1944).

Source: own editing

In what follows, I will examine Who would you give financial advice to? to the question of how the gender distribution developed.

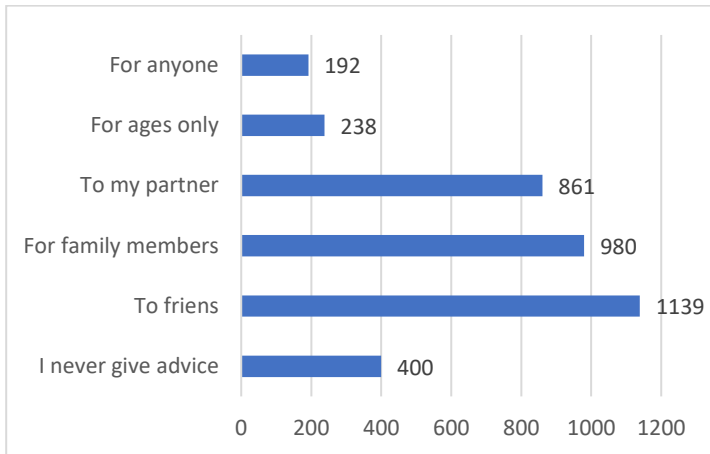


Figure 5: Who would you advise on finances? Answers to **question**

Source: own editing

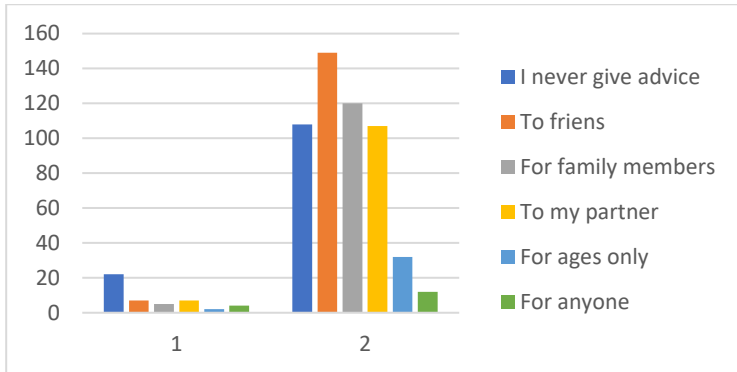


Figure 6: Who would you advise on finances? - gender distribution of answers to the question. *Source: own editing*

Figure 6 clearly shows that students' willingness to counsel shows a different pattern by gender. Women prefer not to give advice, or if they do, to those in their age group, while men mostly advise friends or family members.

It is also important to examine how students who complete the questionnaire evaluate their financial knowledge and, consequently, the relationship between financial knowledge and financial advice, as it is known from theory that a good advisor has both theoretical and practical knowledge.

The relationship between financial knowledge and financial advice is illustrated in Figure 7.

Figure 7 shows that students' perceived financial knowledge is mediocre, and despite mediocre knowledge, they would give advice to others in the financial field. Consideration should be given to those who have assessed their financial knowledge with an insufficient, sufficient, and average grade to receive advice on financial matters from them.

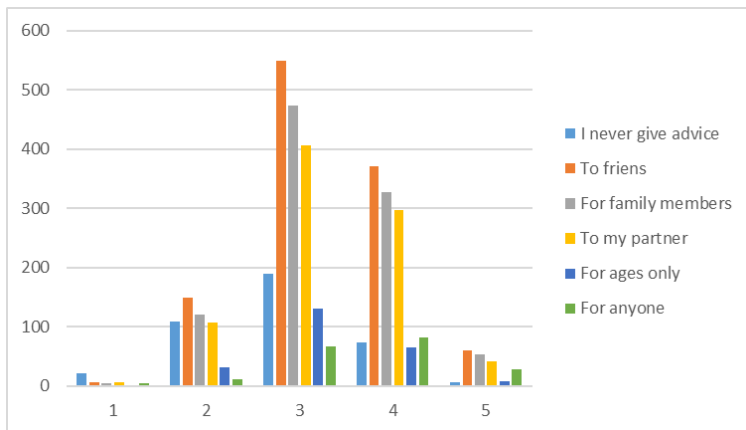


Figure 7: Who would you advise on finances? and the distribution of current financial knowledge according to the answers to the question

Source: own editing

Of course, far-reaching conclusions should not be drawn from perceived financial knowledge alone, as knowledge of real financial knowledge is also required to establish this.

Conclusions

A survey of the provision of financial advice to young people aged 18-24 in higher education shows that 80% of respondents would provide advice. This advice would be best given by men to their family, partner, or friend, while women refrain from counseling. Regardless of whether students have average financial knowledge based on their judgment, they would still be willing to give advice, which may not be an effective solution in all cases. To draw a well-founded conclusion, further research is needed into what real financial knowledge students have for a piece of possible financial advice that is essential for a good advisor.

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Theoretical aspects of the financial literacy in the context of demographical migration crisis

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To be successful, a modern consumer in the financial services market needs the technical ability to temporarily place free financial resources on the market and the relevant knowledge and skills to rationally "exist" in the financial environment. The issue of financial involvement and financial literacy of the population is actively raised by the world community. According to the organization CGAP (Consultative Group to Assist the Poor), today, in the world, about 1.7 billion people (more than 22% of the world's population) do not have a bank account. However, many people have an open account but do not actively use it due to a lack of necessary knowledge and experience. In the context of the United Nations sustainable development goals of overcoming world poverty, improving education, and public health, it is the increase in financial literacy that will contribute to this.

According to the methodology proposed by a group of experts subordinate to the OECD (The Organization for Economic Cooperation and Development) INFE (International Network on Financial Education), the population's financial literacy is assessed in the following areas: financial knowledge, behavior, and attitudes. The formation of an integrated assessment is done by analyzing respondents' answers to questions within each block. Given the questions' structure, each block is evaluated differently: financial knowledge - 7 points, financial behavior - 9 points, and financial attitude - 5 points. Thus, the maximum level of financial literacy of the population according to this method is estimated at 21 points.

The OECD conducted the previous study of adult financial literacy in 2020. The study involved 30 countries, some of which are not members of the OECD. The highest levels of financial literacy are observed in Hong Kong (14.8), Slovenia (14.7), and Austria (14.4). As you can see, the countries with the maximum level of financial literacy scored only about 70% of the points, which indicates the urgency of improving this area. Analysis of the results of other countries that also participated in the study suggests that the relationship between the country's level of financial literacy and economic well-being is not always direct and may be due to many other factors, including demographics. Figure 1 presents a bubble chart showing the level of financial literacy (X-axis) and the total population of the country (Y-axis), taking into account its economic development (the area of the ball is equal to GDP per capita) for Western and Central Europe.

As you can see, to the right of all are Slovenia and Austria, with the corresponding maximum values for the region of the level of financial literacy 14.7 and 14.4. Germany, ranking second in terms of economic development among the represented countries (GDP is 46,445.2 dollars per capita), is inferior to the leading countries' level of financial literacy. Italy, despite the high economic standard of living (GDP per capita - 33228.2 dollars) and high population (60.3 million people), is in one of the last positions in terms of financial literacy of the population (11.1). France also participated in this study, but it is not presented in Figure 1 because it did not conduct a comprehensive assessment of the financial literacy of the population, but only a component of "financial knowledge".

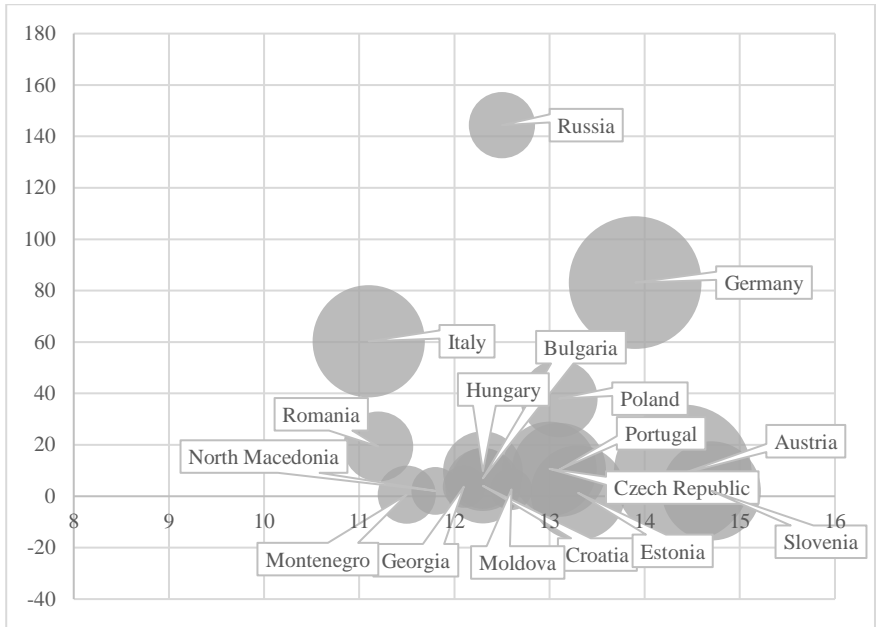


Figure 1 – Level of financial literacy (X) in 2020, population (Y) in 2019, million people. and GDP per capita (bubbles sized by GDP per capita) in 2019, USD for Western and Central Europe

Source: based on data from the World Bank and OECD

Despite innovative progress in finance and the absence of barriers to the availability of financial services, according to statistics (Table 1), the gender component still plays an important role in positioning the financial literacy of the population. According to the information presented in Table 1, the level of financial literacy is higher than that of women, except Georgia and Russia, where the opposite picture is observed.

The reasons for this gap are the lower level of knowledge of women in the field of digital technologies and, as a consequence, the lower activity of their use; cultural aspects of countries, both at the level of laws and social norms, exacerbate the problem of gender inequality; access to educational services; security in financial transactions through social networks. Of course, the issues of the gender gap in financial literacy are more relevant for countries with low levels of economic development. Still, they must be addressed by the European community in order not to exacerbate the current situation.

In addition to the gender component, the age structure plays an essential role in studying the population's financial literacy. Carrying out active measures aimed at improving the younger generation's financial literacy has not yet yielded significant results, as according to the OECD, young people (18-29 years) have a low level of financial literacy in contrast to middle-aged people (30-59 years). Older people (over 60) have the lowest level of financial literacy, forcing governments in countries where the number of older people is significant to introduce special education and training projects for this category of people.

An important reason for such relatively low values of Western and Central Europe's financial literacy, which are characterized by a significant level of economic development, is also the migration problem. Migration flows, the vast majority of which are directed to highly developed European countries with low living standards, create additional obstacles for the governments of countries where migrants overcome the problem of low financial literacy of the population. Thus, the current demographic and migration crisis in Europe and around the world is a cornerstone for improving the population's financial literacy. This process is not easy and requires significant

Table 1 – Distribution of the level of financial literacy among women and men in 2020 for the countries of Western and Central Europe

Country	Female	Male
Austria	14,2	14,6
Bulgaria	12,3	12,3
Croatia	12,2	12,4
Czech Republic	13	13
Estonia	13,3	13,4
Georgia	12,1	12,1
Germany	13,7	14,1
Hungary	12,4	12,3
Italy	10,9	11,4
Moldova	12,4	12,8
Montenegro	11,2	11,7
Poland	13,2	12,9
Portugal	12,7	13,5
North Macedonia	11,6	12
Romania	11,2	11,2
Russia	12,6	12,4
Slovenia	14,4	15

efforts from both the government and non-governmental organizations.

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Financial literacy as a guarantee of life success of the population of Ukraine

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Financial literacy helps to achieve financial well-being and maintain it throughout life. With such knowledge, a person does not exist from salary to salary, and makes loans only when he/she is sure that in the future such action will bring him/her income. Financially literate people do not panic even in crises, as they always have a financial cushion that can cope with force majeure [7].

Despite the great importance of financial literacy, a small number of people in Ukraine can boast of it. Most people do not consider financial literacy important. They spend a huge amount of time on vocational education, ignoring issues that are not taught anywhere.

All this is confirmed by a number of facts:

Almost 50% of the population of Ukraine keeps finances at home. They do not have the habit of striving for capital increase. Moreover, a huge number of crises have created a persistent distrust of banks.

More than 50% of Ukrainians do not use any financial services. There is a need for them, but there is no understanding of the principles of their work. Moreover, some citizens are simply unaware of the existence of certain ways of earning income. Less than 50% of citizens know that Ukraine has a deposit insurance system. Most Ukrainians do not understand the principles of the modern pension system. Meanwhile, it is in it that the state offers to finance capital [3, PP. 16-25].

In fact, the subject of these issues is gradually being introduced in schools. But it is the basics of financial literacy that help a person to become successful [8, pp. 64-71].

Financial literacy has the following significance in people's lives [9]:

Helps to find sources of income that are different from employment. Of course, financial literacy does not guarantee a large income. However, thanks to this knowledge, there is an understanding of how to make money, which earning options are the most promising. Given the high level of literacy, in addition to employment, there is the possibility of a huge number of ways to generate income.

A person develops not only knowledge and skills, but also psychological stability. Financially literate people are confident in their abilities, because they know a lot of things that others do not even imagine. Thinking is formed that contributes to success [1,2,4].

Ultimately, financial literacy provides a certain level of prestige. A person stands out from the crowd, creates the impression of a confident citizen who knows how to manage capital. The presence of financial literacy in most cases is accompanied by quality knowledge in other areas. Such people are constantly trying to learn something new, to monitor the situation on the market [10, pp. 167-172].

Unfortunately, even rich people do not always know how to manage capital. A small number of billionaires have earned their fortunes on their own. Many of them inherited it. At the same time, they have not learned to manage finances and pass this question to more literate people [5, PP. 11-16].

So, financial literacy is profitable, prestigious and quite useful. If a person learns to apply the basic rules of life, his/her life will gradually change for the better. He/She will learn to move towards success and will be motivated to continue working on himself/herself [6].

Therefore, financial literacy needs to be based on a number of provisions that are indispensable. Below are the most important of them.

1. Planning and accounting of financial flows.

Daily accounting of financial flows has a great importance for people's financial literacy. Today, competent planning of income and expenses has been significantly simplified due to the development of various programs for both computer and smartphone.

Also of great importance is the development of family budget planning. To become financially literate, you need to learn how to properly compile and analyze a plan of income and expenses. Equally important is the creation of savings and an investment fund. It always helps to know what financial resources you have.

2. Use of additional sources of income.

One of the reasons for keeping the financial literacy of the population at a very low level is that most citizens see traditional employment as the only source of income. Therefore, in the process of studying it is important to learn that in addition to active income can be used and passive.

It is important to understand that only diversification of income methods helps to protect the family budget from force majeure. In other words, if you have several sources of income, even if you lose one of them, you can ensure a normal existence.

In addition, experts recommend directing part of the profits to self-development and training. Such investments will definitely bring results in the future.

One of the best ways to earn extra income is to work in the financial market. But in that sphere it is important to pay attention to the choice of brokerage company, without which it is impossible to start trading on the stock exchange.

3. The right attitude to finances.

Right attitude to money has great importance. We will have to change the approach to finance from consumer to management. This means that it is necessary to abandon the principle of "what you earn, you spend." It is important to abandon the use of the concept of personal money, replacing it with personal finance.

In addition, you will have to get rid of the dependence on money, which manages a huge number of people. It is important that you manage your finances, not finances manage you. This rule in practice is true and promising.

4. Interaction with financial organizations.

It is almost impossible to achieve success and wealth without cooperation with banks, insurers, brokers and other companies that are part of the infrastructure of the financial market. It is important to learn how to use the tools they offer to manage finances and savings, as well as increase capital. Gradually, the number of people who understand the importance of financial institutions is growing.

To become financially literate, you have to master the use of all the opportunities provided by such companies. It is necessary to learn to build mutually beneficial cooperation with banks. It should be remembered: loans often do not lead to good. Those who live permanently on credit are gradually slipping into a debt pit. At the same time, deposits are an excellent tool that helps to save savings.

It is not necessary to have huge capital to start cooperation with financial institutions. There is a lot of competition in the market today. Due to this, many programs have been developed, which, among other things, allow you to start investing with minimal amounts.

5. Competent capital investment.

Everyone, regardless of the type of activity should understand: money can bring income. They can not only be spent, but also forced to work. This can bring a good passive income.

So, since the teaching of financial literacy in the school curriculum has been introduced only recently, the population is forced to acquire the necessary knowledge on their own. This will require a certain amount of time.

Only if a person wants to change his/her life, he/she will succeed. First of all, we will have to change internal stereotypes and habits. An important reason for the low financial literacy of the population is that they are not taught anywhere. Even with higher education in economics, accounting, taxes, there are no subjects devoted to personal finance.

There are no subjects dedicated to financial literacy in the programs of secondary and higher educational institutions. This is primarily due to the fact that the capitalists are disadvantaged by such

knowledge of the population. They need workers who will work for them all their lives, not create additional sources of income.

Due to the above reasons, the financial literacy of the population in our country is at a very low level. The consequence of this is a sharp division of society into rich and poor people. A huge number of people are dissatisfied with their financial situation. At the same time, the low level of financial literacy does not allow them to get out of a difficult situation. It turns out a vicious circle, but there is always a way out - to learn financial literacy on their own.

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Electronic Money to Support B2C E-Commerce at the Beginning of the 21 Century

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1. Introduction

The economy based on electronic channels is playing an increasingly important role in our modern lives, although there is still potential for growth in terms of its rate of spread. Electronic payments now belong to our daily lives, it is as wide spread as cashing checks in post offices. We use credit cards or bank transfer on a daily basis, but it is becoming more and more common to make purchases and make payments using the opportunity provided by the Internet or mobile phones. The “ancestor” of payment systems supporting e-commerce known today began to operate in the 1990s, although on a conceptual level, scientists were preoccupied with the issue earlier in our digitalised society. The first real needs that called for a digital payment system that could be used efficiently in practice happened in transactions where the transaction could be implemented quickly, easily and economically. Our paper is about electronic money, the development and stages of the concept, some successful implementations of it in the 21 century.

2. Characteristics of online commerce

The first literature references in 2004 defined e-commerce as follows: "E-commerce is the electronic conduct of a business based on the electronic processing and transmission of data (text, sound, images). E-commerce includes a number of different activities: electronic distribution of goods and services, electronic money transfers, electronic securities trading, commercial auctions, public procurement, direct marketing and customer service, and so on (Süveges, 2019). E-commerce activities can be carried out via the Internet, narrowband applications (telephone, fax), teleshopping and offline (catalogue-based sales on CD-ROM) or through a combination of telecommunication channels and institutional computer networks (teleshopping services) '(Talyigás-Mojzes 2004, p. 11).

In Hungary, the official legal definition was described in Act CVIII of 2001. "Electronic commerce service: a service related to the information society, the purpose of which is to sell, acquire and exchange goods or services in a business-like manner. Electronic means: the use of wired, radio, optical or other electromagnetic means for electronic data processing, storage or transmission. "

The most important points of e-commerce are: connecting remote business partners, using an electronic channel, and a sales transaction. Based on the distant parties, the grouping is broad, narrowing down the paper to discuss payment solutions related to B2C and C2C (Consumer to Consumer) commerce. In short, B2C (Business to Consumer) refers to the sale of products or services that define retail to the public, the other is a form of in-house e-commerce over the Internet where both the seller and the buyer are individuals (Vladislava et al., 2020).

Whether we look at either B2C or C2C trading, the large number of transactions and the relatively small value are more typical. Initially, sales were made only in a narrow circle, at very high fees, with an

infrastructure less suitable for online payments, but the development quickly forced the demand for mass transactions (Kovacs – Tertak, 2019).

Digital payment systems

With the technological development of communication channels (mobile phones, broadband internet, satellite services), new opportunities have also opened up for financial systems. Building on these achievements and the paradigm shift brought about by the Internet, the availability of money and money-related services has changed. The new concept of e-banking encompasses various electronic banking services. These include innovative solutions that play a major role in the proliferation of bank cards and the acceleration of national / international payment transactions.

According to Mátyás (2005): Basic requirements of e-money / digital payment system:

- Integrity: data cannot be changed between sender and recipient
- Non-repudiation: serves as evidence in case of a problem
- Authenticity: authentication, integration of security protocols into the system
- Confidentiality: only the parties involved know the details of the transactions
- Reliability: last state restorability, transaction smoothness
- Scalability: scalability criterion without avoiding overload or downtime
- Easy to use: easy to use for lay people
- Independence: independence of operations from each other

- Interoperability / compatibility: e-money can be transferred between completely different operating systems, a unified protocol is required
- Prevalence: used by as many people as possible
- Cost Effectiveness / Economy: The need to keep operating and transaction costs low
- Atomicity: the execution of the transaction can only be started if it can be guaranteed to be completed
- Divisibility: convertibility between denominations
- Sustainability: an effort against money deterioration

Credit card

"A bank card is a non-cash means of payment issued by a bank that is linked to a bank account and allows non-paper money to be transferred through them." (Gellért, 2001, p. 146) There are both debit and credit cards, which according to the participants of the transaction are the same:

- Issuing bank: The bank that issues the card to its customers, who are only users but cannot dispose of it (advantage: it provides a service for a fee / commission)
- Cardholder: The bank's customer (advantage: convenient, simple, secure)
- Merchant: Accepts the card to pay for a service or good (advantage: encourages purchase, has a turnover-increasing effect)

- **Accepting bank:** The bank that enters into a contract with the merchant for the purpose of accepting cards (advantage: it provides a service for a fee / commission).

In the first step in the card transaction process, the merchant forwards the data to the accepting bank, which initiates an authorization request to the cardholder (issuing) bank. The card company checks the validity of the card while the issuing bank checks the financial coverage. The issuing bank blocks the amount in the buyer's account, sends the data back to the accepting bank, and then to the merchant, who completes the sale. Credit card payment is part of a rather complicated multi-layered encrypted reconciliation process. In the case of credit card payments, security and the prevention of abuse are the most critical points. (Gellért, 2001)

Smart card

First-generation magnetic stripe bank cards were capable of identifying the holder for a central system. International card companies have committed themselves to chip technology, which has resulted in the EMV standard (Eurocard-Mastercard-Visa). It aims to bring developments in different directions to a common denominator and to create a common standard for the dissemination of this technology.

With the chip card solution, the amount that can be spent is stored directly on the card, so the merchant does not get the approval from the centre, but believes that the buyer has the sufficient amount of money. A terminal is required, the software deducts the given amount from the card's balance when making a payment, and then writes it to the terminal's balance. The chip card is an intelligent minicomputer that not only stores the keys used for encryption, but can also use it with its own processing unit. The key never leaves the card and its holder it can only be activated after verification. This verification is

the PIN. The chip card can be programmed by using a microprocessor, data can be uploaded in its “empty slots” and by expanding banking services, it is possible to have many more functions available to the cardholder with a single card. This solution provides additional benefits to smart card operators: it gives issuing banks access to new technologies and e-commerce payments, reduces the risk of counterfeiting for cardholders, provides new revenue streams for acquiring banks, and reduces telecommunications costs, transaction processing time, administrative and infrastructure costs, which can be reallocated e.g. to target a new customer base. (Gellért, 2001)

E-check

A digital version of a debt security widespread in Anglo-Saxon culture. This digital document has all the supplies that also qualify as a check, is digitally signed, and is much faster, more convenient, and less expensive than its paper-based type. Halfway between the paper-based and the e-check is the institution of digital check presentation, which means scanning and electronically transmitting the issued checks for a shorter settlement time. In terms of its process, the buyer digitally signs a check first, sending it to the merchant along with the certificate. It is the merchant’s job to verify the authenticity of the check and then execute it. The merchant then forwards the check to the bank and, using the interbank settlement, settles the transaction financially with the buyer's bank.

Virtual money (crypto currency)

With the development of technology, both cash and electronic money have faced new challenges, virtual money has been created. The main difference is that they only appear virtually, with these new payment solutions payment service providers promise faster, more secure, cheaper transactions. In terms of its characteristics, the difference is that while in e-money the unit of account for e-money is a legal tender, virtual ones are virtual money (eg Bitcoin, Dogecoin, Peercoin) with

a different exchange rate. The basis of virtual money is usually determined by its own demand and supply. (Murányi, 2017)

Digital money systems - practical implementation

GeldKarte

An electronic wallet called GeldKarte was created in Germany, it is based on chip-based technology. Prior to use, specific currencies must be topped up on the card, one of the types can be recharged, the other can be discarded once all currencies have been used from it. Charging can also take place via an ATM, a bank branch or a specially operated device. The transaction can be paid in cash or with a card belonging to a bank account, so the customer's current account can be easily debited. Using e-money is easy, speeding up the payment process. The cardholder authorizes the deduction of the amount from his/her card by pressing a button, which is transferred to the seller's e-cash register. The transaction is offline, the time required for payment is significantly shortened, and the process can be carried out without a PIN code or signature. The user can be informed about the balance of the card from several places, but as an additional option there is also a card reader that can be connected to the computer. The issue of data protection cannot be circumvented, as most cards in circulation are also linked to a bank account, in addition, the operator also maintains a so-called a shadow account, which summarizes the place, participants, amount, time of the transaction, which the user may not even know about. The aim was to provide comprehensive information and to issue cards that could not be linked to a bank or account, with which actual anonymous payments could be made. In summary, GeldKarte practically offers the possibility of transactions combined with economic efficiency based on the bank card system, however, the data protection aspects do not reflect the requirements of a real electronic money system.

DigiCash / eCash

The basic concept of this form of e-money was that with the permission of the bank, the user withdraws a certain amount to the digital checking account of his computer. If the customer wants to make a purchase from an online store where electronic money is accepted, they can initiate their transaction from this account after logging in. DigiCash worked like real money as they took a one-on-one chip-based local currency from the bank. This idea was also suitable for direct sales between individuals, which typically belongs to the lower segment of micropayments.

The DigiCash concept has been replaced by eCash, a software product that implements a payment system. It can be applied over the Internet with public key encryption, and the use of email was a novelty in it. The system is based on the use of electronic coins, so the user must have a bank account with a digital bank. These coins are given a serial number, which also gives them a unique identifier. The user stores the money on their own computer until it is used on their next purchase. Redeeming for cash or for different currencies is unresolved.

How the eCash system works in 5 steps:

- The user must log in to an electronic coin issuer
- Purchase coins, download them to your computer and blindly sign them for anonymity
- Purchases are made over the network, sent to the seller
- The online merchant sends the coins to the issuing bank for review, and then the bank compares them to the eCash database, eliminating any double withdrawal.
- If the transaction is valid, the validated coin will be returned to the merchant.

There may be an anonymity problem if two different users receive a coin with the same serial number, and this is revealed during the check. The second submission is considered double use, even if the second transaction is valid.

Its shortcomings can be found in the fact that it does not meet the divisibility requirements, because both the seller and the buyer may mistakenly consider the electronic coin to be their own or the others. This system can point in the direction of perfect anonymity in such a way that an intermediary logs transactions, which would improve the anonymity between the two actors, and if necessary, both the bank and the authorities can trace the parties involved. (Cameron, 1997)

Cybercash

CyberCash unifies the various payment instruments in any software that can be used by any user, merchant or bank. The system offers three credit card-based payment instruments (CyberCash, CyberCoin, CyberCheque), which is a good solution for both merchants and banks. The transaction is based on a secure credit card system and acts as a gateway between the Internet and the banking network. CyberCash software is free to use and can be used to create a virtual wallet.

How the CyberCash system works in 7 steps:

- The buyer orders the goods, the seller sends an electronic invoice for the purchase
- The buyer pays with the CyberCash wallet, i.e. sends an encrypted data packet to the seller
- The seller separates the order part from the data package, forwards the remainder to the CyberCash server with his digital signature
- The package goes on the banking network where the dedicated hardware decodes and forwards it to the seller's bank

- The seller's bank forwards it to the buyer's bank, where they either approve or reject the transaction
- This information is also received by the CyberCash server
- The server notifies the seller of the outcome of the transaction via the Internet

The background of the system is user software installed on a machine, a merchant software and a CyberCash server. The program on the customer's computer is an e-wallet, the credit card number must be entered during installation. When the buyer initiates a payment, it automatically activates itself and then receives all the information about the order and can initiate the transaction. The software then encrypts the information provided with the company's public key and sends it through the CyberCash server to the merchant, who adds his own ID and returns it to the CyberCash server. The server unpacks the message and converts it into a traditional card payment request, which forwards it to the bank. Using CyberCash for small purchases is not worth using, as the cost of a credit card can be higher than the amount paid. In addition, two new options have been introduced. One is CyberCoin, which supports micropayments, the other is CyberCheque. The downside is that it is complicated, hinders mobility and is not completely anonymous. (Guttman, 2003)

Millicent

Millicent is based on the online payment micropayment segment. The purpose of the system is to enable low-cost but secure transactions. This has been developed specifically for service purchases (e.g. news portals) that cost pennies. Its most important innovation is that it uses brokers and scripts as a means of payment that are only valid for a particular vendor who issued it. The script is a password-protected, digitally signed, serial numbered data package that is only accepted by

the seller within the expiration date. Coins from individual traders can be purchased from brokers or exchanged for another.

It is an offline digital money system that differs from the others in that it is operated by brokers and not a central payment service provider. It can be purchased both in person by cash or card and online using SET (Secure Electronic Transaction). There are basically three participants in the transaction: seller, buyer, and broker. The storage of coins is the responsibility of brokers, who can control the risk of double spending by checking their own databases. From the seller's point of view, this solution is easy to use, but the situation can be problematic for the user because coins often have to be converted if the buyer wants to buy from someone else.

Operation of the MilliCent system in 5 steps:

- The buyer obtains from the broker the coins issued by the broker to the dealer with whom he wishes to spend.
- The broker obtains the requested coin from the seller (optional, if necessary)
- The broker sells the coins to the buyer, who pays with the coins issued by the broker
- The buyer buys the product / service with a coin issued by the seller
- The remaining scripts are returned by the seller to the buyer if necessary.

It is also ensured that the seller grants permission to the broker to issue coins, thus reducing network traffic. The reliability and divisibility of transactions is a less important aspect, because the risks are negligible due to the small amount. (Glassman-Manasse-Abadi-Gauthier-Sobalvarro, 1996)

Mondex

Mondex is a smart-card-based, non-anonymous hardware e-wallet that requires special hardware to read. Coins have a central issuer, so the amount of money put into circulation can be controlled. An important feature is that “money” can only move between Mondex cards, it can be stored on a Mondex card thus ensuring complete closure. Transactions take place partly offline and regular synchronizations allow changes to be visible in the central database. Merchants cannot pay with each other for coins, but users can use it for both C2C payments. It can also be used on public networks, and its security is provided by the fact that any counterfeit cards will expire in a short time due to regular chip updates. The financial service provider constantly monitors the development of the amounts stored on the cards and, in suspicious cases, even prevents payment. (Stalder, Clement, 1999)

NetBill

This payment system is designed to sell information-based “goods” (e.g., newspapers) for which the user must open a NetBill account and transfer the consideration from there.

Operation of the NetBill system in 5 steps:

- The ordered “goods” are received in coded form by the buyer from the seller
- On the buyer's computer, the software checks for integrity and then notifies the seller
- The seller sends this confirmation to the NetBill server along with the buyer's details and the key used to encrypt the goods
- The server checks the coverage, transfers the amount, and notifies the seller
- The buyer receives the code key from the seller

It is a completely unique system, so compatibility is unresolved and its economy and scalability are questionable due to high network traffic. (Sirbu, Tygar, 1995)

PayPal

PayPal is a successful representative of a fast and widespread micropayment system. According to its basic structure, it is a loan-to-deposit model based on an independent central account manager, originally created to make C2C payments as cheap and efficient as possible on eBay. PayPal does not use a new solution, either technologically or financially, it uses e-mail to process transactions, which is why it is also commonly referred to as “e-mail money”. The user once enters the bank account and card details, and then his registration becomes complete when a minimum amount of money is transferred to the PayPal account. If you want to buy, you have to top up the amount in advance, if you also sell at the same time, the credited amount is freely available. As long as the amount is spent within the system, the cash flow is completely out of the sight of the banking system. Real value or money does not move in the e-mails, only unique transaction codes generated by the system from the sender's and recipient's e-mail addresses and the amount sent. A PayPal member can receive money from any other member, however, if the receiving party does not already have a registration, you will be notified by email how you can receive your money. The anonymity criterion is not met, nor is the flexibility only if someone within the system wants to spend for e-money. PayPal is not a bank, it does not provide credit, it does not pay interest on deposits, yet it operates as an international settlement. PayPal is not electronic money as it does not create account money in any form. (Mátyás, 2005)

3. Summary

It can be seen that the natural beneficiaries of development are always customers who demand newer and more modern, faster and easier to

use services. Business models that can be used in online commerce are significantly influenced by payment systems. The most important determinants and limitations of B2C and C2C connections are the available payment solutions. Although the traditional tools (bank card, bank transfer) are compatible with the digital system, they are not primarily designed for electronic commerce. With the advent of e-money and e-wallets, this has been eliminated as it performs the functions and properties of traditional cash in the same way only in the digital world. Most of the initial examples outlined remained at a narrow implementation level or were completely lost, while in most cases the lack of market support could be the reason for the smaller market segment. It should not be overlooked that as an integral part of financial culture, the sacrament of cash still has an advantage that can be brought closer to individual actors by increasing trust and education.

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Digital solutions in the world of accounting

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SUMMARY

Technological change can cause a cessation or radical change of certain professions. So, it is to be expected, that costs of investment in learning a profession will not be cleared. Development is necessary, this is true in field of accounting as well, which reveals several aspects of it. Based on the trends outlined below, it is easy to see that the public confidence in decentralized databases will be one of the most prominent priorities in the near future. Organisations are changing their business models because the investment in digital transformation is substantial. (*Bor Zoltán, Pál Tibor (2019)*) In 2016, ACCA devised a series of quotients about the skills and capabilities of that the accounting and finance professionals needs to remain in possession in the future. The digital quotient was one of them: 'The awareness and application of existing and emerging technologies, capabilities, practices and strategies.' (*ACCA: 2020, pp 19*) This quotient shows the backdrop of fundamental organisational and technological change through a survey of over 4,000 accountancy and finance professionals. The rate of change of digitalisation is unprecedented. The profession

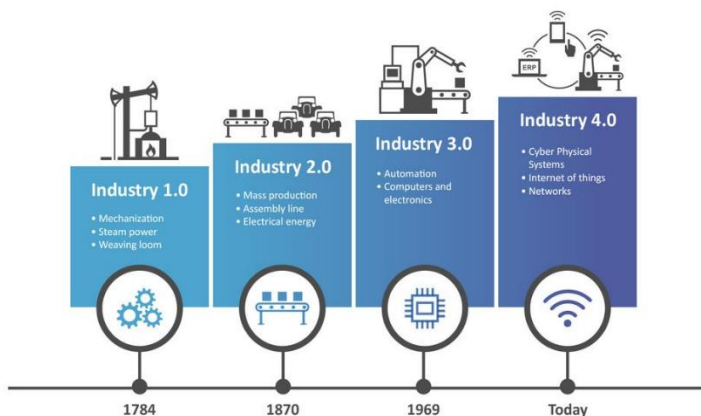


Figure 1. Industry 4.0 Revolution

Source: <https://www.btelligent.com/en/portfolio/industry-40/>

is comfortable with previous digital technologies and applications, therefore considering emerging technologies, such as blockchain and the use of coding, we often somewhat lack the ambition and the motivation to get to know and understand them. As accounting and finance professionals we have a significant opportunity to develop our digital skills. (ACCA:2020)

Industrial revolution has always meant that machines take over certain tasks from human resources, but finally people still work and get even more important, more complex, more interesting challenges. (Selmeczi-Kovács, Zsolt ; Kuttor, Dániel ; Németh, Gábor ; Pál, Zsolt (2020))

The impact of digital changes in finance is determined by five external forces, that are: (Figure 2)

- Firstly, **Velocity**: the rate at which the business is changing.

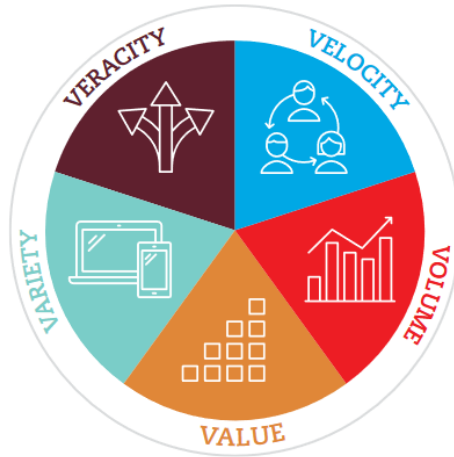


Figure 2: Five Vs of change
Source: ACCA: 2020, pp. 11

- The second one is **Volume**: nowadays the increased volume of transactions are more significant.
- The next one is **Value**: It is the demand to derive insight, analysis, and prediction from the data flow; to understand and model the business better.
- The fourth one is **Variety** – It is how technology is driving us to use a variety of systems, a variety of data sources and a variety of project management models.
- The last one is **Veracity** – the reliability, quality, truth and prejudice of the data on which we base business decisions. (*ACCA: 2020*)

The combination of these five forces means that the workplace itself undergoes a transformation, and consequently the role of accountancy and finance professionals in organisations is changing.

Data production is a function that machines can fulfil; therefore, human contribution will not be needed in this field. However, scope of activities that requires competences - such as business partner - may remain people's job in the future. (*Bozsik Sándor; Lipták Katalin; Musinszki, Zoltán ; Szemán Judit, (2021)*)

At the same time, the processes of digital change are made more complex by the fact that access and sharing of information has become much simpler. However, you must keep in mind the worrisome trends of our days hindering the 'consumption' of information: fake news, propaganda, social media filter bubbles, identity theft, cyber-crime, etc., which are obstacles of access to relevant information and its logical systematisation if you do not have the necessary knowledge, which is indispensable to make smart decisions in finance or as a consumer of goods. (*Kovács Levente, Terták Elemér ((2019))*)

Digital quotient has four components. Level of relevance of each potential component was evaluated, as part of a survey. (Figure 3)



Figure 3: Four components of digital quotient
(Source: ACCA, 2020, pp. 22)

It is a fact that each of these components affect the digital change of individuals and companies.

- **‘Existing and emerging technologies’** is the first component. It shows that the relevance of several technologies fundamental to finance was evaluated.
- In relation to **‘Capabilities’** the specific skills needed to embrace and deploy relevant technologies were considered.
- In **‘Digital practice’** the techniques of managing digital environment that are relevant to accountancy and finance were considered.
- **‘Strategy’** is the last component. It shows that the relevance of digital strategy to the accountancy and finance was considered.

Maintaining the right level of digital skills to be effective in one’s role is essential for accountancy and finance professionals. (*Kántor Béla (2015)*) Developing our digital skills in a changing world is a continuous process. Nowadays many experts have predicted the development of blockchain technology. (*Gróf, Pál ; Süveges, Gábor ; Szemán, Judit, (2017)*) However the number of public blockchains is few, while there are examples of private blockchains developing in industries where guaranteeing provenance between trusted parties is an issue. (*ACCA, 2020*)

In this article we introduce the potential application of blockchain for the accounting professionals as distributed ledger technology is a shift from conventional accounting and is fundamentally changing the functioning of the accounting systems.

Real-time accounting

In the financial world, precision, accuracy, and strict deadlines are essential, as we need to be able to process more and more data without loss of quality. We use a myriad of island solutions, which, due to their heterogeneous structure, result in additional work and opacity.

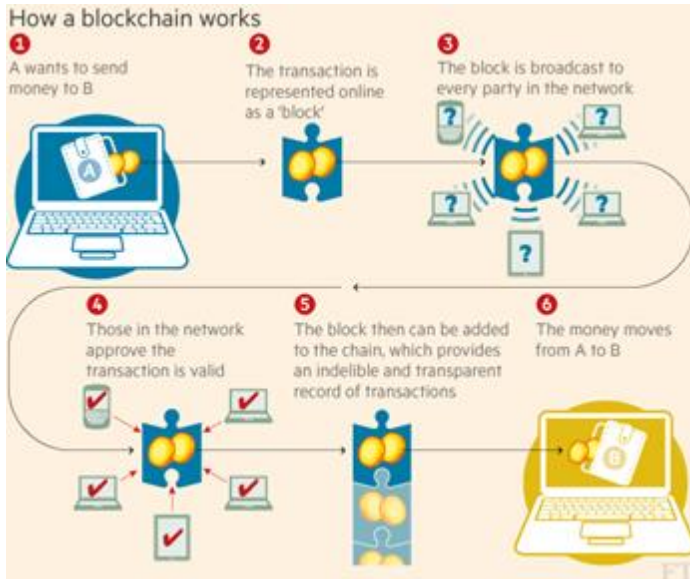


FIGURE 4: Operation of the Blockchain
 (SOURCE: World Economic Forum: 2016b)

The Blockchain database - which was originally the technology behind bitcoin - is a so-called “shared folder” or otherwise known as “Distributed Ledger Technologies” (DLTs, Figure 4.). This is a payment system without central (state) control which means that the validity of the data contained in it is guaranteed by the users of the folder themselves. As each user has a copy, so the system is secured from both IT and physical attacks. Blockchain prevents double spending by verifying all payment transactions in such a way that the algorithm used for verification is unique and more than half of the network points are the same that each of the recent transactions was

unique. Verified transactions are written by a cryptographic process into a block of data, which is linked to a special algorithm so-called “*hasn*” to the previous data blocks. Then the entire folder is synchronized with all copies of it and each user stores one copy. This is how the blockchain is created. (*ITMA Hungary, 2017*)

This IT innovation could have many new fields, which can be used for any database that currently requires third-party validation. Regarding the financial processes, real-time accounting can be introduced, so the transactions can be recorded at the same time and in the same way by both parties. (*Kuttor, Dániel, Zsolt, Pál, 2019*) Of course, this would also have a major impact on the audit, as most of the audits could be carried out online and its traditional methods, such as balance sheet letters, would disappear. The scheduling of the activity would also be closer to a real-time solution if system-audited accounting of economic events were available in real time. Although these mentioned benefits should lead to a reduction in audit fees. However, the consequence of this process is that it will also be necessary to use IT experts in audit firms, which has the opposite effect on its fee. (*Interstand Kft, 2017*)

Today, the processing of documents and the production of data have changed greatly, but its evaluation is not separated, but takes place in parallel. In addition to internal control, the new business solutions affect the audit. It is already on the market new business services based on an intelligent cloud-based service, even a “smart” audit platform. Each Big4 is building blockchain knowledge centers and is actively looking for opportunities in this area. (*KPMG, 2017*)

The Big Four accountancy firms have started a variety of initiatives and are currently involved in many projects exploring distribute ledger technologies and their implementations.

Table 1: Blockchain applications by the Big Four companies

Company	Achievements in blockchain applications
Deloitte	<ul style="list-style-type: none"> • It developed the first blockchain based software platform Rubix, that allows company's employees and clients to build customized blockchain and smart contract applications for different use cases (Minichiello 2015). The platform is designed with four application areas: 1) reconciliation – for automation of financial reconciliations between company's internal departments or with its counterparties; 2) audit – allowing real time auditing as well as optimizing auditor's involvement in the process; 3) land register – for eliminating the threat of corruption by digitizing and decentralizing a jurisdiction's property deed transfers; and 4) loyalty points – allows for added features and insights for customers by creating a more efficient loyalty points program. ⁸ • The company claimed that in 2017 it managed in performing its first blockchain audit with all audit standards applied – an accomplishment for its continuous and dedicated efforts to automate some of the auditing processes for its clients. • It launched Blockchain laboratories in New York, Dublin and Hong Kong (Fintech News Hong Kong 2017; Deloitte 2017) with more than 800 experts engaged, seeking for different blockchain solutions.
EY	<ul style="list-style-type: none"> • The company is involved in the project Libra, focused on distributed ledger technologies and their applications (Allison 2015). • It has developed EY Ops Chain, which has many practical implementations for optimizing accounting work. Primarily, it focuses on areas as payments, invoicing, inventory information, pricing, and digital contract integration (Prisco 2017). • It has developed Blockchain Analyzer, especially designed for auditing of companies that are involved in cryptocurrency transactions. It could be used as a supporting tool for auditing blockchain assets, liabilities, equity, and smart contracts (Thomas 2018).
KPMG	<ul style="list-style-type: none"> • In cooperation with Microsoft, the company developed the innovative workspace Microsoft Blockchain Nodes, focusing on blockchain application in healthcare and the public sector. Moreover, the use of KPMG Digital Ledger Services is designed to assist companies in providing financial services with expected benefits being efficient automated back-office operations, faster and more secured transactions, reduced costs (KPMG 2017), (Zhang et al. 2020).
PWC	<ul style="list-style-type: none"> • The company developed the Blockchain Validation Solution, a special audit tool for seeking and detecting indicator patterns for risks that might occur in the long run. • It assists its customers as stock exchanges and digital wallet providers in blockchain applications, including control and implementation of testing standards (Buntinx 2018). • It conducted a profound survey on blockchain applications for the benefit of energy producers and consumers (PWC 2017). • The company sponsored the United Nations's ID2020 event on the future of identity held in June 2017 (Del Castillo 2017).

Source: (Allison 2015), (Bonsón and Bednárová 2019), (Buntinx 2018), (Del Castillo 2017), (Deloitte 2017), (Fintech News Hong Kong 2017), (KPMG 2017), (Prisco 2017), (PWC 2017), (Thomas 2018), (Zhang et al. 2020).

Source: Stancheva-Todorova, 2020, pp. 199

CONCLUSIONS

The powerful impacts and expectations of innovative solutions point beyond the accounting profession and professionals, they affect, e.g. the work and operation of politicians, organizations representing various professions, companies, public administrations, and educational institutions. Therefore, it is essential and urgent to develop our digital capabilities and skills, to use constantly evolving modern tools and methods, to eliminate the general digital divide between those who have access to and use it and those who cannot take advantage of innovative, digital, and related online services.

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Cash usage habits and the development of the electronic payment system in Hungary

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Abstract

The purpose of this paper is to present the processes related to electronic payment and cash usage habits in Hungary. I would like to determine changes in recent years and identify what trends can be observed. The main focus is the consumer payment behavior and it is important to mention that the focus of this article is cash usage for transaction purposes, I do not plan to present the cash for investment purposes in detail only as far as the subject requires. My aim is to present the processes related to electronic payment and transaction cash use and to examine the development of these processes based on data from the past years. Besides, I try to identify the trends in the payment habits of the Hungarian population. I am trying to gather innovations and initiatives that affect and shape the payment system over the past decade, both from the technological and regulatory sides. I also examine the topic in an international context and try to judge the maturity of the Hungarian payment system based on a comparison with European countries. I attempt to outline how the popularity of electronic payments will develop in the coming years and how long it is possible to reduce the daily use of cash in Hungary.

Keywords: cash usage, electronic payment, consumer payment behaviour

Despite the rapid development of electronic payment systems and the increasing popularity of cashless payments, cash remains the most popular means of payment in the world (G4S, 2018). This is the case in Hungary, where seems that in addition to the spread of electronic

payments, the cash on hand is also growing year by year. The value of cash in circulation at the end of June 2020 was HUF 6,825 billion, which shows a 12% increase compared to the same period of 2019, excluding seasonal effects. The value of the currency in circulation increased significantly during March 2020, followed by slow consolidation in April and May (MNB, 2020a).

The phenomenon is due to the increase in the demand for cash for savings, which can be explained primarily by the declining interest rate environment. In addition to declining interest rates, there are also individual effects that increase with the amount of cash held for savings (Belházyné Illés & Leszkó, 2017). Although the increase in the cash on hand is not only a Hungarian phenomenon, the situation is similar in other countries over the world. Especially in a time of global crisis, when the proportion of cash-held assets is otherwise increasing, as shown by past experience (Bélyácz – Pintér, 2018).

The paper aims to present the processes related to electronic payment and cash use, present their changes in recent years and identify what trends can be observed. I also examine the topic in an international context and try to judge the maturity of the Hungarian payment system based on a comparison with European countries. I attempt to outline how the popularity of electronic payments will develop in the coming years and how long it is possible to reduce the daily use of cash in Hungary. At this point, I am going to identify the factors influencing the openness to electronic payment and to present the development of the infrastructure.

During my research, cash usage for transaction purposes is the focus, I do not present the cash for investment purposes in detail. The transaction cash demand is the amount of cash that is used to perform payment transactions in cash, e.g. necessary for the purchase of goods and services. This volume of banknotes and coins is related to income and the prevalence of cashless (card or other electronic) purchases. In

contrast, cash demand for savings is the amount of cash that is in the form of cash as a result of the portfolio decisions of economic agents. Cash is generally considered a risk-free, liquid asset that is becoming more and more expensive with ever-higher yields. As yields rise, investment decision-makers are increasingly willing to invest in riskier assets and reduce the proportion of their liquid assets. Therefore, there is an inverse relationship between the demand for cash for savings and the size of the interest rate (Belházyné Illés & Leszkó, 2017).

Incentive innovations, technological background

As defined by Sharma (2013), the use of technology in modern banking services that we know as electronic payment systems make banking performance more optimal, various activities can be implemented quickly and accurately while impacting productivity (Pintér – Bagó, 2020a). The definition is still valid today but needs to be supplemented by new entrants such as FinTech payment service providers and BigTech companies that have reformed the traditional payment systems.

Like many other industries, the financial sector has undergone a huge development over the past decade, with several innovative solutions emerging aimed at modernizing the payment system. From a user's point of view, the introduction of contactless cards in Hungary was a huge milestone in 2011. Contactless payment is based on near-field communication (NFC) technology, which is a standard radio communication technology that allows connecting devices within a 4 centimeter range by waving or tapping the objects without providing a signature or PIN for verification. The feature is usually embedded in conventional payment cards, but also in other devices such as mobile phones and key fobs (Trütsch, 2014). This type of payment has become increasingly popular over the years, for the first time in 2016 there were more contactless transactions than traditional credit card

usage, and in 2020, 92% of card purchases were made with a contactless card (MNB, 2016, 2020b).

The next level of innovation was the emergence of an also NFC-based construction, the mobile payment service. At the end of 2016, the first Android digital wallet and mobile payment solution were released in Hungary and Apple Pay was available to domestic iOS users in May 2019. Based on Lemák's survey (2021), there are currently seven banks in Hungary that offer a digital wallet for Android users. Unlike Apple, Google has opened its platform for banks to develop its own contactless-capable mobile payment solution. The popularity of technology is reflected in the number of cards registered in the wallet application, which reached half a million in 2019, and the number of transactions made through them quadrupled compared to 2018 (MNB, 2020b).

As regards the regulatory side, the Revised Payment Services Directive (PSD2) entered into force in September 2019 with the aim of developing digital financial services. According to Mansfield-Devine (2016), PSD2 means that any business – a social network, say, or a mobile app developer – can handle payments on behalf of its users. All it needs is the user's permission and access to the bank's API (Application Programming Interface), which the bank has to grant. As a result, the open banking era started in Hungary in 2019. So far, the regulator authority has registered four companies providing account information services and one service provider acting as a payment originator on the domestic market. The potential of open banking is still being assessed by the participants involved, but the Central Bank expects significant developments in open banking and payment services in 2021 (Németh, 2021). As we have seen, regulation is also important in financial culture, and all these efforts must be supported by innovations that also support financial law (Pintér – Bagó, 2020b), (Kovács – Sütő, 2020), (Kovács, 2017)

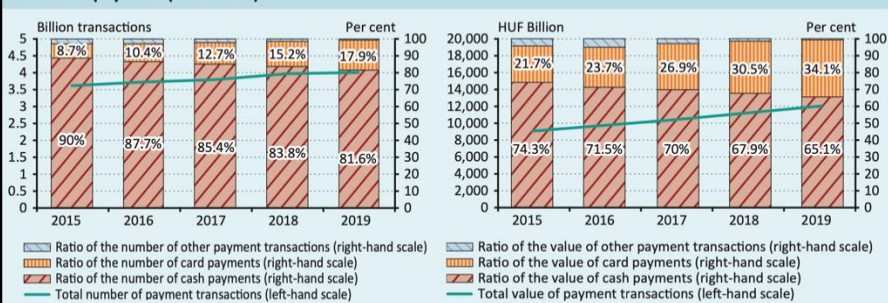
On March 2, 2020, the instant payment service was launched, which is a milestone in domestic payments. The service is mandatory for all domestic banks and it covers credit transfers up to HUF 10 million (€27.700), which will be settled within 5 seconds (compared to the 10 seconds being the European maximum benchmark). It only requires having a mobile phone number within the European Economic Area or an email address, and a domestic tax identification number (IMF, 2019). In the case of HUF transfers, the stable growth trend of the previous period continued, with a significant increase in the value of each HUF transfer compared to the same period of 2019 by almost 12 percent (MNB, 2020c).

Hungary has already had an advanced infrastructure in the field of electronic payment. From 1 January 2021, taxable persons with a cash register (traders, service providers) are obliged to provide consumers, customers with the possibility of electronic payment and the continuous availability of electronic payment (Jogtár, 2021). The measure taken by the government serves to whiten the economy on the one hand and to provide electronic payment in commerce on the other. It affects about 60.000 businesses in Hungary.

Payment habits of the Hungarian population

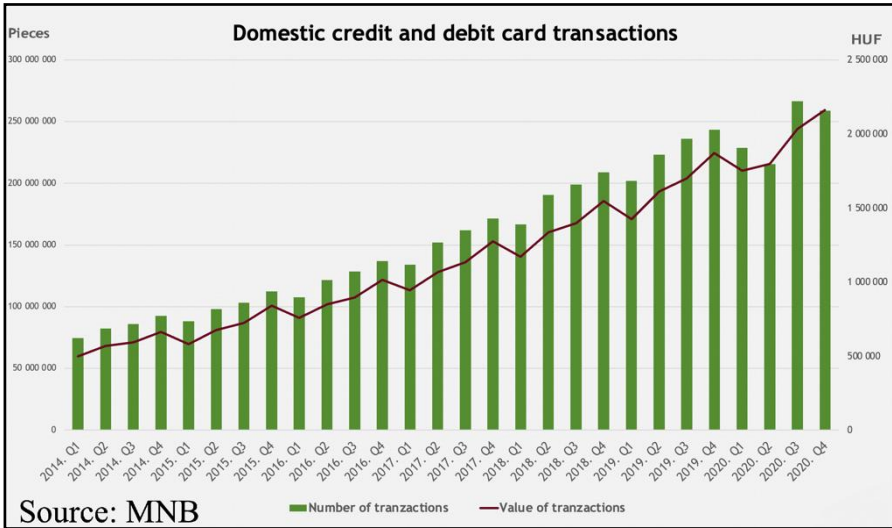
Since the introduction of online cash registers in 2013, the Central Bank of Hungary has issued annual reports on the situation of the payment system. As shown below, the ratio of electronic payments -both by number and value- is increasing year by year, but people mostly prefer cash payments. Due to the emergence of more convenient payment arrangements and the wider e-payment infrastructure, the number of debit and credit card payments doubled between 2015 and 2019, and in terms of the amount, more than a third of the total consumption was made with a card payment in 2019.

Ratio of the number and value of payment transactions included in the database of online cash registers by method of payment (2015-2019)



Source: MNB

Data for 2020 show a further increase in card usage. In 2020 Q1, after a trend-like decline at the beginning of the year, card purchases also decreased in the second quarter.



Source: MNB

This is due to the emergence of the COVID-19 epidemic and the measures taken to combat the epidemic, which has caused a general decrease in consumption of the population. However, Q3 and

Q4 resulted in an unprecedented use of cards, one of the main reasons being to encourage contactless payment among the population. Because of the emergency caused by the spread of the COVID-19 epidemic, in March 2020, the Hungarian government raised the limit of non-contact payment transactions that can be carried out without the PIN code (from HUF 5.000 to HUF 15.000) to increase health security (Fizetési Pont, 2020).

Taking into account the whole year, the popularity of cashless payments continued to increase in 2020. While GDP volume was 5,1% lower in 2020 than in the previous year (KSH, 2021a), a record level of card payments was made and the value of cash withdrawals fell for the first time during the period considered. According to the Central Bank database, since 2014, the cash withdrawal value has steadily increased over the years, with an average of 6-7%. Compared to this, the 5,45% decrease experienced in 2020 is significant. The number of cash withdrawals decreased more spectacularly, between 2014 and 2019 there were a constant 105-106 million cash withdrawals. In comparison, it did not reach 92 million in 2020, a decrease of 13,11% compared to the previous period. These are related to the change in consumer habits, which is a direct effect of epidemiological measures such as the lockdown, the introduction of the home office, and the restrictions on opening hours of shops and restaurants.

Despite the efforts of the government and the regulator, the use of transaction demand for cash has not been drastically reduced so far. But why do we insist so much on cash? According to the IMF research (2019), there are typical determinants of cash usage, such as income, interest rates, and inflation. Besides, there are specific factors that are relevant for Hungary. One of the most important is the financial transaction tax. Since 2014, two free ATM withdrawals are allowed per month, which do not exceed HUF 150.000 (about €415). The current tax rate is 0,3 percent for financial transactions and 0,6 percent for cash withdrawals. Another significant factor is the shadow

economy, the size of which can only be estimated. The government has introduced comprehensive measures to reduce the shadow economy (electronic cash registers, online invoice system), which may have contributed to the recent decelerated growth of currency in circulation. The instant payment system already presented is also a specific factor that can be beneficial for the promotion of electronic payment solutions.

Based on the analysis of the data from the Central Bank's 2017 questionnaire survey, it can be said that the Hungarian population can still be considered highly cash-oriented. Especially among those aged 15-29 and over 60 who have low earnings. The role of cash is further enhanced by the fact that in Hungary the proportion of those who receive their regular income or a part of it in cash is high compared to the European Union. The reasons for clinging to cash include, for example, the perceived speed of cash payment or a better saving of income, but the role of habit is also considerable. (Végső et al., 2018).

In recent decades, wages in cash have been cut off and almost all employees are paid by bank transfer. However, the state still pays a significant proportion of pensions and pension benefits in cash by postal delivery to those concerned. On average, the Hungarian Post delivers pensions and pension benefits to approximately 1.1 million persons per month (Magyar Posta, 2020). According to the Central Statistical Office, the number of Hungarian pensioners reached 2,56 million in 2020 (KSH, 2021c). It means, 43% of pensioners receive their earnings in cash, which is 11% of the total population. The cash orientation of the young generation is due to low employment. In last year, 4,9% of the 15-19 age group and 48% of the 20-24 age group had a declared job (KSH, 2021b). The remainder probably has no monthly electronic income, so they are mostly potential cash users.

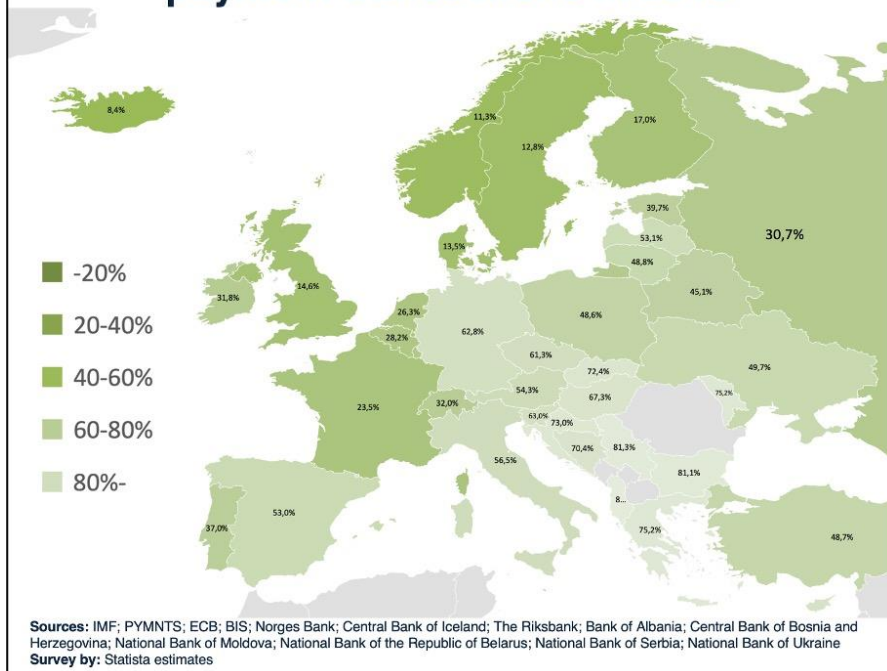
The last broad survey on cash use habits was carried out in 2018. About two-thirds of the Hungarian population said that they

currently prefer to pay with cash rather than cards, but nearly half of the group can imagine that in the future they will pay electronically, which may be motivated by the expansion of electronic banking services and the reduction of related fees. Mostly the majority of pensioners and lowest-income groups over the age of 60 insist on cash use (Pénzügyi Szemle, 2019). The fact that the majority of the Hungarian population is generally cash-oriented is due to several reasons. One of these may be the habit, that people are accustomed to cash during daily purchases. Another is that they can better realize the value of money if they pay in physical form and the income can have better economized.

European context

From the data so far, it can be seen that electronic payment is gaining ground in Hungary, but it is also worth examining the international situation for the evaluation. Statista surveyed the estimate of the share of cash in total POS payment transactions in 2019. This methodology tries to put cash withdrawals, either at an ATM or OTC, in the perspective of all payment transactions (withdrawals+card payment+e-money transactions) within a country. The numbers provided there are based on calculations because no data is available that covers the exact volume of transactions conducted with cash. In the survey, Hungary ranks 30th out of 38 countries with a 67,3% share of the cash. The average of the countries surveyed is 47,15% and the average of the euro area is 46,55%. As it seems on the map, the best performing countries are Iceland, the Scandinavian countries, and the United Kingdom, which are below 20%. At the end of the list are Albania, Serbia, Bulgaria, Moldova, and Greece, mainly Balkan countries. Hungary is far away from the forefront, but it performs well at the regional level in terms of the survey.

Estimate of the share of cash in total POS payment transactions in 2019



However, Hungary is among the first in terms of the proportion of contactless payments. Based on the number of payments processed by MasterCard in 2018, Hungarians were in 4th place with 82%. This is outstanding, especially to the European average of 48%. In terms of the contactless ratio within card payments, only the Czech Republic, Georgia and Poland achieved better results (Statista, 2018). In 2019, the ratio continued to improve, contactless transactions representing 92% in the physical purchases of domestic credit and debit cards (MNB, 2020b). The current interchange fee in Hungary is 0,3%, which is the second-lowest in Europe after France (0,21%). The list is led by Poland (1,53%), Croatia (1,48%), and Romania (1,34%), so the

Hungarian fee is not only favorable compared to the European average of 0,95%, but also unique in the region (Resendiz, 2021).

Sweden has one of the most advanced payment systems in the world with a high level of financial culture, where the question of the feasibility of a cashless society was first raised. In Sweden, the development of an electronic payment system has long been a top priority. The Swedish cash stock peaked in 2007, the decline in cash use has since been significant, especially in 2017, and appears to continue to decline in a stable manner (Arvidsson, 2018). It should be noted that the strong declining trend of cash used in the Scandinavian countries during the 2010s, is not representative of the global average (Capgemini & BNP Paribas, 2017). The success of the Swedish situation lies in the perception of consumers, that is, society. Cashless payment goes hand in hand with the Swedish way of life. The shift towards a cashless society is driven by FinTech, which is based on a high degree of trust (Maxia, 2020), (Pintér – Bagó, 2020c). Confidence in banks and other financial service providers is self-evident among the Swedish population, not only open to innovation, but they also require it.

Another example to follow in Europe is the United Kingdom. In terms of cash demand, their situation is similar to that of Hungary. While the transactional use of cash has declined, the value of banknotes in circulation (NIC) has increased. Between 2005 and 2017, the value of NIC doubled. Even adjusting for rising economic activity and price levels, notes in circulation has generally been trending upwards since the early 1990s, following a European trend (Caswell et al., 2020). Besides, the rate of electronic payment increased rapidly and measures were successfully implemented to change transaction cash usage patterns. In 2018, the volume of UK payments made using cards overtook cash transactions for the first time. As cash use falls, the UK's cash infrastructure is shrinking in a self-perpetuating cycle. As ATM and bank branch infrastructure shrinks, more and more

consumers are pushed towards alternative providers, such as the Post Office, or towards digital payments. In the UK's view, with fewer consumers withdrawing cash, the costs of maintaining cash infrastructure are shared across a shrinking pool of transactions (Statham et al., 2020).

But there are also promising countries in the Central European region, such as Poland, which has become an enthusiastic early adopter of the contactless payment system. In December 2018, 85% of cashless payments in Poland are made with domestic contactless cards. Part of Poland's advancement has been the influence of the Cashless Poland Foundation, a committee set up specifically to increase the advancement of NFC technology in Poland. The work of this committee, particularly its efforts to provide micro and small businesses with free contactless terminals, has rapidly increased the country's willingness to pay cashless. The example of Poland also shows that a cashless society is the way of the future (300Brains, 2019). According to the Polish Central Bank (Narodowy Bank Polski, 2020), in the second quarter of 2020, the share of contactless payments in the total number of non-cash payments was 92.9%. The maturity of the Hungarian payment system is well reflected in the fact that almost the same number was achieved (92%) on the Hungarian market in 2020.

Conclusion

It can be seen that although the Hungarian society is generally highly cash-oriented, it is increasingly open to electronic payment. The conversion process to cash-free payment has been further strengthened by the COVID-19 situation and the Hungarian market was not left out of the global digitization trends and the transformation catalyzed by the epidemic situation. Although online banking and financial management have been increasing in the last few years, the

pandemic situation has accelerated. New consumer groups have also appeared in the online banking area, who previously rejected this rigorously, for example, a significant proportion of people over the age of 60 (Danóczy & Sajtos, 2021).

The competition generated by open banking involves the emergence of new entrants and services, with a direct impact on the reduction in transaction cash demand. Besides the innovation, the developed infrastructure will further accelerate the trend in the spread of electronic payments in the coming years. In my opinion, the number of domestic electronic payment transactions could reach up to 300 million in the third quarter of 2021, and the value of electronic purchases is expected to reach cash by the end of 2023.

A realistic goal is to achieve the European average over the next five years. To do so, the willingness to pay electronically should be increased, notably by measures aimed at the most cash-oriented groups. The lesson of the Swedish model is that the transition can really be successful if the attitudes of young people change. In my opinion, the most successful means of this is to create a high level of financial culture among young people, even at school age. As far as pensioners are concerned, they are experiencing some kind of digital switchover. One reason for this is that in the coming years (and for a few years now), determining the percentage of people reaching retirement age will be paid by bank transfer and it is likely that the vast majority will also claim their pension in this form.

It would be a huge step forward if the structure of financial investments could be changed and decrease the share of cash demand for savings. For this, it should be necessary to offer a beneficial alternative to those with low income and low savings, the easiest way would be to increase deposit interest rates and increasing confidence in financial institutions. Statistics show that measures to reduce the

shadow economy also have a positive impact on the reduction of cash use.

Overall, there are still plenty of opportunities to increase the number of users of electronic payments, but a radical reduction cannot be triggered without government and legal intervention. Regulatory bodies and service providers can only encourage the process, which is important and necessary but is not enough in itself to change the everyday habits of society. The options are given, the question is, what is the state's plan with cash in the long run?

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The impact of Big Data on market competitiveness

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Abstract

Markets are volatile and consumer demand changes rapidly. Companies face great challenges to effectively control their business processes and retain their competitive advantages. Affordable information technologies enable organizations to develop their data generation, data capture and data utilization capabilities. Large quantities of data can no longer be processed by traditional means. Big Data management is quickly becoming essential. The impact of Big Data on market competitiveness is a complex subject. Companies that make heavy investments without developing necessary capabilities struggle while others that neglect Big Data entirely can quickly lose market share.

Research Method

This article is an exploration of Big Data technologies and a review of the current state of the art from a managerial perspective. This article focuses on informational resources and organization adaptability as the primary variable in firm competitiveness.

Key Concepts

Data sets that can no longer be processed by traditional means are considered Big Data (volume in the millions). Three main attributes of Big Data:

- Volume: Quantity of data available.
- Velocity: The number of incoming data streams
- Variety: Types of data (video, text, picture, sound, etc.)

Big Data Analytics focuses on processing large quantities of data to extract valuable actionable information. It can be split into three parts: the ability to recognize patterns, the ability to acquire, and the ability to reconfigure. Pattern recognition is the foundation of finding new opportunities, the ability to acquire means the organizational capability to effectively utilize resources. Reconfiguration means the ability to combine firm resources with firm capabilities in new configurations (Wamba et al. 2020). Big Data Analytics is a toolset developed to minimize costs in acquiring valuable informational resources (Tabesh et al. 2019).

Big Data Analytics tools (Tabesh et al. 2019).:

Descriptive (present)

- Clustering: Grouping customers based on spending habits and available funds.
- Association Rule Discovery: Grouping products. Customers usually purchase certain things together with high probability.
- Sequential Patterns Discovery: Sequential behavioral data sets.

Predictive (past)

- Classification: Grouping based on personal habits and personal attributes.
- Regression: Comparing current and past market states to predict future demand.
- Anomaly detection: Looking for outliers, variance to improve product and service quality.

IoT (Internet of Things): IoT means a network of interconnected smart devices that can track, communicate and provide data in real-time.

ICT (Information and Communication Technologies): Systems and electronic devices that record and transmit data.

Significance of the topic

Big Data is one of the hottest topics among management consulting firms, increasing investment into the technology is proof of its growing significance (Mikalef et al. 2020). It serves as a backend for the utilization of IoT devices to overcome the market competition (Sestino et al. 2020). The decreasing costs fuel the growing adoption (Amankwah - Adomako, 2018). Big Data means the acquisition and processing of large quantities of data sets, in most cases, these data sets originate across the supply chain, gathered from e-commerce businesses, direct vendors, and marketing agencies that gather and sell them to companies (Zhe Jin - Wagman, 2020).

ICT platforms allow key consumers to influence demand and disproportionately utilize their position in key network nodes (Lammi - Pantzar, 2019). Global digital commerce push markets to harmonize demand despite cultural differences, and reduce transactional costs (Loebbeckea - Picot, 2015) Large investments into technological infrastructure allow companies to quickly anticipate changes in the market, it enables firms to form new strategic cooperations to share data, control the markets, and consumer freedom (Zhe Jin - Wagman, 2020). Even though negative externalities exist data sharing could bring various industries closer to realize new synergies for more sustainable economic growth. (Tseng et al. 2018). The adoption of Big Data among top firms may cause markets to trend towards oligopolies or monopolies due to the heavy investment requirements and low supply of qualified data scientists (Loebbeckea - Picot, 2015). Even with the dangers of the erosion of market competition, it is not clear if the new market conditions would be detrimental to consumers due to

cheaper and better products (Zhe Jin - Wagman, 2020) Further legislation may cause to decrease in supply which can push certain consumers out of the market (Loebbeckea - Picot, 2015).

The current market environment is turbulent, and globally interconnected. The growing innovation in products and services necessitates further investment into the research of firm efficiency and firm adaptability, especially amongst firms that can combine traditional and new resources to satisfy quickly morphing short-term demand and not fall behind in the long term (Wamba et al. 2020). Business development has its roots in proper financial planning. Large technological investments require the parallel development of financial processes focusing on the financial culture of firms (Kovács, 2017)

According to the MIT Sloan Management Review companies that adopt Big Data and much more likely to develop new products and services (Mikalef et al. 2020). Innovative corporations and much more likely to adopt new technologies leading to even more innovation. Firms that properly manage the change grow significantly faster (Mikalef et al. 2020).

Firm resources can be split into multiple categories. Normal resources that don't generate competitive advantage, but are required for functionally, and unique resources that account for all the firm's competitive edge. Organizational capability is the ability of the firm to effectively utilize its complex resources. Big Data Analytics generates unique resources, but it can only lead to market advantage in the long term if the firm is capable of integrating it. Short-term gains are still possible even if the long-term capabilities are not present, by forming strategic partnerships (Amankwah - Adomako, 2018).

The biggest hurdles in Big Data adoption are the lack of technological resources and underdeveloped organizational culture. The lack of technological resources includes both infrastructure and human

resources. The organizational culture is underdeveloped if it can't support the adoption of new technologies in everyday operations and requires heavy reengineering because the employees on various levels don't have access to or aren't capable of processing and utilizing information to increase the quality of their decision making and output. Data-centric organizational support can only manifest when employees are empowered to convert data into information (Tabesh et al. 2019). The implications of the current organizational transformations on the employment market require more research (Loebbecke - Picot, 2015).

In the traditional market, the consumers only influenced the markets with their spending, in the new digital economy everyone generates value by generating behavioral data (Lammi - Pantzar, 2019). Big Data allows marketing experts to discover latent consumer demands to generate large market shares for their firm with the first-mover advantage (Sestino et al. 2020). Regulations that enforce market competition treat the relationship between consumers and the company separately from the relationships between firms. The importance of ensuring companies don't abuse the information asymmetry between them and the consumer is increasing, putting pressure on regulators to consider new emerging technologies and their impact on consumer protection (Zhe Jin - Wagman, 2020).

Ways digital companies exploit competitive advantages and high market share (Zhe Jin - Wagman, 2020):

- Exclusivity and curation: The market-leading platform demand exclusivity and rank orders participants based on hidden criteria
- „Voluntary” data sharing: Platforms incentivize the sharing of extra data that would otherwise be unnecessary for their operation
- Closed networks: Platforms trap consumers with network effect which states that every extra user generates value for all existing users thus making leaving the platforms very punishing and undesirable

- Information overload: The users' „information appetite” gets exhausted so they lack the desire to investigate further.
- Saving on data security: Platforms reduce costs and gain market advantage by not taking care of user data properly because the fines are too low to be detrimental

Sources of competitive advantage

- Companies don't have to demonstrate how they are utilizing the collected data (Zhe Jin - Wagman, 2020). The combination of valuable, rare, and hard to imitate resources are the bases of competitive advantage. Big Data resources are „easy” to copy, thus the key to their usefulness lies in the organizational capability to utilize the data, secure it or leverage it for strategic partnerships (Mikalef et al. 2020).
- Multi-channel interactions with consumers lead to greater consumer participation, brand loyalty, and more data which helps fine-tune products and services (Sestino et al. 2020).
- With the integration of IoT devices, we can monitor and control business processes across the whole firm with real-time data-enabled corrections reducing lead times and unnecessary costs (Sestino et al. 2020).
- The longer a firm utilizes Big Data the more its pattern recognition and prediction capabilities increase thus making it more difficult for late adopters to catch up (Tabesh et al. 2019).

Firm requirements

The consolidation of various industries puts a large pressure on the limited resources available to companies and their ability to cultivate capabilities to function in a data-driven environment (Amankwah - Adomako, 2018). The key goal behind IoT integration is to reduce cycle times and increase control over business processes by

automation. They supply data for product development from the prototype stage (Sestino et al. 2020).

The continuity of data collection is a key aspect of functional Big Data (Sestino et al. 2020). The dynamism of markets (how individual industries adept at different paces) and organization agility is linked and should be handled together for mid and long-term stability (Wamba et al. 2020).

The composition of the workforce is critical. As firms compete for market share and their processes get more efficient and effective profit margins usually decrease. In response they often cut back on the workforce which in turn decreases their competitiveness and they fall behind (Loebbeckea - Picot, 2015). The management must integrate leadership, management control, human resources, and strategic planning to achieve sustainable growth (Sestino et al. 2020). When it comes to Big Data it's important that middle management has the necessary knowledge and is empowered to coordinate with data scientists to influence business processes and that it is not just the sole purview of top management (Tabesh et al. 2019).

Conclusions

Big Data motivations:

- Reduce competition - increase operational efficiency to support price reductions
- Identify market gaps - predict trends
- Increase market share - reposition existing products
- Increase supply - redefine business processes
- Generate demand - increase the perceived value of products and services

The impact of Big Data on human behavior is not yet fully understood (Loebbeckea - Picot, 2015). Big Data utilization must switch from an IT perspective to a business one. Organizational culture must be prepared for the integration of IoT and ICT technologies. There are endless amounts of customizations and improvements one can make, but the costs can get out of hand quickly (Sestino et al. 2020).

Most of the Big Data literature was written by management consultants. The relationship between competitive advantage and Big Data is not yet conclusive (Mikalef et al. 2020). Data like any other resource without proper utilization does not provide any benefit, it's up to the firms to develop the necessary capabilities or the proper strategy for utilization otherwise it can lead to the reduction of organizational cohesion (Amankwah - Adomako, 2018). Corporations can't be afraid to make costly changes based on Big Data Analytics otherwise their potential will never manifest (Amankwah - Adomako, 2018). In highly dynamic environments the ever-increasing knowledge-wealth of companies can pressure management to fully utilize every resource available before developing sufficient corporate capabilities (Wamba et al. 2020).

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Digital channels from the view of the Hungarian strategy for financial education

Izabella Tebeli

The importance of the digital delivery of financial literacy has been growing nowadays. With the use of digital technology it has become easier to access information. Via digital channels wider audiences could be reached and the impact of financial literacy policies and programmes increases. The measures implemented to contain the COVID-19 pandemic have made the role played by digital tools even more relevant to help ensure that all target audiences, in particular those most affected by the economic consequences of the crisis, have access to financial literacy resources. It is now more important than ever to make sure that the innovative use of digital technologies in the field of financial education contributes to increasing financial resilience and well-being effectively, and that governments design and implement effective digital financial education initiatives. Digital financial services offer great opportunities for wider financial inclusion but may also pose new risk and challenges for consumers and regulators, including risks of financial exclusion for some groups.

The last and the recent financial crisis have left an indelible mark on citizens' perception of financial security and more so in their trust in financial service providers. Recent surveys and international trends show that inadequate financial knowledge and practical application thereof also contributes to the perception of insecurity. Nowadays new and increasingly complex financial products are marketed, hence it is indispensable to apprehend the inherent risks of the financial landscape, and manage them properly. Appropriate financial skills and motivation are essential to make good individual and family-level financial decisions. Those in possession of adequate financial knowledge are likely to respond to financial shocks in an appropriate

way. Experience gained from the financial crisis also makes the dissemination of general financial literacy essential.

Since 2017, OECD has supported governments in strengthening digital financial inclusion, digital financial literacy and financial consumer protection in the digital age, especially for specific target groups like young people and the elderly.

The promotion of financial literacy and the development of related programmes are important at national level in order to avoid events that cause financial losses to consumers. Accordingly, the Hungarian Government has set, an outstanding goal, the improvement of the citizens' financial literacy. The strategy targeting this significant objective covers 7 years, from 2017 to 2023, breaking down its practical implementation into two-year consecutive action plans.

The website: okosanapenzzel.hu

The education of financially conscious, knowledgeable and self-confident citizens is a key element to a stable and sound functioning financial system with contribution to the competitiveness of Hungary. One target of the first action plans of the strategy was to develop a strategy for sharing relevant financial information to citizens via public education and IT tools. That is the context and the main reason why an official website was created with the slogan “Smart Finance” (*okosanapenzzel.hu*). Visibility of the website is optimized for both tablets and mobile screen, fit for the future.

This official website, Smart Finance, as a kind of platform makes all trusted and certified general financial information available existing in Hungary in webpages of public institutions like Central Bank of Hungary, Ministry of Human Capacities (responsible for public education), State Audit Office etc. Links are also provided to professional associations' webpages to ensure access to general financial educative materials without using brands. Particularly the

Banking Association, the Insurance Association and Pension Funds' Association are involved.

The whole project was launched by the Ministry of Finance. The head of the project was the Deputy Secretary of State for Financial Policy Affairs. He has been responsible for website developing and content management. Financial policy professionals, communication experts and a webpage administrator form the management team. The website is operated by the Ministry of Finance.

The website was effectively planned and executed by taking into account the priority needs of stakeholders. Focus groups and meetings are regularly organized with stakeholders and partner institutions involved in the project, like the banking and insurance associations, specific financial institutions demonstrating activity in financial literacy issues, and other NGOs with competence in this area.

An effective and targeted communication campaign has been started. Posters, leaflets about the website were given to schools and a complementary Facebook page was created. The Facebook page has the same mission statement: to inform the target group interested in financial topics by sharing all relevant and up-to-date information about basic and new services, products, new risks, new regulations and financial literacy related events etc.

The website helps to provide useful information about the financial products to citizens. The purpose of the homepage is to raise people's awareness of financial literacy by giving detailed information on financial services, products and life situations. Real life situations are simulated to make visitors to better understand their possible choices, risks and benefits: for instance, what if I have become university student (Student Loan), what if a new-born arrived to our family, what if I have to prepare for my elderly years (Pension savings), what if I plan to purchase a flat (housing savings and loans). In addition, a special calculator is available for personal budgeting, so visitors can

easily plan their revenues and expenditures with regard to possible savings for their longer term objectives. High risks are highlighted, comparative tables about specific financial products and services support their financial decision making. The website contains free, online tools for teachers addressing financial products and services, insurance and consumer rights. These tools include guidance for teachers, course specification, quizzes, games and other interactive features.

This is a unique, citizen-friendly website in the Hungarian public sector. It functions as a hub: visitors at any age can find relevant information to their everyday financial challenges, or other financial interests. The structure of the menu is clear and user-friendly. All available information is professional, certified, up-to-date and relevant. Nowhere else can so much useful information on the field of finance be found in Hungary.

The visitor can also find:

- downloadable course books for elementary and secondary level schools
- basic information and explanatory materials about key products, services and risks
- e-learning materials
- studies, surveys in connection with financial literacy
- educative games for children where finance is in the centre
- financial tests for adults
- useful information for pensioners
- short movies and teacher's manuals on topics such as budgeting, credit, savings, insurance and consumers' rights
- latest news in the financial world

- latest news about financial literacy projects: Money Week, Cashless Schools
- initiatives of the Ministry of Finance: programmes, events

This informative website itself is a milestone of the Strategy for Financial Literacy, which may make the abstract notions and complex context of financial services and products tangible and understandable to the broader public in all segments of the society. The sometimes mythic financial services through this webpage are translated into everyday tools, available instruments for families which support the well-being of all citizens through their improving financial decisions.

Mobile applications

The financial education game of Financial Compass Foundation, the "Financial Hero Training" enables pupils of classes 7 and 8, as well as their teachers, to gain experience-based financial knowledge at a high standard, presenting real challenges. The basis of the education game accessible on mobile devices was the foundation's textbook entitled "Challenges in the world of money". This game is an up-to-date and high standard method of disseminating financial knowledge, and it offers an excellent contribution to experience based learning, with more than 5000 downloads.

Platypus: the FinLit Story is another mobile adventure game for children, characterised by financial puzzles, elaborated graphic design, a story and a pace that fully meet the tastes and expectations of today's youth. The OTP Fáy Foundation has taken this to an even higher level by developing a mobile game application as part of a large-scale project. The development process was supported by the Ministry of Human Capacities and the Prime Minister's Office, as well as by successful technology companies with expertise in international

developments, but other financial and economic expert teams have also been involved, like those of OTP Bank, Financial Compass Foundation, and the Hungarian Central Bank. The application can be used individually or in classroom mode. Finally, the app is free-to-play, and will remain free in the future; neither registration nor in-game progression requires any payment from students. Besides a wide range of tasks, subjects – household finances, ventures, government, banks and the banking system, financial awareness – are also elaborated by feature videos and dialogues designed not to distract users from the diverse, fun learning process, but to encourage them to always face new challenges.

The third one is an application for car damage announcement developed by the Association of Insurance Companies. This accident reporting smartphone app helps drivers report accidents and document important evidence that could affect the value of a claim settlement. Since 2019 more than 350.000 drivers have downloaded it.

Online games

Government and market players joined hands to make the programme Hungarian Money Week successful. It has grown into a public educational programme reaching over 1.200.000 schoolchildren until this year.

The Ministry of Finance in Hungary organizes a financial scoped competition “ZsetON” (Token) for high school and higher education students every year linked to Money Week. This year the test would be hold online because the pandemic situation. This educative competition is very popular among the youngster, more than 36.000 participants registered into the game in 2021. The final during European Money Week and Global Money Week was more like a show, with excitement, surrounding activities and lots of fun.

There is an online Competition for Students organised by Financial Compass Foundation and the Budapest Stock Exchange: Stock Market Race since 2016. This is a virtual investment with virtual money. Through this online contest, organised with huge success every year, near 2000 players (secondary schools students and teachers) have the chance to discover the world of stock market trading without having to risk their own money. The winner will be the one, whose portfolio has increased the most.

The Financial Compass Foundation has also released an online financial “**Escape room**” for individual players. Students will learn all about savings accounts, credit and debit cards, importance of credit score, jobs and taxes for teens in this discounted financial literacy bundle that includes culminating Escape Room activities that can be done digitally.

Another successful programme of the Hungarian Money Week is the Innovation Day, where teams of enterprising young people (4-5 people) have the opportunity to offer their own solution to a real social or business problem or challenge. This day is not only a special meeting between students and representatives of the business community, but also a competition where students receive feedback on the results of their work from renowned professionals and receive valuable prizes. During teamwork, in addition to developing creative thinking and problem-solving skills, they also gain practical experience, trustworthy, up-to-date information, from volunteers who support their work and are made up of recognized professionals from their respective fields. Throughout the day’s work, company professionals shape and support students in developing their ideas with advice, information and an entrepreneurial approach. Nowadays, adapting to the pandemic situation, the competitions have been held online, with 10 teams measuring their knowledge and creativity at the same time.

Digital Security Quiz Competition: cyber security becomes extremely important in our digital world. Modern payment methods, PIN and password protection and other related issues are the topics of the competition developed by the Hungarian Banking Association and its partners. Students between the ages of 10-14 and 15-21 entered the online contest to test cybersec abilities, which could also be exciting for older persons. With the quiz, anyone can test their knowledge of digital security on Kahoot anywhere. The top 10 players from both age groups, with good answers in the shortest time, have been invited to the final where they could play in real time for the grand prize in April.

The European Banking Federation, as the chief organizer of European Money Week launched the **European Money Quiz** to make the transfer of knowledge about financial literacy playful for students from about 30 participating countries. The organizers of Hungarian Money Week have also created questions and tasks for students dealing with financial literacy, digital payment and security, the use of money and the related mathematical foundations. The winner team of the Hungarian final represent Hungary in the European Money Quiz Grand Final in April every year competing online with the other participating countries' teams.

Budget planners

The “ZsetON” pocket money calculator is specifically designed to help students understand their expenses and income while attending university, college or high school. This calculator started on the Money week and was designed for smart assets, free and allows them to input register every expense and income.

The other calculator is for families. Building a good budget is the key to managing the money of the family. This free budget calculator is available on the okosanapenzzel.hu website and give families a clear view of their monthly and yearly finances.

Smart rooms on Hungarian universities

The first FINTELLIGENCE Financial Literacy Centre was established in 2017, and now are present in 4 universities (Miskolc, Debrecen, Pécs and Budapest). FINTELLIGENCE sets the goal to develop financial literacy and business culture using modern technologies and digital channels effectively. The emerging financial awareness raising activity of FINTELLIGENCE is carried out with the help of several committed professional partners and supporters. These institutions are characteristically among the most important participants of the financial sector. FINTELLIGENCE International Scientific and Practical Online Conference focused on link between FinTech and financial literacy and current challenges with 425 participants from 9 countries. During the online conference, several professionals gave lectures address economics and business fields from the viewpoint of financial skills, financial education or financial literacy development.

Train the trainers' digital skills

The Financial Compass Foundation conducts successful training programmes for teachers. Almost 3000 teachers have attended these trainings so far. Teachers receive free professional training enabling them to teach subjects in finance and economy, for which they are also awarded credit points. The aim of Digital Summer Academy is to improve teachers' digital skills.

Summary

The OECD and its International Network on Financial Education (OECD/INFE) has long recognised the importance of digital initiatives and tools to support financial literacy. The potential of digitalisation for helping to meet the financial literacy needs of the general population and vulnerable target audiences was one of the messages contained in the OECD/INFE Policy Guidance Note on Digitalisation and Financial Literacy delivered to the G20 in 2018. The OECD Recommendation on Financial Literacy also acknowledges the contribution of digital tools in support of learning. Through the OECD/INFE, and in particular its Working Group on Digital Financial Literacy, public authorities have continued to discuss the design and implementation of financial education initiatives that make use of digital solutions as a standalone methodology or in combination with traditional face-to-face delivery. This report contributes to a better understanding of how public authorities worldwide are designing, delivering and evaluating digital financial education initiatives, and prepares forthcoming work on the development of high-level international guidance on the digital delivery of financial education.

Side by side with shaping public awareness, the teaching materials and topics of the Hungarian Financial Education Strategy contribute to improving financial literacy and the enterprising culture of the children and their parents and – in the end – of the whole society.

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Relevance of credit management in the Hungarian construction industry between 2004 and 2019

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Introduction

The building industry is considered one of the most economic cycle sensitive sector. When the economy is prosperous, the customer confidence is strong, the private people keenly invest to purchase new home and the companies tends to increase their production capacity by building new production plants. The markets of the building industry boost. In recession the people focus to meet their daily required consumption needs and the companies are struggling to survive. Here the private investments (including the building) halt and the building industry faces difficulties.

This paper examines the importance of credit management of the Hungarian building industry in different time periods. What was the size of account receivables among the current assets, how the credit period developed in recovery and in recession? The database contains data from 2004 to 2019, this is the raison of my examination period.

The learning points from the previous crisis in 2008 help the decisionmakers to prepare the management of our current crisis caused by the Covid virus (Selmeczi et al. 2020).

Legal and economic background of the Hungarian building industry

Economically the analysed period can be split into three periods. Between 1997 and 2005 the Hungarian economy enjoyed a long-standing economic recovery. The recession started in 2006 (the

mortgage crises affected Hungary only in October of 2008, the previous fall was the product of the domestic equilibrium problems) and lasted till 2012. From 2013 till 2019 the economy growth was impressive again (Kovács et al. 2020).

The Hungarian building industry is much more economic cycle sensitive compared to the European Union average. See figure 1.

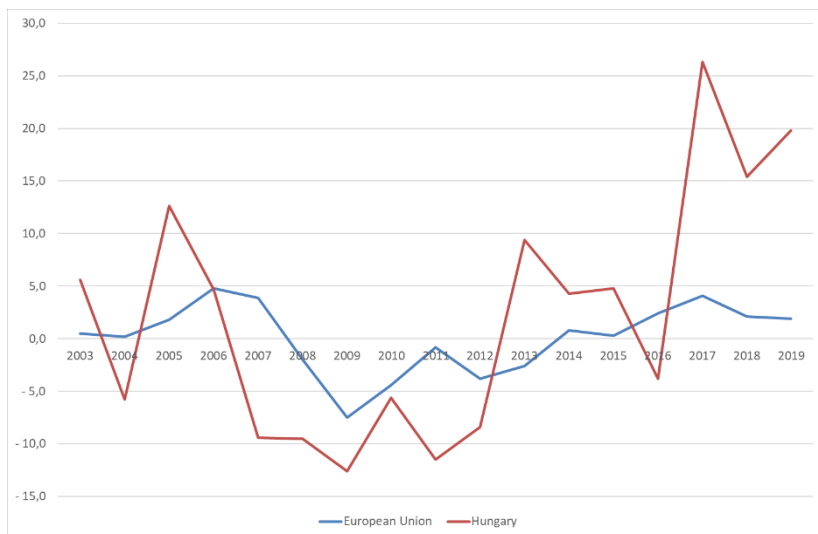


Figure 1. The annual change of production volumes in construction industry of Hungary and European Union average between 2004 and 2019

Source: Eurostat, 2020

As you see, the production value of Hungarian building industry grew and fell in parallel with the European one, but the fluctuation (or crisis sensitivity) of the Hungarian one is much bigger. The growth in the recovery periods was higher and the recession period the fall was deeper (and lasted longer) than in the European Union. Unfortunately,

the Hungarian construction industry is also heavily dependent on the European subsidies.

This higher fluctuation can be explained by two reasons. The first is, that the demand for construction industry work heavily dependent on EU subsidies, but the availability of this funds is very different in time. Since the European Union is operating based on 7-year budget, these funds are not available in the initial phase while the framework of EU applications should be worked out. At the end of the 7-year budget, the money should be spent very quickly till the deadline. Unfortunately, the initial phase of the 2007-2014 budget period coincided with the outbreak of the mortgage crisis depending, the lack of demand. The small drop in 2016 also can be explained by the interim lack of available EU sources (Bor et al., Füredi-Fülöp et al. 2018).

The second reason is the procyclical behaviour of the Hungarian monetary and partly the fiscal policy. In the recovery period the state prefers to encourage the economic growth and further decrease the unemployment, which leads high public investments in real estate directly by giving tax allowances to build for example stadium building or indirectly by giving favourable loan to build family flats. These instructions mean demand for construction be in addition to the company investment. However, these public investments increase the public credit, which should be repaid in time of recession, so in recession the public investments are also squeezed which further deepens the crisis (Bozsik, 2021; Kántor 2016).

So, the Hungarian building industry is a perfect choice to examine the credit management behaviour in different periods of economic cycle.

The analysed period is affected by an important change in the legal environment. Following the Directive 2011/7/EU on combating late payment in commercial transactions (EU, 2011), the Hungarian Parliament accepted the amendment of the Civil Code concerning

payment deadlines and default interest (MK, 2013). According to the Act, in the case of a construction or installation contract, the delivery credit must be paid within thirty days after completion, or if the receipt of the payment order or invoice of the right holder preceded the performance of the supplier (Musinszki et al., 2020; Süveges, 2019).

The data should be separately examined before and after 2013 due to the changes of legal environment.

Methodology and database

The focus of the examination is the size of Account Receivables in the Current Assets, which more highlights its financing needs than the traditional turnover ratio. The examined ratio was the following:

$$\text{Credit ratio} = \text{Account Receivables} / \text{Current Assets}$$

The ratio was examined by the subsector of construction industry – code name 41 (TEÁOR, 2008), and by the size of enterprises (i.e., micro, small, medium or large companies). One pair t-test were used to test the differences, to the credit ratio, ANOVA test were used to test the significance of the examined variables. The statistical tests were run in Excel 2016.

This paper's findings are based on a database provided by Céginformáció.hu Ltd. This database contains financial report of Hungarian enterprises from 2004 to 2019 in text files, from which the data were uploaded to a MSSQL database.

The database contains the data of 8474 construction companies' financial reports. Unfortunately, the financial reports do not separate the revenues and cost of other activities, so it was assumed, that the companies operate only their reported main activity.

Table 1 – Number of analysed financial report by size of the companies and the year of the report

Year	Micro	Small	Middle	Big
2004	348	78	50	3
2005	391	78	40	3
2006	244	79	32	1
2007	289	87	52	4
2008	247	77	52	4
2009	405	94	57	5
2010	560	90	57	5
2011	460	87	61	5
2012	545	98	76	6
2013	474	95	77	6
2014	444	95	80	6
2015	438	108	83	5
2016	369	83	68	4
2017	319	75	71	6
2018	282	79	75	5
2019	200	82	78	6

Source: Céginformáció database

Results

The construction sector contains two almost equal groups in this sample - the construction organisers and the actual construction worker companies. The following table shows the credit ratio of these two groups in each examined year.

The construction workers subgroup has got significantly bigger credit ratio than the organisers. In each group the credit ratio increased in the recession period and decreased in the recovery period, which indicates that the collection in recession is harder than in normal circumstances.

Table 2 – Average credit ratio of construction organisers and construction workers and total by year

Date	Construction organisers	Construction workers	Total
2004	0,20	0,43	0,39
2005	0,21	0,44	0,39
2006	0,17	0,50	0,44
2007	0,17	0,48	0,42
2008	0,19	0,73	0,62
2009	0,22	0,46	0,40
2010	0,10	0,34	0,26
2011	0,15	0,36	0,30
2012	0,12	0,30	0,25
2013	0,14	0,29	0,25
2014	0,13	0,30	0,25
2015	0,13	0,27	0,23
2016	0,14	0,27	0,23
2017	0,11	0,25	0,21
2018	0,13	0,27	0,23
2019	0,14	0,30	0,25

A t-test assuming unequal variances was run to test, if the average credit ratio is significantly smaller after the legal changes in 2013 or not. The analysed data were the followings:

The difference is significantly bigger in the construction workers group than the construction organisers group.

Table 3 – Average credit ratio of construction organisers and construction workers before and after 2013

Period	Construction organisers	Construction workers	Total
Before 2013	0,17	0,45	0,38
In 2013 and after	0,13	0,28	0,23
Difference	0,04	0,17	0,15

The t-statistics however show that both differences are significant.

Table 4 – Results of the t-test in case of Construction Organisers

Construction Organisers		
<i>Period</i>	<i>Before 2013</i>	<i>After 2013</i>
Mean	0,169707	0,13236
Variance	0,001589	0,000125
Observations	9	7
Hypothesized Mean Difference	0	
df	10	
t Stat	2,678401	
P(T<=t) one-tail	0,011578	
t Critical one-tail	1,812461	
P(T<=t) two-tail	0,023156	
t Critical two-tail	2,228139	

The t Stat value is significantly higher than the one-tail and two-tail probe values, so the difference is significant.

Table 5 – Results of the t-test in case of Construction Workers

t-Test: Two-Sample Assuming Unequal Variances

Construction Workers

<i>Period</i>	<i>Before 2013</i>	<i>After 2013</i>
Mean	0,449424	0,27975
Variance	0,015828	0,000346
Observations	9	7
Hypothesized Mean Difference	0	
df	8	
t Stat	3,990333	
P(T<=t) one-tail	0,002002	
t Critical one-tail	1,859548	
P(T<=t) two-tail	0,004003	
t Critical two-tail	2,306004	

The t Stat value is significantly higher than the one-tail and two-tail probe values, so the difference is significant.

After examining the sectors, the credit ratio of the different company size groups was examined. To determine the size of the companies, the number of employees were used. The micro companies employ less than or equal to 10 workers, the small ones between 11-50, the medium enterprises between 51-250, and the larger more than 250.

The analysed data were the following:

Table 6 – The average credit ratio by size of the companies and by year

Year	Average			
	Micro	Small	Middle	Big
2004	35,59%	43,14%	52,11%	48,99%
2005	36,74%	42,35%	53,48%	45,32%
2006	41,60%	47,26%	55,30%	48,27%
2007	38,93%	44,68%	52,05%	45,30%
2008	69,41%	45,92%	50,44%	42,74%
2009	37,38%	45,72%	51,19%	36,83%
2010	20,93%	40,66%	51,83%	38,36%
2011	24,68%	44,81%	49,46%	41,97%
2012	19,85%	37,99%	41,46%	48,15%
2013	19,22%	37,21%	40,96%	39,97%
2014	20,22%	35,91%	39,87%	34,80%
2015	19,66%	30,49%	28,30%	31,22%
2016	18,76%	29,62%	36,59%	36,49%
2017	15,10%	28,08%	38,77%	35,64%
2018	15,37%	34,63%	36,65%	39,54%
2019	17,94%	32,11%	34,25%	30,73%

Generally, the larger the companies the bigger is the credit ratio to the middle companies. However, the large companies credit ratio is smaller than the middle companies' one. The reason can be, that a bigger company can wait longer time for the payment than a smaller

company whose access to the source of finance is limited. But the real big companies have got enough market strength to require earlier payment.

It is interesting, that 2008 was an exception from the general rule – here the micro companies had the largest credit ratio. In recession the claims of the small companies are always subordinated for the bigger ones.

An ANOVA test was used to show the relevance of size in the credit ratio. The result of this test was the following:

Table 6 – Results of the ANOVA test

SUMMARY						
<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>		
Micro	16	4,51	0,28	0,02		
Small	16	6,21	0,39	0,00		
Middle	16	7,13	0,45	0,01		
Big	16	6,44	0,40	0,00		
ANOVA						
<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	0,231	3,000	0,077	8,784	0,000	2,758
Within Groups	0,526	60,000	0,009			
Total	0,757	63,000				

The p value is 0, so the average credit ratio among the various size groups is different.

Conclusion

The results of the paper are the following:

The construction workers subgroup has got significantly bigger credit ratio than the organisers. In each group the credit ratio increased in the recession period and decreased in the recovery period, which indicates that the collection in recession is harder than in normal circumstances.

The legal change of credit period significantly decreased the financing needs of the construction industry.

Generally, the larger the companies the bigger is the credit ratio to the middle companies.

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Financial knowledge of higher education students of economics

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Abstract

This study presents some partial results of a complex research. The original research topic is the comparison of the financial literacy and security of Hungarian and foreign students as a result of environmental crises. In this study, we examined the impact of individual-family financial difficulties caused by economic crises. Our aim was to show that without the right level of financial knowledge, these problems cannot be solved properly. Only undergraduate students in economics were included in the present study. On the one hand, we examined the area of investment because it is one of the possible ways to create personal financial security. The other focus point was the practical application of knowledge, the study of shopping habits. Our results draw attention to the importance of practical knowledge.

Introduction

The economic crisis of 2008 and its effects that are still rippling today focused the attention of decision makers on the importance of financial knowledge (Kovács, 2017). The insolvency of the population caused by unpaid loans, the bankruptcy of financial institutions caused by it and the resulting economic collapse led to a global crisis (Savchenko et al., 2017). Even though most of the problems caused by the crisis

have been successfully solved, the lack of financial literacy has been an ongoing difficulty for more than a millennium (De Beckker et al., 2019; Kovács, 2015; Xiao et al., 2011). However, complete recovery from the crisis is still elusive today, and now humanity is facing another problem: the health emergency caused by the coronavirus and the resulting economic recession. In contrast with 2008 and all the previous crises, which developed as a result of overproduction, excess loaning and the accompanying loss of confidence, the cause of the current crisis is the drop in demand because of the lockdowns ordered for public health reasons and reduced economic production.

Since for a long time the only remedy for the epidemic was quarantine and the restriction of personal contact, the world economy almost completely stopped for a prolonged period. The consequence of this, especially in the initial phase, was massive job losses, income shortfalls, thus financial difficulties for households. Political decision makers and governments played a significant role in solving the problems, e.g., by job protection and income shortfall compensation subsidies. At the same time, the effect on households varied depending on what kind of personal financial safety nets they had developed for themselves in the period before the pandemic. The quality of this financial safety net was considerably defined by personal financial literacy (Klapper & Lusardi, 2020)

My own research – research themes, data and methodology

My research presented here is also connected to this subject range. As a part of a larger study, I research the financial literacy, behavior and attitude of higher education students. I started my work back in 2019, before the breakout of the COVID-19 pandemic. The pandemic provided an opportunity to assess its effects as well. My research was on the international scale, it included 5 Hungarian and 2 foreign universities. The respondent students included some who specialize in economics as well as others. Financial literacy is composed of the

combination of several factors (Kovács & Terták, 2019). In my questionnaire I asked about ninety of them. The respondents could give yes/no answers to all the questions, which made statistical processing easier (Peterson, 2000). The respondents could mark the possible answers according to a scale. If it was an opinion-forming question I applied a five-level Likert scale (Asún et al., 2016). The questions investigating knowledge were multiple-choice questions with one correct answer. Another part of knowledge investigating questions is described by nominal variables, for these I applied yes/no questions (Saunders et al., 2015).

In my present work I introduce a slice of the complex research. I introduce a portion of the results that analyze the similarities and differences in financial literacy evaluated among economics students attending Hungarian and foreign universities. Considering that as an effect of the COVID-19 pandemic, I repeated my 2019 questionnaire in 2020, I chose a theme that compares the results of the period before the pandemic with the changes that occurred during the first wave of the pandemic. The crisis caused by the virus pointed out the importance of a personal/family financial safety net. Investments comprise one of the elements of this (Mallinson, 2020), which contribute to the creation of emergency reserves. The research methodology was questionnaire in both cases. My first study occurred before the appearance of the coronavirus. At this time I chose the online questionnaire because in this way I expected a significantly higher response rate (Gunter et al., 2002; Zhang et al., 2017). My expectation proved to be correct: the response rate turned out to be 92%, which exceeded the usual 20-40 % response rate that is considered to be a success in the case of online questionnaires (Ilieva et al., 2002; Mehta & Sivadas, 1995; Tse, 1998; Tse et al., 1995). I forwarded the questionnaire to the respondents with the help of my acquaintances who study at the affected universities, and they returned them to me after those were filled in. In the second round I applied a similar method, in this case I used the loosening of the restrictions after

the first wave of the pandemic (the period in September when in-person education started) for the offline questionnaire. I recorded the collected data in MS-Excel, then I imported them into IBM SPSS Statistics after cleaning and coding the database, and I used this software to perform the statistical analyses.

My results

In the present work I focus on two areas among the received responses. One of them is the subject of investments – as I mentioned in the introduction – they represent the foundation for creating financial resilience and the personal safety net. The other subject range is everyday practical knowledge, of which this time shopping and card use was in the focus, and I also asked about interest calculation as a basic skill. I studied the two areas separately in the case of full-time and part-time (correspondent) students.

Investments

In the area of investments, I measured skills with 5 questions:

- Q_B_01 In the case of a mortgage combined with life-insurance, do the savings cover the amount to be paid back?
- Q_B_02 In your opinion, is it a good idea to have insurance with investment purpose?
- Q_B_03 Money market funds do not involve risk, since our money is only invested in bank accounts and securities.

Q_B_04 There are risk-free investments.

Q_B_05 A portion of our pension contribution goes to our personal account managed by the voluntary pension fund.

I studied the knowledge level calculated per person based on the indicator gained from to total of correct answers. Before the pandemic 69 % of Hungarian, Slovakian and Austrian students gave correct answers, the percentage was the same during the pandemic. Regarding investment knowledge correspondent students performed better in both years (Figure 1). At the same time, while the performance of full-time students declined, the performance of correspondent students improved, based on the results of the second questionnaire.

An explanation to this may be that the changes caused by the pandemic significantly affecting every area of life diverted the time and energy of students from expanding their financial knowledge. Another possible reason is the heightened uncertainty brought on by the virus situation. The better performance of part-time students is probably a result of their greater work and life experience and the connected practice. Moreover, correspondence students were less affected by transferring to online education.

While studying the differences and similarities between countries, I concluded that progress occurred in investment knowledge among Vienna students (3% improvement) and Bratislava students (9% improvement). However, the performance of Hungarian students

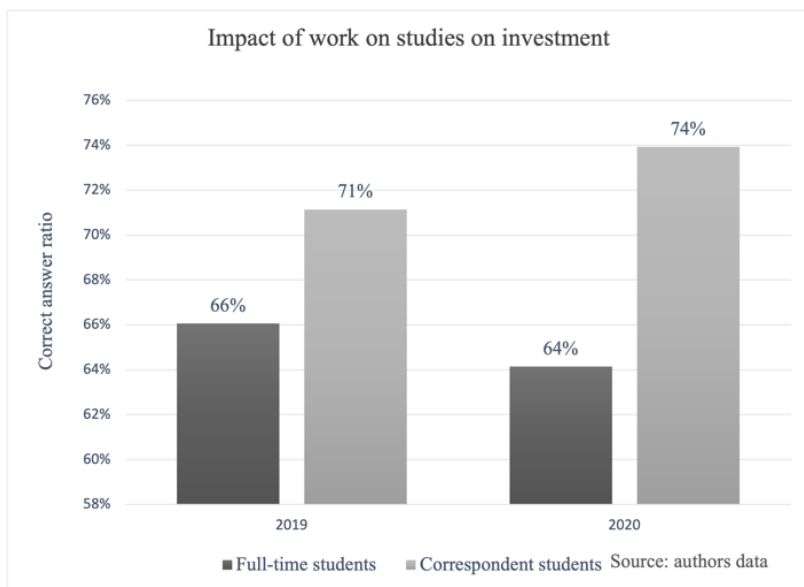


Figure 1: Investment knowledge of full-time and correspondent students in higher education
Source: own data

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While studying the differences and similarities between countries, I concluded that progress occurred in investment knowledge among Vienna students (3% improvement) and Bratislava students (9% improvement). However, the performance of Hungarian students

declined by 11% (Figure 2). This significant decline is still to be explained. I would mention as one of the possible reasons that the fast and forced transferring to remote education caused by the virus may have played a role in this decline. Literature indicates this with a separate name ‘Emergency Remote Teaching – ERT’ and distinguishes it from other forms of remote education (Hodges et al., 2020).

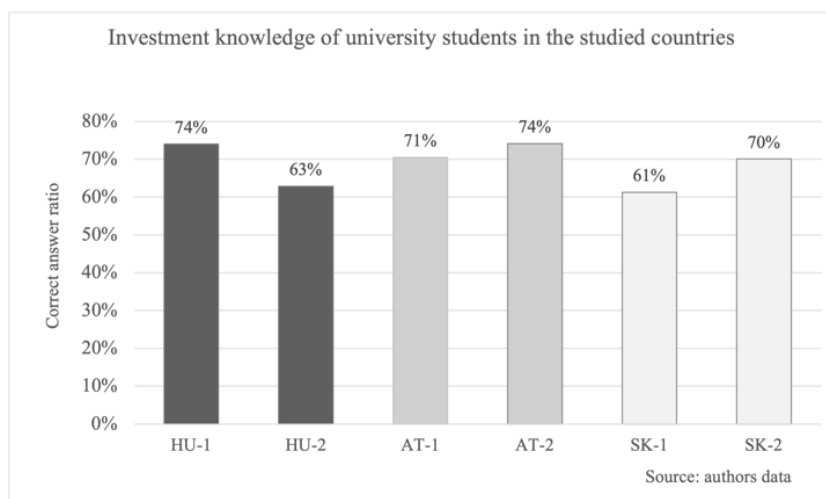


Figure 2: Level of investment knowledge in the studied countries
Source: own data

The basis of this differentiation is primarily the forcedly short preparation time, which did not allow for finding the appropriate methods and platforms. In the success of ERT the role of the students’ side is just as important as the teachers’ side, specifically an overwhelming majority, 98%, of education was realized even without in-person classes (Sinóros-Szabó, 2020). Moreover, the participation

rate in online classes was higher than what the experts expected (Deés, 2020). At the same time Deés also mentions that activity in this participation was significantly lower than usual. Even though the authors of the report – based among others on the assessment by the Social Science Lab (Aristovnik et al., 2020) – the unusual circumstances of the education environment are cited as the main reason for difficulties in paying attention. Dr. Vilmos Vass learning methodology expert, Docent at the Budapest Metropolitan University (METU) gives a real explanation in the interview with him (VG, 2020). He calls attention to the fact that in online-education mainly the students' sense of responsibility is critical, they must be disciplined and motivated enough to not just login to the online class, but truly participate in it.

While analyzing the responses to specific questions, in summary it can be stated that economics students in all 3 countries gave correct responses at similar rates. However, there are 3 outstandingly poor results. In the question related to money market funds, before the pandemic Bratislava students were 20% behind the knowledge of their Hungarian and Austrian counterparts, while in risk assessment and pension-savings Hungarian students practically failed during the pandemic (Figure 3).

On the one hand, this means that Hungarian students at this age don't care at all about their pensioner years, which can be a source of later financial problems. At the same time, it should be mentioned that in this question compared to the others there were almost 30% less correct responses among the students of all of the universities.

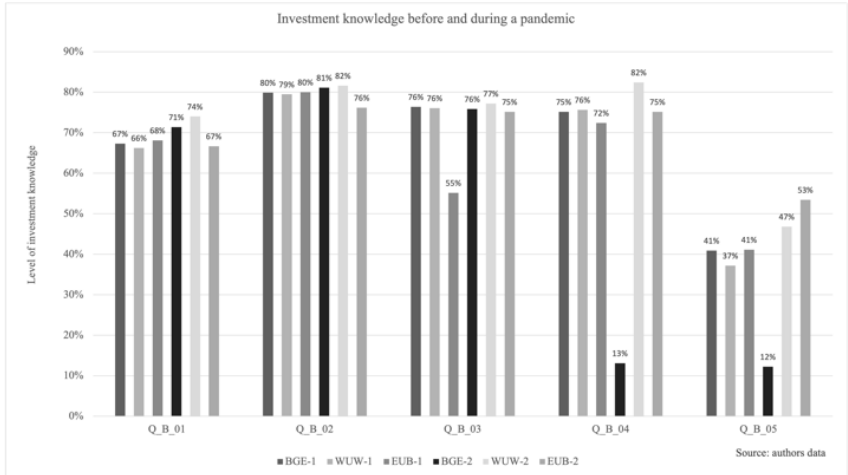


Figure 3: Student responses to interment knowledge related questions before and during COVID-19

Source: own data

It is even more noteworthy that for the other question only about 1 in 10 Hungarian students answered correctly. Thus, they are the ones who have special knowledge in their field of study in a way that they are unable to apply it in practice. The basic suspicion toward „too good to be true” offers is missing from them. During the financial difficulties caused by the pandemic this may lead to particularly dangerous decisions. After this I investigated among the part-time students who were found to be more practical, at what rate the Hungarians gave correct answers. Based on the results I concluded that roughly 2/3 of these students reacted correctly to an irresistibly good offer. This proportion is significantly higher than the responses of full-time students, but it is still considerably lower than the over 90% rate of Bratislava and Vienna students.

Practical knowledge

All knowledge is worth as much as it is proven useful in practice. This statement has been particularly true since the 2008 Economic Crisis. Unfortunately, it is a general experience that although the world managed to get over the crisis, the level of people's financial literacy is still too low (Béres et al., 2013; Huston, 2010; Klapper et al., 2015; Pintye & Kiss, 2017). It is of particular importance in the case of higher education students to be able to use their knowledge in practice. Of the questions from my questionnaire, I selected 5 for the current analysis. All of these are related to the practical side of financial matters:

- Q_P_01 Do you know what to do if you buy a faulty product with your credit card/bankcard?
- Q_P_02 How many days do you have to change your mind in the case of buying in a shop?
- Q_P_03 How many days do you have to change your mind in the case of an online purchase?
- Q_P_04 You can use a credit card to pay an unlimited amount.
- Q_P_05 Do you know how to calculate interest?

In the questions I mainly focused on practice related to shopping, as a characteristic daily activity. In contrast with the unchanged investment knowledge, practice has developed during the past year: the 2019 data increased from 73% to 76% in 2020. The improvement was observed among both full-time and correspondence students. The difference in knowledge between them practically

disappeared. Both groups had a 74-77% performance, which means that daily activities are not unknown even to those who do not work on top of studying. This is well illustrated by the fact that the most correct responses came to the question related to unlimited credit card purchases (full-time: 92%, correspondence: 96%). This was followed in the second place by interest calculating skills. The respondents were least confident in the subject range of shop purchases, but I still found an over 50% correct response rate. Ranking the universities based on performance I found a Vienna – Budapest – Bratislava order both among full-time and correspondent students. I observed as an interesting result that the correct response rate to questions related to online shopping decline by 4%: from 73% in 2019 to 69%. In reality this is not surprising. A possible explanation is that as a result of the pandemic the proportion of online-purchases considerably increased, customers who previously preferred brick-and-mortar shops appeared in webstores as well. But their experience in this field is narrower, thus they responded less successfully resulting in the decline.

Summary

This study presented some specific aspects of the results of a PhD-research. The study is focused on the financial literacy, behavior and attitude of higher education students. From among these I introduced two areas, investments that represent the foundation of the financial safety net and knowledge related to shopping, by which I measured practical everyday skills. In the knowledge related to investments and money markets Hungarian students performed the weakest, particularly full-time students. In the practical area similar differences were not detected. It was also proven that correspondence students were more successful in every field, which can be attributed to greater practical experience. The entire research is still ongoing, the processing of results is being conducted.

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Changes in the financial habits of university students studying economics as a result of environmental crises

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Abstract

The study presents a sub-area of a larger research. In the basic research, I examined the development of the financial culture of the students of Hungarian and foreign universities in two stages, with a questionnaire survey, which I conducted in the autumn of 2019 and the autumn of 2020. The actuality of the second query was the coronavirus pandemic that had broken out in the meantime. My results show that environmental crises have a significant impact on the financial situation and habits of individuals-households. An appropriate level of financial culture is essential to address the personal financial difficulties caused by the crisis. Theoretical and practical introduction of this in the education system can be the basis for the proper treatment of many later problems.

Introduction

The history of the world economy can be examined in several ways. Fitting to the topic of the present work, I will now focus on the history of crises, analyzing the historical curve of development, but in the light of length constraints, I will only flash a few excerpts. Perhaps the greatest financial crisis of antiquity was reported by Tacitus (Tenney, 1935), which led to the collapse of the entire banking system of the Roman Empire. A similar crisis threatened the world in the early 1600s, when Le Maire, a rogue who acquired a majority stake in the Dutch East India Company, who was considered the world's first supply chain and also on the board, wanted to treat the company's

money as his own property. In this case, however, the other shareholders acted on time, preventing bankruptcy (Schoorl, 1968). The crisis of 1929 and, fortunately, less critical of 2008, is already part of our modern history. Nowadays, a crisis situation has arisen again in connection with the COVID-19 pandemics.

It can also be seen from this brief outline that economic recessions return from time to time, as Kondratyev illustrated (Grinin et al., 2016). The other conclusion that can be drawn is that, apart from rogues, the causes of the crises were mainly overproduction and over-lending, as well as the resulting loss of confidence and inflation. However, the coronavirus has caused a global problem due to limited reproduction due to forced closures. Depending on the cause, the solution may be different, but for individuals, consequences are the same: financial insecurity and financial difficulties. The solution is for them to have the right level of financial knowledge (Kovács, 2017; Kovács & Terták, 2019). The importance of teaching these was recognized as early as the 18th century (UNSGSA, 2016). But it was not until the 1990s that the topic came into the focus of research. Research on financial literacy has already begun among university students (Bakken, 1966; Danes & Hira, 1987). These studies also drew attention to the importance of financial literacy education. Nevertheless, worldwide - including Hungary - there is a significant lag in this area (Béres et al., 2013; Disney & Gathergood, 2013; Kovács, 2015; Lusardi & Mitchell, 2014; Pintye & Kiss, 2017).

However, progress has begun, and the first National Core Curriculum (NAT) after the change of regime has already included economic knowledge in competence-based education (Baranyi, 1993). Knowledge that can be used in practice has become the basic measure of the level of knowledge (Kovács, 2015; Németh, 2015, 2017)

Methodological summary

In my present research, I focus on students in higher education. On the one hand, because they had already studied during the mentioned NAT period. On the other hand, because they are the ones who will soon enter the labor market with a degree in hand, where they will also have to use the knowledge they have acquired. I examined the financial culture of university students studying economics in three countries (Austria, Hungary and Slovakia) using an offline questionnaire. Therefore, I chose this method on the one hand to reduce the distortion effect (Gunter et al., 2002; Zhang et al., 2017) and on the other hand in the hope of a higher response rate (Ilieva et al., 2002; Mehta & Sivadas, 1995; Tse, 1998; Tse et al., 1995). Both of my expectations were met, especially the response rate was high (92%) compared to the average rate of 30 percent typical of online questionnaires.

The questions were compiled partly on the basis of the OECD (Kossev, 2020) classification (knowledge, behavior, attitude), but I also supplemented my questionnaire with questions examining financial security and crisis stress (Ali et al., 2015; Spitzer, 2021). The questions were closed, partly to be decided (yes / no), partly to be answered on a multi-level Likert scale. The answers were processed using IBM-SPSS Statistics, IBM-SPSS-Amos and R-software package. I used regression models, a road model (structural equation model) and cluster formation as methods. In the present work, I analyze only a small slice of the results, the development of students' financial habits. I conducted the queries twice, in the fall of 2019 and 2020, during the attendance educational period with attendance.

Results

I measured financial habits with 18 questions in the questionnaire, these are the daily use of banking services (bank account, bank or credit card, Internetbank, mobile bank), modern financial technologies (Revolut, Tranfewise), the willingness to take out insurance (health, life, accident insurance, Casco) and bill payment habits that were affected. For the yes-no questions, the yes answer was one point, an no was zero. Where an activity frequency was asked, the most common behavioral response received one score, never zero, and the other responses received a proportional value between the two extreme values. The index of financial behavior was created as the average of the 18 responses, with a theoretical minimum of zero and a theoretical maximum of 1.

The average value of financial behavior became 0.62 (standard deviation: 0.09), and its overall model became 18.99% explanatory. Financial knowledge ($\eta^2 = 0.0804$; $p < 0.001$) and students' work schedules ($\eta^2 = 0.0411$; $p < 0.001$) have the greatest effect on behavior. Financial habits changed significantly ($p = 0.048$) from 2019 (0.63) to 2020 (0.64), but the magnitude of the increase is quite small. I was able to show a significant difference ($p < 0.001$) between the financial habits of full-time (0.62) and correspondence educated (0.66) students. In the case of the latter, I measured a significantly higher value. This means that they are more involved in financial life and are more active in other areas.

The model included two quantitative variables, of which the independent effect of stress did not prove to be significant ($p = 0.641$), however, the positive effect of financial knowledge (0.276) was significant ($p < 0.001$), which suggests that if someone is better informed about finance then it also appears in his or her habits, which then covers several areas. In the case of stress, on the other hand, I was able to show a significantly different effect between the two examined

time points in 2019 and 2020 ($p = 0.026$). Its negative impact (-0.0218) was only in 2020, i.e. the more stressful someone was this year, the less they did their usual financial activities. The change is likely to be related to increased stress levels due to the coronavirus pandemic, but causal linkage requires further research because the Granger test, which provides the response, is not applicable in the present case due to the lack of time series data.

At the time of preparing the road model, the explanatory variables for financial behaviour were: financial literacy, financial attitude, age, stress, and crisis situation, the latter being shown by the COVID-19 epidemic at the time of the study. The completed model is shown in Figure 1. and Table 1. table shows:

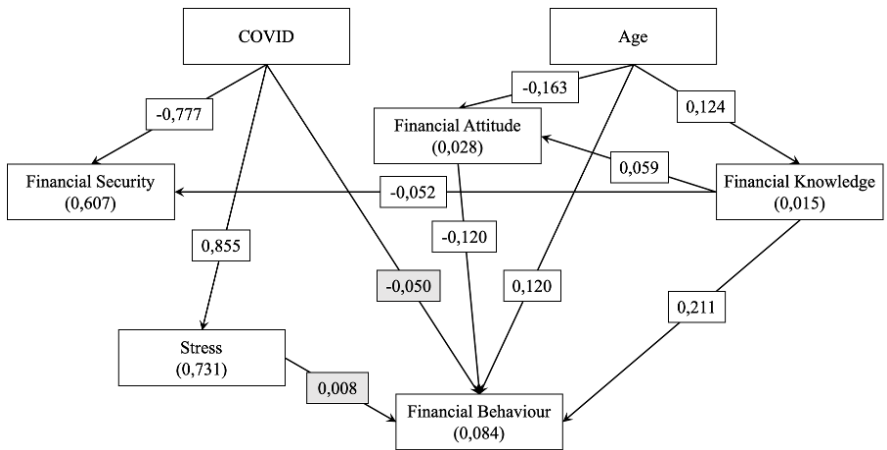


Figure 1 The path model of the sub-sample of economics specialists (standardized direct effects, the ratio of the explained variance in parentheses, the non-significant direct effects in gray)

Table 1 Full and (direct + indirect) effects included
in the path model of a sub-sample of economics professionals

Cause					
Effect	Age	COVID	Financial knowledge	Stress	Financial attitude
Financial knowledge	0,124	0	0	0	0
	(0,124+0)	(0+0)	(0+0)	(0+0)	(0+0)
Stress	0	0,855	0	0	0
	(0+0)	(0,855+0)	(0+0)	(0+0)	(0+0)
Financial attitude	-0,156	0	0,059	0	0
	(-0,163+0,007)	(0+0)	(0,059+0)	(0+0)	(0+0)
Financial security	-0,006	-0,777	-0,052	0	0
	(0+-0,006)	(-0,777+0)	(-0,052+0)	(0+0)	(0+0)
Financial behaviour	0,165	-0,044	0,204	0,008	-0,120
	(0,120+0,045)	(-0,050+0,007)	(0,211+-0,007)	(0,008+0)	(-0,120+0)

Based on the model, the epidemic has no significant direct effect on students' financial activities and habits, but it has significantly increased students' stress levels. However, the behavior-modifying effect of increasing stress is orders of magnitude weaker than that of changes in the level of financial literacy and experience gained with age.

Among the other notable results of the model, I highlight that I experienced a negative change in financial attitude with age. Of course, no far-reaching conclusion can be drawn from this, since the studied population is made up of university students, so we cannot find a significant difference in terms of their age. My other observation is that increasing financial literacy reduces the (of course, subjective) sense of financial security.

In the further analysis, I examined how much financial activity is rising or declining among students from 2019 to 2020. To this end, I separated and examined three groups of questions.

The questions in the first group measured spending. These included the frequency of credit card use, the amount spent on the credit card, and the evolution of online purchases.

The second group of questions examined the use of modern financial technology opportunities in 2019 and 2020. This includes the use of Internetbank and mobile banking, as well as the frequency of the use of payment services such as Revolut or Transferwise.

I created the third set of questions given the nature of the crisis. So I started from the premise that the primary cause of the crisis caused by the coronavirus pandemic is a health problem.

Therefore, I have placed the development of health insurance in this issue and supplemented it with the provision of increasing use of motor vehicle insurance due to isolation provisions, i.e. CASCO. (Comprehensive insurance) See on Figure 2

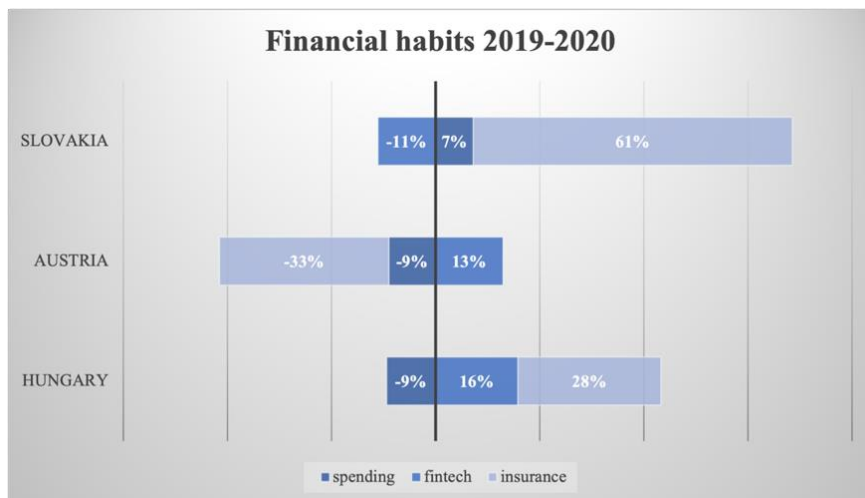


Figure 2: Financial habits 2019-2020

Spending results were in line with expectations. As a result of the crisis, spending in 2020 was 5.7 percent lower than in the previous year for the sample as a whole.

Slightly different from the general trend are Slovak students who spent more, albeit by only 7.3 percent. Hungarian students reduced their expenses the most, with a decrease of almost 9.4 percent.

The impact of financial literacy can be well demonstrated by examining the frequency of credit card use and the evolution of credit

card spending. As these are undergraduate students in economics, who are presumably aware of the dangers of credit card overruns, I have found a decline in both the overall sample and individual countries (Figure 3).

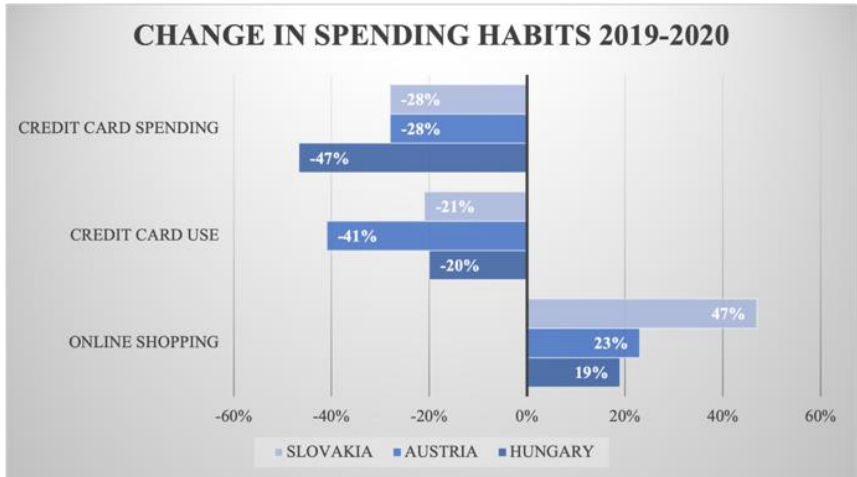


Figure 3: Changes in the expenditure of university students during the period under review

The sample as a whole used its credit card 27 percent fewer times in the crisis year of 2020 than a year earlier, and the amount spent also fell by 34 percent. Outstandingly, the frequency of credit card use among Austrian students fell by 41 percent.

On the other hand, credit card spending was reduced the most by Hungarian students, who withheld such expenses by 47 percent. Due to the shortages caused by the virus situation, the frequency of

online purchases also increased, I was able to show an overall increase of 30 percent.

Slovak university students made the most use of this opportunity, among them the share of online purchases increased by 47 percent, and the lowest among Hungarians (19 percent increase). On the other hand, it is an interesting result that among the Slovak students, who buy the most online, the frequency of using Internetbank increased the least, by only 7 percent.

Recourse to modern financial technology and services also increased, by 5.9% for the sample as a whole. In this field, however, Hungarian students are at the forefront (increase: 15.8%, followed by Austrians (increase: 12.9%).

Slovak respondents came in third - but they made less use of these opportunities during the crisis (I found a decrease of 11.1 percent). The dominant element of the decline is a significant (58 percent) decline in the use of services such as Revolut or Transferwise. The increase in mobile payments and Internet banking use (by 18 and 7 percent, respectively) does not differ significantly from students in the other two countries (Figure 4).

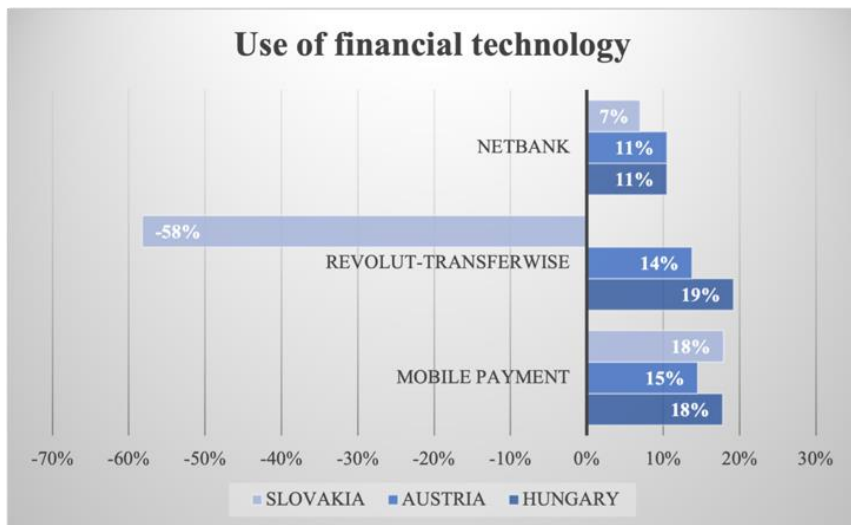


Figure 4 Trends in the use of modern financial technology and services

The insurance market has also changed, with only Austrian students thinking they need less insurance. They have reduced both their private health insurance and CASCO-type needs. However, for the sample as a whole, the demand for security has increased, mainly for health insurance (27 percent increase) but also to a lesser extent (11 percent) for the CASCO type. Most of all, Slovak students felt the need for such protection of their health, among them the importance of health insurance increased by 61 percent compared to the previous year's opinion

Summary

Economic crises affect finances, not only at the global and business level, but also in terms of an individual's financial security and position. The importance of financial literacy for professionals has been clear for more than fifty years, yet this situation still exists today. The role of financial knowledge can be well demonstrated by examining university students who specialize in economics.

The present work also focused on such students. The basic question of my work was how environmental crises affect individual financial behavior in an environment where the level of financial literacy is above average. My findings show that the knowledge gained helps to avoid many pitfalls, such as irresponsible credit card use.

The developed model also clearly indicates that financial behavior is influenced primarily by the level of knowledge, and secondarily by practical experience with age, and the impact of crisis situations also prevails through these factors. The aim of the present study was to draw attention to the need to teach economic competencies because it significantly helps to prevent future individual-household financial difficulties.

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Financial inclusion: fintech solutions for banking services

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One of the critical elements of any country's economy is the bank. A bank sector is dynamic and depends on technological progress, which influences forms and types of information and digital technologies, globalization, and remote bank services. So introducing the newest technologies is very actual and helps promote consumers' satisfaction from a bank product and develop its financial sphere. This theme is actual for many domestic and foreign scientists and government bodies that engage in developing the corresponding legislative adjusting.

The newest elements of the financial system, well-known as the company FinTech, are based on applying digital technologies to the retail of financial services. At the bank services market, their activity and commodity suggestions are presented by bank calculations (including mobile payments), personal loans (P2P), insurance and even financial consultations that were historically considered part of complex traditional bank service. The companies FinTech concentrate on three primary segments of retail banking. There is a possibility to decrease a break between clients' expectations and satisfaction of their demand financial institution. Development of these business models is based on such basic descriptions, as availability, transparency, simplicity of customer acquisition,

simplicity of using of the financial instrument and bank services, attractiveness for a client, and original specialization.

Today the financial sphere of activity spares all more attention to the ideas of digital ecosystems and platforms characteristic for FinTech. Relatively recently, banks began to inculcate the creation of financial supermarkets, where they suggest to the client the wide spectrum of products and services, not only banking but also of companies that cooperate with them. The certain approach will be advantageous and profitable for all attracted parties: for clients, banks, and partners that could scale the sale of the products due to the clients of financial institutions. Except it, banks were able to shorten expenses on the traditional positioning of their own services and service of customers and create additional sources of forming of profits due to the development of new products and their modification according to a modern environment.

One of the forms of digitalization in the bank sector is creating a financial ecosystem that increases the efficiency of the bank's essential activity in a traditional form through its transference in the internet space. It is realized by using mobile additions, boats of chat, online-assistants, and others like that. Today passing to the digital world became a general tendency for all participants of the market.

Digitalization is most important for banks, as long-term global prognoses testify that profitability and clean profitability of property asset (ROE) of banks will remain in stagnation. Over the past 10 years, bank investments' average global profitability is 8-10% that barely covers their equity value. By 2025, the return on investment in the banking sector will be reduced, and as a result, it will be 5.2-9.3% [12].

According to such forecasts, banks' desire to go beyond the financial services sector in more profitable segments looks logical.

In this context, the portals, platforms and ecosystems are particularly promising and critical for the bank's success. There are even KPMG predictions, according to which by 2030, all banks will be "invisible" for customers. That is, banks will provide remote services using digital technologies. According to experts KPMG Global, the banking industry's fundamental changes for 2030 will be global personalization with artificial intelligence, and cooperation with clients will be carried out through a voice assistant and biometrical. Banks will create digital platforms, with which they will offer customers both their own services and services from external suppliers. The issue of users' trust in the security of its data and their intended use will play an important role, and the cyber security systems will use artificial intelligence to protect data.

One of the most effective ways of introducing digital technologies in the banking sector is creating neobanks. Banks of such a new type, so-called neobanks, are financial and credit institutions operating exclusively over the Internet; that is, they do not have actual traditional departments or affiliates. From the very beginning of functioning, they are built on the latest technologies and provide services exclusively remotely, unlike traditional banks' infrastructure.

The appearance of such banks is connected to the level of economic and technological development. A complete transition from traditional institutions to the neobanks in Ukraine is connected to the presence of the adopted legislative framework. The activities of such banks are possible in two ways, when NeoBank itself receives a banking license or works based on one of the existing banks, in fact,

purchasing wholesale services in a financial institution, which operates as a "financial intermediary", and sells them through retail trade to their clients.

According to FinTech, Ukraine has the opportunity to develop non-banks and other grades in the financial sector. Thus, in Ukraine, at the end of 2019, the share of people using the Internet was 65%. In this case, the level of concentration of smartphone owners is 48%, and the level of coating 3G and the most recent network reaches about 45%. More than 22.5 million people use financial services from which more than 63% have an open account at least in one financial institution, 49% have a debit card, 39% used a debit or credit card for purchases, while more than 29% used cards for online purchases, and 18% used the Internet to access the financial account [12]

As evidenced by statistics, Ukraine, in partnership with FinTech, actively implements the banking sector's latest products and programs. Today, the first fully implemented startup in the field of "NeoBank" is the "Monobank" project. Monobank is a vivid example of a virtual bank, but it is not associated with its traditional format.

The project developers are managers that in the past were part of the nationalized PrivatBank currently launched by the first Ukrainian NeoBank in autumn 2017 along with Universal Bank and general efforts in cooperation with the FintTech Band team. Beta Monobank was previously tested, which lasted a little more than a month, where 15,000 cards with a general open credit limit of UAH 279.3 million were released. And on November 22, 2017, monobank officially began to conduct commercial activities. [12]

Currently, the project does not have a banking license issued by the NBU, which gives the right to conduct settlement transactions, accept money on deposits, or issue loans according to the traditional bank's specifics. That is, Monobank is just a portal on the Internet, which provides access to banking services. Universalbank is a financial partner and performs direct operations. In other words, by connecting to an online service, the user becomes a client of Universalbank. But he does not have direct access to his services in Universal offices, and conducts them remotely through Monobank services. In essence, Monobank offers its clients the opportunity to calculate (transfers between cards, payment for various services and products (replenishment of mobile accounts, utilities and budget payments))), get a credit limit, place a deposit, and also provides cashback for purchases.

Despite many positive aspects of the new neobanking technology from Monobank, it is still not a leading financial intermediary through the realities of the specifics of regulation of the banking sector in Ukraine. One of the reasons is the conservative approach of the current legislation.

There is currently a problem of legal regulation of the creation of a Monobank as a full-fledged "neobank" and the creation of other Internet banks in Ukraine. The basic laws regulating the activities of banks in Ukraine are the laws of Ukraine "On licensing of certain types of economic activity" [8], "On financial services and state regulation of financial services markets" [9] and "On banks and banking activities" [10]. The required licenses' scope and specificity are directly dependent on the volume of services provided within the project framework. Today, the opening and maintenance of current

accounts is an exclusive bank spectrum of services, as provided in Article 47 of the Ukrainian Law "On Banks and Banking" [10].

The current law does not provide any "equivalent" license that can regulate new banks' full functioning as a full financial institution. Thus, a project in which customer accounts are saved maybe only in the old banking. The same applies to the debit card. Although the Monobank card involves the possibility of providing and perform various payment operations, its supplier may be the only bank that has agreed with another payment organization. This is provided by Article 14 of the Ukrainian Law "On Payment Systems and Transfer of Funds in Ukraine" [11].

Consequently, now the Neobank Project's implementation in Ukraine requires the cooperation of the latest banking institution with one of the existing banks. Maybe another way: to open bills and make payment instruments abroad, but this path will be more expensive to launch an institution's activities and will include more, compared to tariffs of domestic banks, a card account service fee.

Although Internet banks are becoming more popular globally and in Ukraine through a number of their benefits over traditional ones, they also have many drawbacks. The main disadvantages of the neobanks are:

- the high cost of creating and implementing specialized services and programs providing consumer services;
- the high costs for developing and implementing reliable protection against Internet fraudsters and cyber viruses;
- lack of investment funds;

- the need for significant investment in the development of the neobank;

- the presence of distrusts to bodies that provide privacy and protection of personal data of individuals, as well as small and medium-sized enterprises, banking activities in general and non-banking in particular;

- if there are problems with servers, accounting and documentation can be suspended indefinitely before their maintenance and debugging;

- a low level of literacy in the country and in the world which undermines the technical advantages of neo-banking over traditional banking, and distrust of alternative payment systems;

- the emergence of other risks, the source of origin, which is the need to maintain the competitiveness of banks in the financial market;

- high competition and short-term expenses;

- availability of distrusts to transition to alternative payment systems;

- the need to compete with traditional banks and challenging such well-known companies as Google, Apple, Wechat and Uber, which have access to a large client base and provide them with a wide range of tools, including financial.

Thus, neobanks' appearance as a new form of banking activity is associated with the significant development of Internet technologies

and the emergence of a new generation of consumers who actively use smartphones in everyday life and prefer total remote control of their finances. Internet banking has gained a significant market share since it offers customers with valuable benefits than traditional banks: reduced commissions and opening accounts without visiting the bank. However, for Ukraine the main problems are the legislative framework, the possibility of creating non-bank service, the possibility of providing traditional banking services through an Internet banking network, a need for significant investment and other aspects that slow down the implementation and reduce the profitability of banks that are fully based on digital technologies.

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Lifecycle and wealth in cee countries

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1. The purpose of present study, background information

The importance of housing and housing loans is significant in the functioning of the modern economy. Due to household savings, it is the main sector in terms of capital accumulation, while borrowing and repaying housing loans is one of the most important economic, financial decisions, and subsequently a financial burden, in the lives of people.

The aim of this study was to examine how the life cycle theory can be demonstrated based on household data in 3 selected countries (Austria, Hungary, Slovakia) in the changes of household income and wealth.

The first part of present study gives a theoretical overview of the life cycle theory which is then presented using statistical data and the wealth data of each country.

1.1 Description of the 3 countries selected for comparison

The reason for selecting these 3 countries was to examine 2 other countries in addition to the Hungarian data already described (Balogh et al. (2019); Boldizsár et al. (2016), Kovács L. (2020)) which:

- a) are EU member states,
- b) were part of the administration of an empire until the end of World War I,

c) are adjacent to each other so that their citizens are well acquainted with each other's living conditions.

All three countries participated in the European Central Bank's Household Finance and Consumption Survey (HFCS). The Household Finance and Consumption Survey (HFCS), a joint project of central banks and national statistical institutes of the European Union, provides detailed household-level data on various aspects of household balance sheets and related economic and demographic variables, including income, pensions, employment, gifts and measures of consumption.

1.2. Overview of the life cycle theory

The term life cycle is used in many different areas of modern science. The **life cycle analysis of products and markets** has an extensive literature; it has become a basic component of marketing, green economy and product economy calculations.

Adizes (1992) also used the term life cycle to identify the **development stages of firms**. This has thus become an important part of organisational theory and management sciences.

It is the concept of the **family life cycle** in psychology that brings us closer to our goal, as it examines the different stages of becoming a family (finding a partner, marriage, families with small children, families with several children, children leaving the family home...) and its phenomena. These family life cycle stages are associated with different income, wealth and economic needs and goals. For us, the changes in savings (which can be interpreted as deferred or "negative"

consumption), indebtedness and loan repayment are the important factors.

Regarding the examination of savings, economics has taken different positions during its development: classical economics has considered savings (which were typically the savings of the “capitalist”) to be desirable and useful, as this has been a source of accumulation of capital and thus growth. The income of the capitalist was also related to the self-restraint of the capitalist, as the capitalist did not spend all their income.

The Keynesian revolution put savings in a different light: for Keynes, growth is based on demand, one component of which is C (Consumption) household consumption demand in addition to I (Investment) and G (Government purchases). Household demand is determined by income, and disposable income is reduced by savings. The examination of household savings and household income are thus linked. Household consumption and household savings have consequently become complementary categories. According to Keynes, consumption is determined by current income (**absolute income hypothesis**), but according to his theory, households do not reduce their consumption proportionally to the decrease in earned income. On the other hand, not all income is used for consumption; as their income increases, households increase their savings; consequently, their consumption grows more slowly than their income.

If, however, we do not spend our entire income on consumption, the question arises, how much will we save? The proportion of consumption and savings of individuals and families had to be

examined in the longer term, preferably in such a way that the effects of economic cycles could be filtered out as well.

According to the **relative income hypothesis** developed by Duesenberry (1949), household consumption also depends on previous income: households compare the level of their savings and consumption to a selected, targeted reference group. This goes back to Thorstein Veblen's theory.

The effect of wealth cannot be ignored in further analyses of consumption either.

Milton Friedman published the **permanent income hypothesis** in 1957, according to which consumption is not based on the current, but on the long-term average income, on the so-called permanent income. Permanent income is thus

- the expected medium- to long-term income
- a time horizon, the degree of foresight (this is a variable that depends on the individual's cultural preferences as well, e.g. the time of planned retirement), and
- affected by previous savings, inherited assets, extent of planned inheritance, etc. as well.

Temporary income is what fluctuates compared to the above.

According to Friedman, the temporary income has no effect on consumption, it is reflected in the measured savings.

Some of the income is also set aside by individuals on the basis of averaged medium- to long-term data to maintain a constant standard

of living in order to “even out” consumption. Friedman also talks about various motives for saving; the life expectancy of an individual, the end of their planned active age, and possible intentions to leave something to their heirs can be defined as variables.

Another important theory, Ando and Modigliani's **life cycle hypothesis** (1963), can be seen as an extension of Friedman's theory.

Modigliani examined how long-term changes in an individual's life cycle affect the changes of income savings and consumption over their life cycle. According to this model, there are well-separable periods in an individual's life where the ratio of income to consumption fluctuates, but behind all of this lies the individual's forward-looking approach to planning. Individuals and families can make an informed decision about how much they want to consume at different ages and thus optimise for a full life cycle, thus using their resources efficiently. In essence, we need to look at the long-term marginal rate of consumption. According to this theory, individuals and families take into account their entire life, the expected costs of raising children, the standard of living they want to achieve in old age, and decide how much they need to save or can spend now to achieve this. Modigliani uses the term “life-cycle wealth” which is the sum of labour income and inherited wealth. The individual's usable resources, which differs from their current income, can be determined by practically discounting this (calculating an annuity).

Modigliani also makes assumptions about:

- the amount of income up until retirement
- whether there is a motivation to leave inheritance

- individuals know how many years they will live
- the goal is to “even out” consumption

The model can be interpreted at the level of the individual, but through population change (e.g. proportion of young people, increase or decrease of the population) macroeconomic relationships can be established for the demand for individual investment instruments (and thus their price changes) and the intergenerational wealth cycle. This theory also has a major impact on the analysis of pension systems.

The model handles cycles with different time spans:

In the short run, consumption is independent of current income because it is “evened out”

In the medium term, the model is also influenced by the conditions of the macroeconomic environment, e.g.

- labour supply and demand correlations
- the current economic cycle as an underlying framework

In the case of the full active life cycle, among other things, the following parameters are relevant:

- How well can households predict the future, is it possible to predict the changes in their living conditions on a 20-to-40-year timescale?
- Do they face a liquidity constraint (borrowing) to “even out consumption”?

- How prudent and conscious they behave, how are uncertainties taken into account by them? How are they affected by the consumption habits of the households chosen as example?
- Can the amount of work be changed; can it be reduced flexibly?
- How does the number of children change their behaviour?

From the point of view of our topic, it is worth to mention that the most common motives for saving are related to housing, and thus income, savings, wealth and housing are correlated here as well, e.g.

- Part of the life cycle motive is having a child, which has a strong connection to housing
- The self-sufficiency motive appears in the examination of the credit limit, creditworthiness
- One of the most common forms of the legacy motive is to support the start of their children's independent life and their own housing goals

2. The examined statistical data

Supporting life-cycle income and its use for consumption or savings with data is a very difficult task. Several logical approaches and models can be used:

- a) Examination of annual average national or regional income data:

The Hungarian Central Statistical Office publishes average income data for each year over long time series. However, these are the average of the data for all residents achieved in that year. Thus, we

cannot draw conclusions from them regarding the changes in the life cycle, but about the underlying macroeconomic processes.

b) It would be optimal to examine the individual incomes of individuals in a statistically reliable societal sample over a longer time series (e.g. National Tax and Customs Administration/NAV data). Even then, the changes in the above-mentioned average income of the economy, which also depends on the economic cycle, may distort the data, as for example the salary of a doctor starting to work in 1995 is difficult to compare with the income of a doctor starting to work in 2020. Unfortunately, we do not have such a sample, so this is not a viable option.

We have at our disposal (in Hungary) the statutory, planned future incomes of the career models of certain employment groups (e.g. health professionals and nurses; teachers; wage scale for civil servants and public officials). These have limited use as they regulate the incomes of smaller social groups and do not cover the long time periods required to assess life cycles.

c) The European Central Bank's **Household Financial and Consumption Survey** (HFCS) provides data with an approach similar to Hungarian national statistics. The survey was conducted in 2016-2017 collecting household data (i.e. not produced from macroeconomic data) using the same methods in 22 EU countries (although national specificities set several limits in this respect). Austria, Hungary and Slovakia also participated in this survey. The data of the 3 countries were thus compiled using the same data collection and analysis, so they are methodologically comparable.

A breakdown of 6 age groups was used and specifically the topics of financial and real estate assets, loans, borrowing limit, consumption, distribution of wealth were addressed; consequently, this resource is suitable for our life cycle analysis as well.

The 6 groups of the HFCS age breakdown are: 16-34 years; 35-44 years, 45-54 years, 55-64 years, 65-74 years, 75+ years.

3. Analyses using the HFCS data and findings

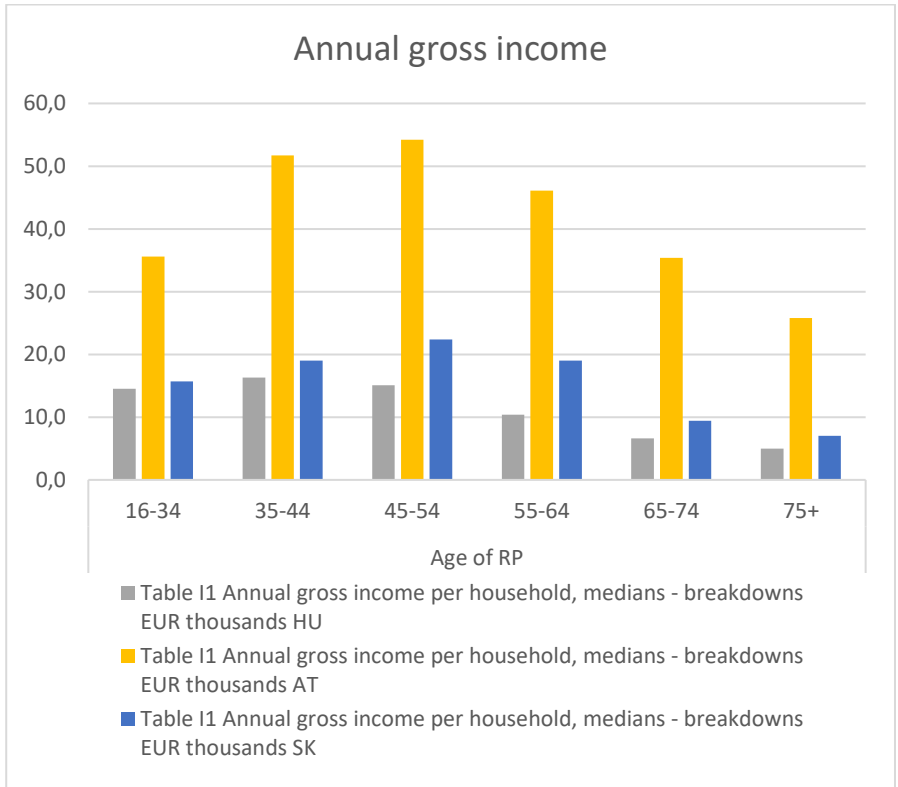
The main aspects of the HFCS publication were as follows:

- A) Main aggregates
- B) Real assets
- C) Financial assets
- D) Shares of assets
- E) Debts
- F) Financial burden
- G) Consumption
- H) Credit constraints
- I) Incomes
- J) Total assets, net wealth
- K) Quintile net wealth

Our goal is to analyse the changes of life cycle financial indicators; thus, from the point of view of our analysis it seems appropriate to follow the following logical order:

income -> wealth -> distribution of wealth (financial and real estate) -> borrowing.

HFCS typically publishes both average and median values. Since we analyse the behaviour of families and households here, we present the median values in this analysis. In each case, the graphs contain the original name of the data as indicated above



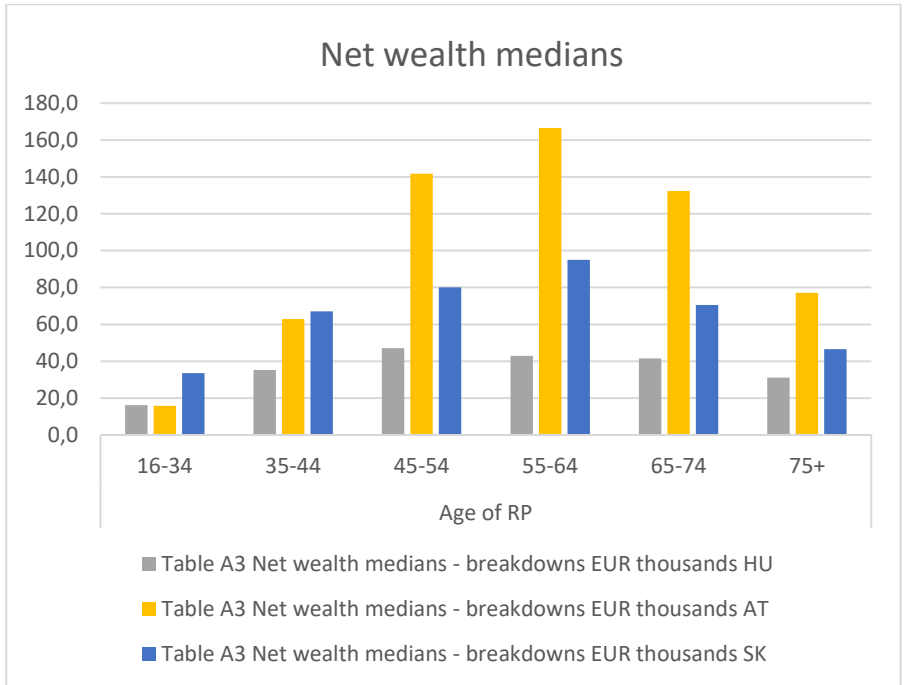
The gross income data of diagram I1 show that the income of households increases continuously until the age of 54 (44 in Hungary) of the reference person (who is the main breadwinner). Thus, the

HFCS database can show the changes in income on a purely life-cycle basis, without taking into account any differences in education, place of residence, or source of income.

Here, the calculation of per capita income can pose a theoretical problem, but the first 3 age groups will certainly include dependent children in all cases. According to the data of the Hungarian Central Statistical Office (Statinfo), in 1995 women gave birth on average at the age of 24-25 and in 2018 at the age of 30-31.

So it can be said that taking into account the children born, the income of families increases up to the age of 54.

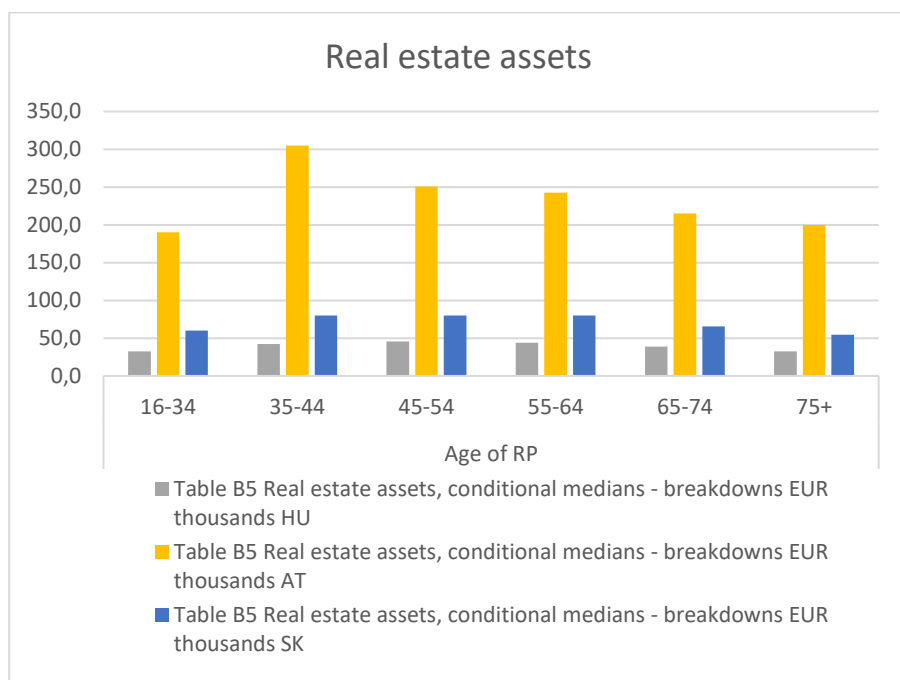
The other problem is the interpretation of the income of the 55-64 age group. These citizens were 28-37 years old at the time of the change of regime in Hungary and Slovakia in 1990 (27 years before the sample). Without conducting separate studies, we assume that they may be the generations in these 2 countries, who did profit less from the change of regime, but are still active, and whose income also reflects this fact. This may explain the fall in the income in these two countries.



The assessment of net median wealth (= real assets + financial assets - total debt) shows a similar picture: The amount of net wealth is constantly and significantly increasing until the reference person is 54 years old (in Hungary) or 64 years old (in Austria and Slovakia). This is true despite the fact that, as mentioned above, these are typically households raising a child (or children), with increased consumption and spending. In addition, they are still able to accumulate net wealth, which suggests that there is room for manoeuvre financially (savings and/or borrowing).

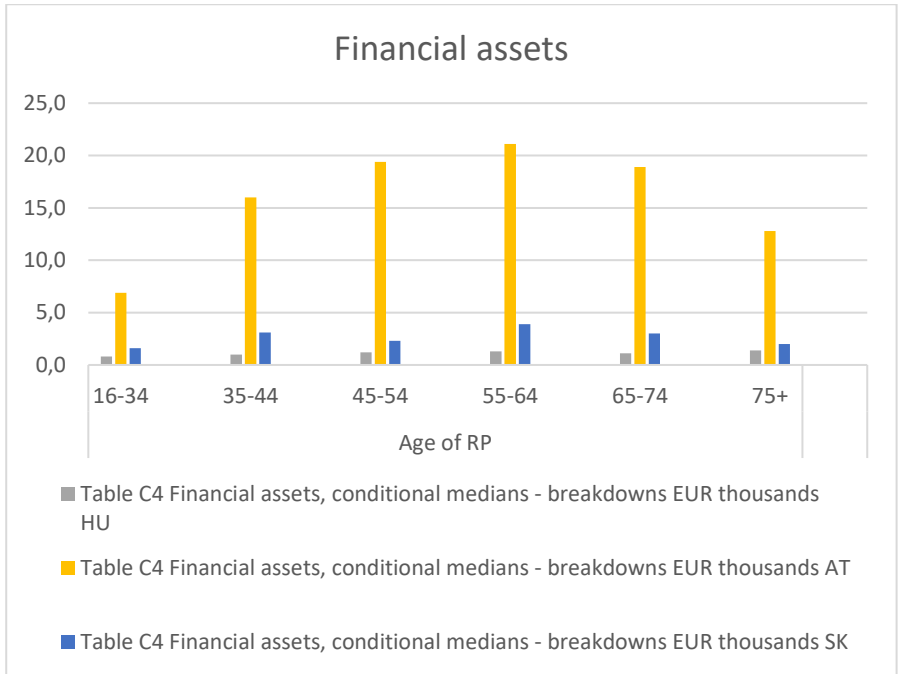
Of particular interest would be to study the age groups 55-64 and 65-74. Here, the decrease in income is not followed by a significant decrease in wealth, which may be in part due to the high proportion of assets invested in real estate to be presented later. The extent and proportion of real estate assets can be what significantly "appreciates" the owner's assets.

The distribution of total wealth between real and financial assets can also be analysed using the medians published in the HFCS survey:



We get a life cycle curve similar to the ones above: Continuous increase until the age of 64 (in the case of Austria, the age group between 35 and 44 stands out even more), followed by a decrease from the age of 65 and above. This means that the observed households increase their real estate assets up to the age of 64 while raising a child (or children). One reason for the subsequent decrease may be the intergenerational transfer of wealth, gifting and leaving assets as inheritance (see the findings of the Hungarian Central Statistical Office in Hungary made in 2016).

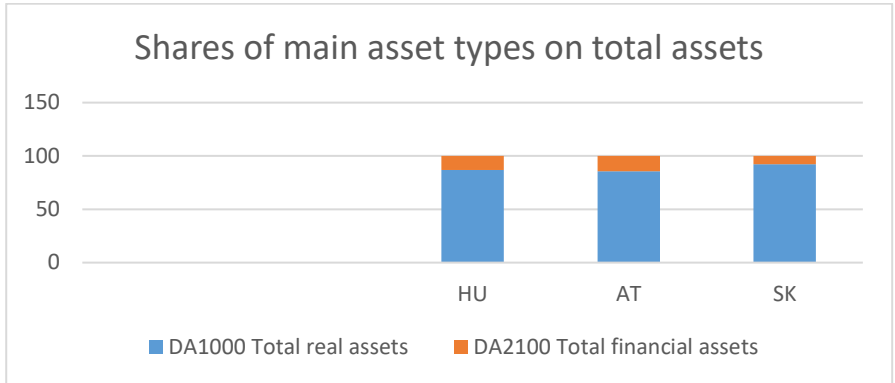
The proportion of real estate is also particularly important from the point of view of creditworthiness. The “Loan To Value” ratio is one of the macroprudential regulatory components of creditworthiness: it is not possible to take out a loan without own funds. This life cycle distribution also means that the creditworthiness of citizens in the countries assessed increases due to their real estate collateral up to the age of 64. However, it is important to note here that in addition to real estate collateral, banks also take into account the expected income, in which case, with a maturity of 15 to 20 years, the real age limit may be 54 years.



The comparison of real assets and financial assets shows once again how important the role of real estate purchase and real estate financing is in the life of households: in Hungary, the median for real estate assets is EUR 30-45 thousand in addition to the median for financial assets of EUR 0.8-1.4 thousand. In Austria and Slovakia, although the numbers are different, the distribution is similar.

Compared to real estate assets, the distribution of financial assets between the age groups is also different, increasing gradually until the age of 64, which may also have something to do with the life cycles. The amount of financial assets does not lose its significance in old age

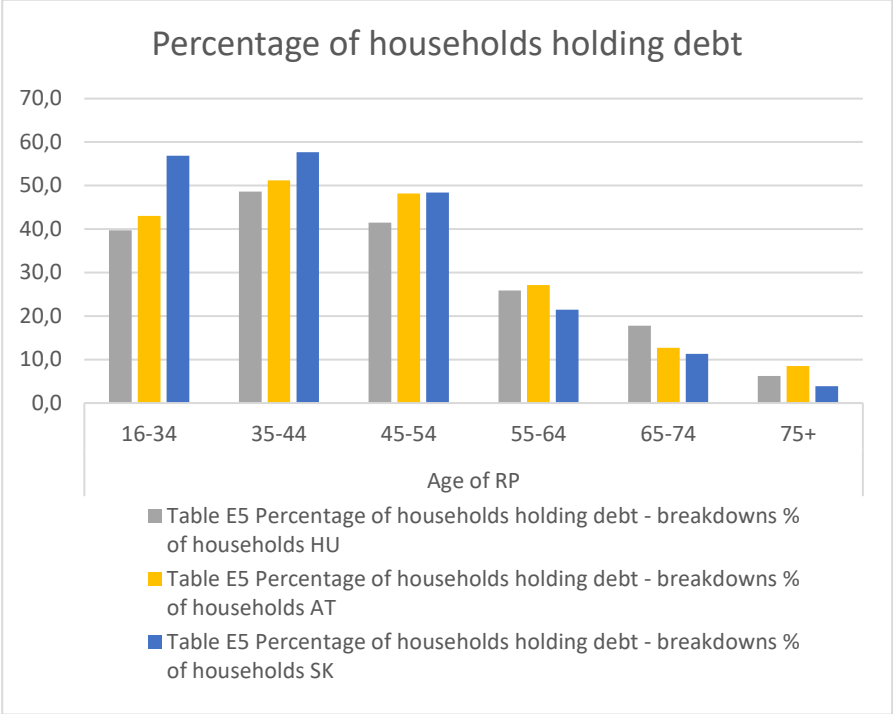
either: it is then presumably used as a means of self-reliance. The high amount of financial assets at the age of 75+ also needs a special explanation.



The distribution of financial and real estate assets within total assets is again surprisingly similar in the 3 countries. The reasons for this need to be further analysed: there may be cultural or institutional reasons for the similarity.

The proportion of households with credit is the highest in the 35-44 age group, and decreases after that. This may indicate on the one hand that part of the money spent on raising children (house, car ..) is realised on credit, on the other hand, taking out a loan is one of the sources of the above real estate and financial assets structure. We also know from the EU statistics that the difference in the loan portfolio/GDP ratio of the 3 examined countries is significant, where Hungary's value is by far the lowest. We have seen above that the amount of real estate assets is still growing in the 54-64 age group and the amount of financial assets is growing up to the age of 64. The

figure below does not differentiate between the purpose of borrowing, so it includes not only housing, but for example consumer credit as well.



4. Summary, further tasks

Similar to previous research in Hungary, when comparing the 3 countries, we also found that the life-cycle based approach is an important and correct starting point for examining saving, capital accumulation and borrowing, which can be defined as complementary to income and consumption. All the income, real and financial assets, and borrowing indicators in the ECB's HFCS show very marked life-cycle based curves as well.

Based on the analysis of the statistical data, it can be stated that in the 3 examined countries, due to the nature of the database, without the possibility of any further segmentation, a definable annual life cycle-based increase in income can be detected up to the age of 54.

The analysis of real estate and financial assets showed a similar picture; even their changes are very similar.

Based on this, it can be concluded that the data of the 3 countries – despite the undoubted development of the countries – are very similar, confirming the importance of life cycle theories.

In order to clarify and refine the analyses, it would be necessary to further analyse life-cycle-based incomes. For this, a finer breakdown (e.g. by education, job, place of residence) or actual representative samples over a longer time period (e.g. 15-25 years) would be necessary (e.g. representative, anonymised data from tax offices).

In this regard, we assume that banks may be able to build these types of life-cycle-based internal rating-lending models based on their own databases.

In a further extension of the above theory, the life cycle analysis must be connected with the macroeconomic cycles that determine and influence this: the income and borrowing opportunities of individuals are also influenced by economic cycles; here it is necessary to examine possible interactions.

The comparison and analysis of the institutional system related to housing also deserves further investigation.

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Management accounting in agriculture

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1. Introduction

Nowadays, the business environment in agriculture, like many other industries, is becoming more complex and dynamic. Business leaders face a high degree of uncertainty not only because of the environmental exposure of the sector and its changes, but also because of the rapid obsolescence of assets and technologies. Therefore, they have to make increasingly complex decisions to improve asset performance and profitability. Today's agricultural organizations, farmers, and livestock farmers have a number of sources of information from which to select data that can help them make decisions. This information should also include data from accounting systems, customer feedback, crop and livestock production processes. Collecting, processing, and evaluating this data greatly supports making the right management decisions. The development of different cost analysis methods has now reached a high level that can be used to deal effectively with cost and the problems associated with different cost allocations. The use of these methods has become common in the secondary and tertiary sectors, but they are rare in the primary sector.

In our study, we examine the significance of management accounting in agriculture and in agricultural organizations, as well as the cases related to the process- activity- target cost calculation methods implemented in agriculture and agricultural organizations with different results.

2. Management Accounting

Management accounting is not based on legislation, but on a set of accounting data and information that supports good management decision-making and aids future planning (Bárczi, et. Al., 2012). This special area of accounting primarily assists management in maximizing profit or minimizing loss (Grimshaw, 1993). Management accounting dates back to the 18th century, when classical cost management decision support procedures were introduced. Under the procedures, the costs were allocated to the departments actually incurred. The procedure proved to be effective, as managers were provided with information on which organizational units could be used for cost optimization by eliminating unnecessary costs in order to reduce costs (Zéman - Lentner, 2018). The goal of management accounting is to support management decision-making in both the short and long term. In contrast to financial accounting, which focuses on communicating past information, management accounting focuses on the future activities of the company, using estimates and forecasts as well (Zéman - Mallinguh, 2020). Information within a company alone does not mean efficient, profit-maximizing operation and competitive advantage. It is important to mention that the information of the organizational units within the company together and complement each other contributes to the company's planning, decision-making and control (Zárda, 2008).

2.1 Management accounting and information in agriculture

In America, in 1989, farmers in Nebraska (USA) began organizing meetings to address new challenges in agricultural production and to share their suggestions. On March 8, 1993, they finally formally formed a non-profit association called the Farm Financial Standards Task Force, which was changed to the Financial Standards Council in 1994. They set the goal of developing an operational, management organization guide for agricultural companies called Financial Guidelines for Agricultural Producers (Doğan, 2013). A symposium was held in 2002 to present the most significant parts of the guide developed. Among these theories, the need to create results-based, cost-based accounting records has been emphasized. The collection of information on which the reports are based should be based on a responsibility center-based approach.

As can be seen, the whole theory is based on the development of an appropriate accounting system and supporting information gathering practices (Süveges, 2013). In creating this, comprehensive strategies and long-term plans need to be formulated, including the development of new products. Attention should also be paid to investing in new production methods with significant changes, as well as in tangible and intangible assets. The way resource allocation decisions and related pricing need to be defined. It is based on the cost planning and cost control of operations and activities, including reporting on revenues, expenses, assets, and the responsibilities of departments, plants, and other responsibilities (Farm financial standards council, 2008). Also part of this is measuring and evaluating people's performance, including comparing actual results with planned results. It may be based on financial or non-financial measures. Finally,

attention should be paid to meeting external regulatory and legal reporting requirements, as laws and regulations typically specify the accounting methods to be followed (Doğan, 2013).

The main obstacle to the development of an effective management accounting system in agriculture remains the human factor, ie the lack of interest of farmers due to non-understanding. According to a Swedish survey conducted in 2017, the majority of farmers surveyed find management accounting tools unusable for business decision-making and control. Consequently, the use of formalized management accounting tools is low among the interviewed farmers. This finding contradicts the majority of the management accounting literature, which states that management accounting provides relevant information for decision-making and control in agriculture. However, the research also reveals that despite their responses, farmers use many informal management accounting methods in practice. Farmers close links with day-to-day activities allow them to make quick production decisions and base their decision-making and control practices on operational non-financial performance indicators and informal calculations. Because farmers work close to production, they can make decisions and control production without the use of formalized management accounting tools. Farmers also often learn from each other and see benchmarking as a valuable tool in management accounting in farming (Jonsson - Sandlund, 2017).

When assessing internal cost structures, formal management accounting tools are perceived by farmers as inflexible and too comprehensive. Instead, farmers perform informally simplified calculations and make decisions and control production along with analysis of non-financial performance indicators. The meaning of

using formalized management accounting is seen more in convincing external stakeholders (Kovács, 2017). This is based on the assumption that formal management accounting tools and financial performance statements are seen as much more useful in external communication than in internal decision-making and control. This is based on the intention that the use of modern management accounting methods will build trust with external stakeholders (Farm financial standards council, 2008).

The application of management accounting methods also depends on the size of the company. The low use of management accounting in smaller farms can be explained by the fact that farmers can make long-term and operational decisions based on informal calculations and personal experience. This is possible because farm managers have extensive experience and in-depth knowledge of the production and business environment. In addition, the organizational structure of enterprises is not complicated in the sense that the farmer does not have to convince middle managers or the board of directors to make decisions (Ryzhova et. Al., 2015).

By applying the management accounting information system on a daily basis, businesses and farmers would be able to estimate agricultural production costs more accurately, facilitate the measurement of productivity and solve problems encountered in the agricultural production process. Management accounting theories are basically based on cost and cost calculation. However, due to the special and specific nature of agricultural holdings, they are generally not fully applicable and do not always show a true value in their calculation. The special characteristics of agricultural enterprises distinguish it from other enterprises. These characteristics are also

reflected in the accounting system of agricultural enterprises, which can lead to a number of challenges in the applicability of management accounting (Teasdale, 1996).

2.2 Controlling - based agricultural costing methods

Management accounting provides decision makers with more detailed information about individual economic events than financial accounting. At the same time, in both accounting analyzes, the method of accounting for economic events plays a key role. At the end of the 19th century, newer methods of cost analysis emerged, only a few of which were applied in agriculture. Furthermore, in the case of several cost analysis methods, it can be stated that it was only partially or latently implemented.

- Activity - based costing

Activity-based costing (ABC), developed in the United States by R. Cooper and R. S. Kaplan in the late 1980s, is a process that uses multiple cost drivers to predict costs and link them to cost subjects. A complex analytical system for accounting and costing that collects financial and operational data on business and management activities (González-Gómez - Morini, 2009). The method clearly seeks to answer the question of what is causing the cost and to what extent this cause results in overheads. This costing model explores the objectively incurred and projected costs of activities and business processes (Bodnár, 1999).

We would like to illustrate the applicability of activity-based costing in the agricultural sector through examples. One such area of application in Lee and Kao's 2001 study is the application of activity-

based costing, simulation-assisted allocation of operating costs in the Pu-Shinwholesale fish market. The results of simulation activity-based costing are used to more accurately allocate resource costs and avoid arbitrary allocation. In their study, based on the results of the ABC model, they found that the total cost of processing fish is \$ 0.17 per kilogram higher than the cost calculated using traditional accounting methods. To explain this in their study, they attributed the fact that the Pu-Shin wholesale fish market does not account for the depreciation of machines in the cost calculation.

In his study, Pockeviciute (2008) also used the ABC budget model in the cost allocation of Lithuanian dairy farms. In his study, the author concluded that the ABC method for allocating milk production costs provided a well-structured overview. As a result of the research, it was stated that the fixed cost per 1 liter of milk accounted for 47% of the total costs during the activity-based cost allocation, while the traditional accounting methods reached less than this percentage.

- Process-based costing

Process costing is a typical example of the further development of business economics based on corporate practice. Traditional costing methods were basically developed with a focus on industrial production and its variable costs. There was a need for an approach that takes into account the outputs created in indirect areas, and this is what provides the basis for performance-oriented cost planning and control.

Based on this method, it can be said that (unlike Cooper and Kaplan) it is not the individual activities that are analyzed, but the processes that go beyond the cost centers. The services provided in these

processes as cost drivers are key factors in costing and cost management. Process costing can be interpreted as a completely new approach that makes cost transparency in indirect (service) areas more efficient and ensures efficient use of resources, and monitors capacity utilization, improves product costing, thus providing a great deal of support to avoid strategically wrong decisions. The basic condition for the implementation and design of process cost calculation is the analysis of activities, the clear identification of processes, their mapping and the recording of services (Horváth - Mayer, 2011).

In field crop farming, the application of process-based costing allows a more accurate breakdown of the costs associated with each work activity. In accounting, work-related costs are assigned to the processes that cause them. However, the application of accounting in agriculture poses some challenges for practical implementation. This includes, on the one hand, the allocation of settlement costs for the work at the level of detail required and, on the other hand, the precise definition and recording of the processes. The applicability of process-based cost accounting in agriculture is supported by production management software and GPS-based data loggers. Extensive digitized data recording of processes provides a basis for cost allocation. In contrast to the traditional costing method, process-based costing allows for differentiated control of costs related to specific work processes and results in a more accurate overview of process costs (Feil - Wendt, 2017).

- Target costing

Target cost calculation can be applied when introducing and developing new products and in the case of lean organizational operation (Anthony - Vijaj, 2006). Effective cost control can be

achieved once it is defined in the product planning and development phase, and not afterwards, after the plans have been completed or production has started.

Target cost calculation is consumer-centric, the basic assumption is what is the market price that consumers are willing to pay for the expected quality and function. To this end, it calculates and allocates the cost of producing the product, taking into account a predefined profit, taking into account its maximum expenditure during its production (Bodnár, 1999).

Target costing is a special cost analysis method in agriculture and is rarely used, but this new accounting method can provide a solution to many challenges (Jack - Jones, 2008). The study below is an excellent illustration of its applicability in agriculture and the challenges and opportunities of its use.

In their study, Theuvsen and colleagues attempted to use target costing to solve ethics and economics, namely animal welfare and profit maximization, and the associated dilemma. Target costs can effectively reflect the dilemma of ethics and economics that results from increasing animal welfare and consumers limited willingness to pay. The study points out that the target cost approach can create a more economical turkey breeding and processing business or organization that can meet both ethical and organizational goals (profit maximization) by avoiding economy and losses. The authors emphasize that marketing research, as one of the most important parts of the calculation of target costs, is also extremely important in animal husbandry, as the ethical characteristics of modern animal husbandry systems must be taken into account and animal welfare systems must be generalized costs from consumers willingness to pay, based on

accurate and effective marketing, market research (Theuvsen, et al., 2005).

3. Summary

For the time being, the practice of management accounting and various cost analysis methods can be used only to a limited extent in agriculture. It is clear from the case studies we have processed that each method is useful differently and has different advantages, but it can be concluded that the application of these methods faces a number of difficulties. These application challenges may be due, among other things, to a lot of uncertainty, which makes it very difficult to develop the right strategy.

In our opinion, management accounting and the related modern methods can only have real added value if currently segmented technological methods are at the service of farmers in a unified system. That is, by analyzing and updating the weather, using satellite field analysis, processing GPS coordination data, integrating regional and global production data and market needs, and integrating the latest IT methods, a comprehensive accounting system based on extensive data would be available to all farmers. Until then, management accounting research should have the important task of collecting and analyzing the experience of farmers accumulated over several generations.

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How to use macroeconomic information to make financial decisions

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Making the relevant financial decisions is impossible without taking into account a set of macroeconomic indicators. Managing a financial capital in an appropriate way needs the analysis of special economic information.

The study of the dynamics of expenditures of the population of Ukraine showed that the largest share of them refers to the consumer spendings (Table 1).

Table 1 – Structure and dynamics of macroeconomic indicators in Ukraine (State Statistics Service of Ukraine)

Indicators	2015	2016	2017	2018	2019
		hrn			
Income	5231,7	6238,8	8165,2	9904,1	12118,5
	hrn				
Spending	4952,0	5720,4	7139,4	8308,6	9670,2
	%				
- food	53,1	49,8	47,9	47,7	46,6
- utilities	11,7	16,0	17,0	15,2	14,6
- health care	3,7	4,2	3,8	4,0	4,1
	hrn				
Savings	279,7	518,4	1025,8	1595,5	2448,3

On average, Ukrainian consumers have to spend about a half of their expenses on food, which according to the world standards is an actual indicator of poverty for the Ukrainian population. As a result of the current cost structure, there is a low level of savings. However, in general, the combined effect of income growth and some positive changes in the structure of expenditures has led to an increase in total savings for the Ukrainians.

However, the savings of the bulk of Ukrainian families are insignificant and do not allow to ensure the stability of an acceptable standard of living in case of economic or social stress. In the structure of financial assets, the population prefers cash and bank deposits. This fact shows that bank deposits in our country are almost an unalterable source of profitable financial savings of the population. According to the experts' estimations, a significant share of money is concentrated in the hands of the Ukrainian population, mainly in cash. This stock of liquid money can be considered a reserve for deposits. This reserve under favorable macroeconomic conditions and trust in the banks can lead to organized forms of savings, bank deposits in particular. That is why it is an important task to ensure maximum assistance in attracting cash on long-term deposits with their subsequent transformation into investment resources (Shevaldina, p. 287).

Favorable macroeconomic conditions in the country are the drivers for money savings by households. The middle-income families seek primarily to maintain their earnings and multiply them, which in turn stimulates growth of the national economy. Thus, involving savings to the investment process requires a set of tools, forms and methods that provide capitalization of household incomes and contribute to their growth (Stepanova et al., p. 46).

According to a survey of the population of Ukraine (Prymostka et al., p. 156):

- 33% of citizens do not keep savings in banks at all;
- 49% - have a small part of organized savings;
- 7% - invest half of their savings in banking instruments;
- 11% - keep most of their savings in the bank.

Under contemporary conditions, the population of Ukraine is wary of deposit and credit policies of the banks and, therefore, reluctant to direct their savings to these financial institutions.

At the state level, the size of savings is determined primarily by the level of production development, since with the increase in production efficiency income enhances, and hence there is an opportunity to increase both consumed and stored part of income (Zolotaryova et al., p. 43).

Analysis of the coefficients of pair correlation of generic macroeconomic factors (Shevaldina, p. 289) allows to assume that Ukraine has formed a consumer model of behavior of the population that prefers unorganized savings. The closest relationship was marked between income/expenditures an indicator of retail trade (coefficients of pair correlation have the closest direct connection with the costs 0.94 and nominal income 0.93). Between consumer price indices and producer prices there is no close relationship with deposits. Inflation expectations are quite tangible, they lead to the formation of the savings of the population, focused on the ready-made stereotypes of accumulation savings in society, not to protect the depreciation of money in the future. The consumer price index has coefficients

correlations that indicate a weak correlation with all other macroeconomic indicators. To a large extent, this relationship is reflected in the producer price index, but it is also critically insignificant. The macroeconomic anti-inflationary policy of the state and the economical behavior of the population do not have a significant impact on the deposit population activity (Table 2).

Table 2 - Correlation coefficients between deposits and macroeconomic factors⁵ (Shevaldina, p. 289)

	1	2	3	4	5	6	7	8	9	10	11
1	1,00										
2	0,66	1,00									
3	-0,21	0,00	1,00								
4	-0,40	-0,56	-0,05	1,00							
5	0,87	0,73	0,03	-0,41	1,00						
6	0,92	0,77	-0,06	-0,45	0,93	1,00					
7	0,49	0,32	-0,13	-0,11	0,38	0,50	1,00				
8	0,83	0,80	0,02	-0,48	0,94	0,94	0,35	1,00			
9	0,50	0,67	0,07	-0,32	0,78	0,68	-0,01	0,82	1,00		
10	0,72	0,49	-0,22	-0,20	0,58	0,75	0,52	0,57	0,29	1,00	
11	0,24	0,44	-0,03	-0,27	0,22	0,21	-0,08	0,31	0,42	0,13	1,00

The consumer model of financial behavior is formed under the influence of macroeconomic factors: the amount of cash, average monthly wages, and spendings. The value of the correlation coefficients between deposits and these indicators show the average

⁵ 1 – GDP, 2 – cash in circulation, 3 – consumer price index, 4 – producer price index, 5 – retail turnover, 6 – nominal income of households, 7 - disposable income of households, 8 – household expenditures, 9 – average monthly salary, 10 – savings, 11 – overall deposits.

level of the strength of the association (0,44; 0,42; 0,31, respectively). This explains that in the medium term savings are formed by the population using a residual principle.

Among the macroeconomic factors, it is impossible to single out one dominant factor that would have a decisive influence on the propensity of the population of Ukraine to invest in deposit accounts under different economic conditions. With the changing economic situation in the country, the factors influencing the decision of the population to place savings on bank deposits are also changing. This allows us to conclude that the choice of form of capital accumulation depends on psychological factors, and the decision of the individual is based on a subjective assessment of the benefits of a particular asset. Thus, psychological factors are dominant in the formation of economical behavior of the population (Shevaldina, p. 291).

In order to make relevant financial decisions one should use the following macroeconomic indicators (Herashchenko, p. 261-265):

1. Increase/decrease in GDP.
2. Rate of inflation.
3. Central bank reserves.
4. The level of real wages.
5. Budget deficit.

Increase/decrease in GDP. GDP dynamics is the general state of affairs in the economy. All economic entities are linked by complex relationships. Therefore, the growth or fall of GDP will somehow affect the standard of living and the state of affairs in various businesses. For a developing economy, markets for non-essential goods will react particularly strongly to changes in GDP. In case of a drop in income, people often significantly reduce the demand for those goods that they can stay without. A fall in GDP means that things are going wrong in the economy, which means there will be reductions in people, the closure of ineffective areas. The feature of the economy is that by reducing your expenses, you reduce someone's income, as you reduce the demand for his products. And this can cause a new round of layoffs and bankruptcies until the economy finds a foothold. GDP growth is a signal for your active actions, the market allows. The fall in GDP is a signal for caution, an understanding that it is necessary to go through a difficult economic period. From 1991 to 1999, the Ukrainian economy collapsed almost by 2,5 times, after which its recovery began. From 2000 to 2003, the economy grew by 25% compared to 1999, the further growth rates were as follows (Table 3).

We can use the dynamics of GDP as a signal for future prospects in the market, in the company, in relation to personal savings.

Table 3 – Dynamics of changes in Ukraine’s GDP, %
(State Statistics Service of Ukraine)

2004	12,0	2012	0,3
2005	2,9	2013	0,0
2006	7,5	2014	-6,5
2007	7,5	2015	-9,8
2008	1,9	2016	2,4
2009	-14,5	2017	2,5
2010	4,1	2018	3,4
2011	5,2	2019	3,2

Inflation. Inflation depreciates our savings. Therefore, it is a signal for us that our assets should be invested in such a way that their profitability exceeds the inflation rate. Prices tend to grow unevenly. Often, before a spike in consumer inflation, one can see a rise in producer prices. In a developed economy, rising inflation is a signal that the central bank will raise interest rates. Therefore, loans will become less available in the future. High inflation can induce the purchase of assets, because in the future they will become more expensive. But it is important that these assets must generate income. One should not be affected by consumer panic when people buy useless things.

Table 4 – Annual inflation rates in Ukraine, %
(State Statistics Service of Ukraine)

2000	25,8	2010	9,1
2001	6,1	2011	4,6
2002	-0,6	2012	-0,2
2003	8,2	2013	0,5
2004	12,3	2014	24,9
2005	10,3	2015	48,7
2006	11,6	2016	13,9
2007	16,6	2017	14,4
2008	22,3	2018	10,9
2009	12,3	2019	7,9

If in developed countries inflation is usually at the level of up to 3% per year, then in Ukraine we see huge jumps in the value of the indicator. This is due to the unbalanced economy, which is poorly able to meet the needs of the population. As a result of this, there are significant flows of exports of raw materials and imports of consumer goods.

Central bank reserves. People like to build their forecasts related to the exchange rate, but it would be more effective to use a direct indicator - the level of gold reserves. If these reserves are steadily decreasing, then the devaluation of the national currency is approaching.

Table 5 – Gold reserves of Ukraine, mln USD
(Ministry of Finances of Ukraine)

2009	26 505,00	2015	13 299,99
2010	34 576,00	2016	15 539,3
2011	31 794,61	2017	18 808,45
2012	24 546,19	2018	20 820,43
2013	20 415,71	2019	25 302,16
2014	7 533,33	2020	29 132,89

The level of real wages. The dynamics of wages determines consumer demand. An increase in nominal wages does not yet mean an increase in purchasing power, because there is a level of inflation. But at the initial stage, people try to maintain their usual level of consumption, so the economy does not yet feel a drop in demand. Over time, adaptation to really decreasing incomes and a change in the structure of demand takes place.

Budget deficit. The budget deficit is a major problem for many governments. If takes the value within 3% of GDP, it can still be considered as such, which does not pose a big threat. But higher numbers indicate high inflation is to be expected. To cover the deficit, the government will have to borrow and, most likely, increase the money supply.

Table 6 – Budget deficit, % GDP

(Ministry of Finances of Ukraine)

2008	-1,5	2014	-4,6
2009	-4,1	2015	-2,28
2010	-6,0	2016	-2,94
2011	-1,8	2017	-1,6
2012	-3,6	2018	-1,66
2013	-4,3	2019	-1,96

All the above mentioned indicators are the macroeconomic signals which should be taken into consideration when making personal financial decisions.

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Current situation of electronic payment options in Hungary

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Introduction

The past year has been unusual in every sense. The coronavirus has not only transformed personal relationships, but it has also encouraged all active market participants in the economy to develop completely new operational solutions. A solution had to be found in all sectors to make products and services available even without personal connection. In my study, I deal with cash-saving payment solutions in a descriptive way without claiming completeness. Given that some of the solutions are still current, I have had limited opportunity to draw foreseeable conclusions. I have decided to detail these factors because they can be found in most media platforms and when visiting the websites of credit institutions.

Cash-saving payment methods

The pandemic has contributed greatly to the spread of various cash-saving payment instruments among consumers. Even though the National Bank of Hungary has stated that the use of cash does not pose a greater risk of the spread of the coronavirus,⁶ in order to reduce personal relationships, the greater emphasis has been placed on the use

⁶ <https://www.mnb.hu/koronavirus/hirek/a-magyar-forint-biztonsagos-a-keszpenz-hasznalata-nem-jelent-extra-kockazatot> (download: 04/11/2020. 16:50)

of cash-saving payment instruments in everyday life. This situation, as well as the introduction of various payment solutions, services and technologies timed for this period, also serve this purpose. The digitalization of various financial services has been further accelerated by the epidemic⁷, the electronic administration and payment are spreading to a wider range of users through various applications.

The instant payment system was successfully launched on 2 March 2020 after longer preparations. It was the first task waiting to be solved, which allowed the other solutions to develop. The Instant Payment is a transfer-type mode of payments. (*Selmeçzi-Kovács-Kuttor-Németh-Pál, 2020*) The essence of the system is that individual domestic transfers of up to HUF 10 million, initiated electronically, are executed in 5 seconds every day of the year, from 0 to 24 hours. From the point of view of the consumer, the transition to this system was automatic, nothing needs to be done for this system to come into force and, more importantly, it does not come at an additional cost. The underlying aim of the system is to restructure domestic payment habits, this is new possible solution to reduce cash payments, and it has appeared as another alternative to reducing cash flow in addition to card payments.⁸

However, from the point of view of credit institutions, it posed several challenges for market participants. There was an expectation to develop user-friendly and even more economical payment services

⁷ <https://www.vg.hu/penzugy/penzugyi-szolgalatok/felgyorsitotta-a-jarvany-a-penzforgalom-digitalizaciojat-3539953/> (download: 07/02/2021 08:04)

⁸ <https://www.mnb.hu/azonnalifizetes> (download: 02/02/2021 8:14)

based on the central infrastructure of instant payment, thus helping the widespread use of instant payment. (*Payment System Report, 2020*) In addition to fast technical solutions, the development of user-friendly interfaces was also important for credit institutions.

Transactions - that meet the above conditions - will be settled in the instant payment system. This is further facilitated by the fact that the use of secondary identifiers (e-mail address, telephone number or tax number/tax identification number) is sufficient, thus making the transfer even easier. With the rise of FinTech and digitalization, traditional financial services need to adapt to new user needs.

This principle works on the payment request, which facilitates fee collections. A payment request is a payment demand initiated by the payee which can be approved by the payer with one click and will be credited to the payee's current account within 5 seconds as an immediate transfer.⁹ The payee must have the payer's name and bank account number or registered secondary IDs to initiate the request. The merchant or service provider sends the payment information (e.g., merchant's account number, purchase amount, transaction ID) to the customer, this information is displayed - typically - in the mobile payment app on the customer's mobile phone, which, if approved by the buyer, is also referenced to the value of the purchase. Finally, the merchant is immediately notified of the successful transaction. (*NAV, 2021*)

⁹ <https://fintechzone.hu/ujabb-bank-vezette-be-a-fizetesi-kerelem-szolgaltatast-joht-a-digitalis-sargacsekk/> (download: 13/02/2021 09:15)

From 1 January 2021 in Hungary, all merchants - using online cash registers - will be obliged to provide the consumer with the possibility of electronic payment and its continuous availability. Compliance with this requirement can be achieved with any electronic payment solution. It can be credit card payment, or any payment method based on an instant payment system, such as QR code payment solutions. *(Kádár, 2020)*

The spread of credit card payments cannot be dated 1 January 2021. The use of credit cards is now an everyday phenomenon and is an integral part of today's payment in a POS terminal. By touching or swiping a plastic card, we can pay anything and anytime. *(Süveges, 2019)*

Using QR code technology is a step more complicated. An essential accessory for a transaction is a device that can detect the QR code (e.g., mobile phone, tablet, POS terminal) while the other party needs another device (typically a mobile phone) that can scan the QR code. The basic data required for the transfer are encoded in the QR code (e.g., the merchant's account number, purchase amount, transaction ID), and after scanning the QR code, the amount is transferred with a single click, and the payee is immediately notified. *(Füredi-Fülöp, Várkonyiné Juhász, Pál, 2017)*

Traders can decide for themselves which of the many options to choose from, with fixed and variable costs, speed or security being factors in the decision. *(Pál, 2020)* In order to facilitate contactless

payment in Hungary, the value limit of HUF 5,000 for the mandatory use of the PIN code has been raised to HUF 15,000.¹⁰

Also, as of 1 January 2021, the two-steps identification for online credit card payments has changed. In addition to the credit card details, it is also necessary to enter a unique code to confirm the intention to pay.¹¹ When making an online credit card purchase, the credit card details, i.e., the card number, the name on the card, the expiration date and the so-called CVV or CVC2 code, had to be entered. These figures will be complemented from 1 January 2021 by a reinforcement phase aimed at strong customer authentication. The procedure varies from credit institution to credit institution, a typical solution is that this confirmation is done through the mobile banking applications of the given credit institution (push message) or with the confirmation code you received in an SMS. (*Herman, 2020*)

Payment processes can be differentiated by whether the parties are physically in the same place or not. The possible characteristics of the basic payment situation are the range of payments for all retail purchases regardless of the profile, the range of payments for different services and the payment for services and fees related to the public sector. In general, we can say that these are the ones we encounter most often in our daily lives, and they can occur with or without

¹⁰ <https://www.mnb.hu/koronavirus/hirek/a-bankkartyas-fizetes-ertekhataranak-emelesere-szolitja-fel-az-mnb-a-penzugyi-rendszer-szereploit> (download: 09/01/2021 7:45)

¹¹ <https://fintechzone.hu/fontos-2021-01-01-tol-uj-szabalyok-szerint-kell-fizetni-az-interneten/> (download: 08/02/2021 12:50)

physical contact. The possibility of payment situations with physical contact can be complemented by the case where payments for purchases and services are made at unattended machines. All the solutions - already explained above - are suitable for ensuring that payments are made promptly and provide feedback on its actual implementation.

The other case - where the parties cannot be physically present at the same place - is the range of transactions initiated on the internet, webshop or online marketplace, which are also paid online. (*National Bank of Hungary, 2019*) The growth of online shopping continues regardless of the pandemic. Nothing proves this better than the fact that in February 2021, the turnover value of internet retail in Hungary increased by 29% compared to a year earlier.¹²

But the possibilities for paying for online purchases are not limited to using a credit card. Thanks to financial innovations, consumers will also have access to solutions that function as virtual wallets, either linked to credit cards or without them. (*Pintér, Bagó, 2020*) An e-wallet is a prepaid, reloadable card. The value of money prepaid by the customer to the issuer is stored in electronic form, i.e., in the form of electronic money, thus enabling payment. It is usually used to pay for low-priced goods and/or services sold in large quantities.¹³ For online payments, customers often prefer these payment solutions

¹² <https://www.ksh.hu/heti-monitor/kereskedelem.html> (download: 19/04/2021 15:48)

¹³ <https://www.mnb.hu/fogyasztovedelem/bankkartyak/bankkartya-tipusok/mi-az-elektronikus-penztarca> (download: 19/04/2021 17:29)

because they find them secure and convenient. It is secure because you do not need to enter your credit card details, and convenient because it is almost one-click to pay. (Kovács, 2017) In Hungary, the most popular virtual wallets nowadays are Barion and PayPal. (Tóth, 2020)

Summary

As a consequence of the epidemic situation, credit institutions have not only been given new tasks, but also a special tax in Hungary. The basis of the special tax is the part of the modified balance sheet total calculated from the data of the annual report of the second tax year preceding the tax year exceeding HUF 50 billion, the rate is 0.19%. The credit institution itself determines the amount of the special tax to be paid, which must be paid in three equal instalments (10 June 2020, 10 September 2020, 10 December 2020).¹⁴

Competition and innovation are among the cornerstones of the functioning of financial systems. The primary reason for the emergence of financial innovation is to be able to adapt to ever-changing buying habits by the ability of market participants from both sides. The development, spread and use of new solutions is greatly facilitated by the constant evolution of the IT background. In recent time, not only the need for change or competition has resulted in this rapid development in online space, but also the emergency phase caused by the pandemic.

¹⁴ Government Decree No 108/2020 (IV.14.)

With the introduction of the instant payment system, merchants and service providers will have access to payment solutions that can replace the more common cash or credit card purchases.

Cash-saving payment instruments or alternatives help customers with fast administration, and the financial sector needs to adapt to new types of technologies. Keeping up with the speed of information flow. Product structures and designs are now being developed with speed and safety in mind, as well as cost-effectiveness on the user side. However, in order to be able to generate significant revenue while maintaining these conditions, a credit institution needs to sell as many of these products as possible. Customer segmentation, customer needs mapping and customer-centric marketing can help even more.

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Let's rethink financial ratios

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Abstract

Traditional financial indicators calculated from financial statements cannot provide adequate information for the management and do not support strategic decisions. From the financial statements, a multitude of indicators can be formed. This paper does not aim to examine the indicators deduced from the financial statements item by item. The study puts emphasis on two areas. First, we review under what principles we can form ratios (quotients) from the financial statements. Secondly, we present some quotient based indexes' content, which are more widespread in practice.

1. Introduction

In today's highly competitive environment, financial indicators alone cannot provide a direction for the future. The reason for this is the methodology used in producing financial statements and the operational logic of financial accounting. Financial accounting thinks in terms of business year which is 12 months long. It deals with events of the past, more accurately, with so-called economic activities. Financial accounting evaluates such economic activities in terms of monetary processes, which means that the traditional financial indicators have

their limits in application. Could it mean that traditional financial indicators cannot be used in long-term strategic decision making? In our study, we point out two connections between financial indicators and strategic decision making. Firstly, we focus on financial indicators used in strategic decision support, in strategic indicator systems. Secondly, we focus on cases in which financial indicators complement the methods of strategic decision making, extending the tools available in strategic management.

From the financial statements, a multitude of indicators can be formed. This paper's aim is not to examine the indicators deduced from the financial statements item by item. The study puts the emphasis on two areas. First, we review under what principles we can form ratios (quotients) from the financial statements. Secondly, we present some quotient based indexes' content, which are – according to our opinion - more widespread in practice. We emphasize the content of the indicators because of more reasons. On the one hand, the devil lies in the details, i.e. without the knowledge of the contents of the counter and the denominator the interpretation of the quotient is difficult. On the other hand, currently, there are no generally accepted names for a significant number of indicators in our profession, and in many cases, the changing legislation is not always clear either (Füredi-Fülöp, Pál & Várkonyiné, 2017; Murányi, 2016). Each content can be associated with a number of names, and behind the same name are often found different types of contents.

However, in both cases, we should keep in mind that the financial statements' information are typically aggregated information, that is why the auditor can also play an important role in auditing the accounts (Füredi-Fülöp, Pál & Várkonyiné, 2020)

These highly summarized data give an overall picture of the company's management. They help us identify the problems, and show where to look for the source of the problems, but they do not detect the causes of problems. We tend to ask questions in the analysis of financial statements, rather than formulating answers.

2. Literature review

During the analysis of the balance sheet we can draw conclusions about the property and financial state of the enterprise, and from the cash- flow about its financial state, determined by, among other things, financial culture and the local, national and international economic environment (Kovács & Terták, 2020; Mélypataki et al., 2020; Kuttor & Pál, 2019; Pintér & Bagó, 2020). In the analysis, both the absolute and the relative differences can be tested. With the absolute differences method, all of the balance sheet, cash flow and income statement items can be analysed. In practice, however, it is appropriate to designate focal points. These points can be:

- characteristics of the enterprise's activity,
- items with high value or ratio, or
- items, which show a big change in ratio or value.

With the relative differences method the profitability, the efficiency, the tangible assets, the stocks, and the strength of the customers and suppliers can typically be examined.

The traditional financial indicators, however, often can not serve adequate information to make a decision due to the following reasons:

- The traditional financial indicators give information about the companies past performance, they have no relations to the future, or to the company's strategy.
- They are unsuitable to prevent the problems, as they take into account the organizational activities and customer decisions that have already happened.
- They have a short-term approach and therefore they do not serve the strategic goals of the company.
- They do not have a diagnostic nature, which means they point out the problem, but are not able to detect the cause.
- They are not suitable for displaying qualitative factors, as their unit of measure is money. However, corporate performance consists of quantitative and qualitative elements based on the company's tasks. (Johnson & Kaplan, 1987, Brealey, Myers & Allen, 2011)

Despite the criticism, the use of traditional financial indicators enjoys great popularity. Their advantages are simplicity, availability, and cheapness. However, their application based on the literature's recommendations has disadvantages (Bozsik, 2010, Bozsik, et al., 2021; Böcskei, 2013; Brealey, Myers & Allen, 2011, Horváthné Csolák, 2015; Szemán, 2008).

3. Research methodology and results

3.1. Handling misleading conclusions

In the case of the individual financial statements, the following the recommendations mechanically can lead irresponsible analysts to misleading conclusions. The number of general ledger items is the number of possible corrections. To illustrate the possible corrections, let's look at two examples.

One of the company's main activities is the operation of local public transport. The service is provided by bus and tram vehicles. In the analysed period, fixed-rail transport was developed. The development was realised with 33.7 billion HUF EU support. (Before, the company's assets' value did not reach 5 billion HUF.)

Table 1 summarizes the indicators and shows the high impact of the project.

According to the first indicator - based on the general mean of the indicator - we can say that the company's capital strength is low and is below 30-35%, which is considered critical. However, the second indicator - which refers to the degree of indebtedness - decreased from 58% to 29%. On that basis, we should say that the company's indebtedness decreased. (This is also shown by indicators 9 and 10.) But how can the company be undercapitalised but not indebted?

The reason is the investment and its funding. More than 89% of the costs of the project were covered by EU support. In accordance with accounting standards, the grant has been booked as an accrual and is accounted for as such. As a result, the deferred payments became a more and more significant part of the increased balance sheet total (shown by indicators 3 and 5), and the ratio of equity and liabilities became less significant. Apparently, the coverage of fixed assets is low (it can be seen in indicators 6 and 7).

Table 1: The public transport company's key indicators

#	The content of the index	Last year	Current year
1.	equity / balance sheet total	14,01%	12,32%
2.	liabilities / balance sheet total	57,77%	28,59%
3.	deferred payments / balance sheet total	28,16%	59,06%
4.	investments, renovations / balance sheet total	43,37%	56,78%
5.	deferred income / balance sheet total	27,44%	58,42%
6.	equity / fixed assets	14,97%	12,77%
7.	(equity + subordinated liabilities + long-term liabilities) / fixed assets	24,93%	17,31%
8.	(equity + subordinated liabilities + long- term liabilities + deferred income) / fixed assets	54,26%	77,88%
9.	equity / (equity + subordinated liabilities + long- term liabilities)	60,05%	73,77%
10.	(subordinated liabilities + long- term liabilities) / (equity + subordinated liabilities + long- term liabilities)	39,95%	26,23%
11.	current assets / short- term liabilities	0,12	0,14
12.	suppliers / 1 day material expenses (days)	528,98	326,24
13.	net sales revenues / total revenues	78,16%	80,63%
14.	other revenues / total revenues	21,78%	19,27%

Source: self-made edit based on the company's financial statements

However, if the coverage ratio is adjusted (indicator 8), we can get a better picture. Moreover, we must consider a new distorting factor. The investments have led to an increase in the stock of investment suppliers. This means that fixed assets (and tangible assets) are financed by short-term liabilities rather than long-term liabilities.

The increased accounts payable due to the investment had a significant impact not only on the coverage but on the value of other indicators as well (indicators 11 and 12). At first sight, the liquidity of the company is disastrous. The liquidity is far below the recommended value of 1.3, and the lead time of the suppliers is more than 100 days (the effect of VAT was filtered out when calculating indicator 12). However, due to the large volume of one individual project, we can not draw far-reaching conclusions from the indicators of liquidity. Since investments are included in the long-term assets of the enterprise, while their source of financing is short-term liabilities.

Indicators 13 and 14 show the characteristics of the company's public activity. The indicators suggest that only 80% of income comes from the basic activities. However, knowing the legal and the policy environment related to the activity, it can be said that the local public transport revenues come from two main sources. From consumers and grants. This translated to the language of accounting means that the core business revenues are in the net sales revenues and the other revenues.

Another company began its operation in 2003, and it is 100% German-owned. The main profile of the company is the production of electrical and electronic appliances for vehicles. It keeps its accounts in Euro. Table 2 shows those indicators, which have special meaning because of the subsidiary status of the company.

Table 2: The electrical and electronic appliances company's main indicators

Number	The content of the index	Last year	Current year
1.	equity / balance sheet total	25,59%	22,32%
2.	liabilities / balance sheet total	70,41%	73,44%
3.	share capital / balance sheet total	0,98%	0,79%
4.	accounts receivable against affiliate / balance sheet total	29,93%	36,74%
5.	short- term liabilities against affiliate/ balance sheet total	58,40%	61,45%
6.	equity / fixes assets	51,55%	47,17%
7.	equity / (equity + subordinated liabilities + long- term liabilities)	100,00%	100,00%
8.	current assets / short- term liabilities	0,71	0,72
9.	cash / short- term liabilities	0,0013	0,0032
10.	customers / 1 day net sales income	0,39 day	0,74 day
11.	suppliers / 1 day material expenses	22,04 days	15,04 days

Source: self-made edit based on the company's financial statements

The company is a subsidiary, which means from the viewpoint of accounting records that as a general rule, the intra-group sales are not in the row of Accounts Receivable, but in the row of Accounts Receivable Against Affiliate. The acquisitions are not in the row of Accounts

Payable, but in the row of Short- term Liabilities Against Affiliate. (Indicators 4 and 5 show this.) The company's capital strength seems low (indicator 1), and the liabilities have a large proportion (indicator 2). This might be seen as critical, but the majority of the commitments are against affiliated companies (indicator 5).

The coverage of fixed assets is also low (indicator 6). Both low capital intensity and low coverage can be traced back to the trend, that the company's long-term developments were carried out financed by the group, of which a significant part is not recognized under the long- term liabilities or in the equity, but under the short- term liabilities. (According to the data of the additional notes the company took out several loans; the previous year 26 million EUR, the current year 31 million EUR, by the end of the current year 130 million EUR from an other company of the group, which is more than the half of the assets.) On the one hand, as the „by-product” of this financing technique, the share capital does not reach 1% of the balance sheet (indicator 3). On the other hand, the value of liquidity indicators (indicators 8 and 9) can be traced back to these actions. Current assets are contrasted with current liabilities, which are items whose primary function is to provide long-term financing for operations. Cash and cash equivalents are used to exploit financing synergies within the Group. This explains why the company's cash holdings represent only 1 to 2 thousandths of its assets, hence the low cash ratio (indicator 9). The company mainly trades within the group. Consequently, the customers' (indicator 10) and suppliers' (indicator 11) lead times are distorted. In the calculation of indicators 10 and 11, the effect of VAT was filtered out. The items to be taken into account for the calculation of the indicators cover only a part of the actual deliveries, as most of the commitments are not shown

in the balance sheet line suppliers but in the line short-term payables to related parties.

3.2. The special relationship between financial indicators and strategic decision support methods

An additional possibility to use financial indicators is to use them not alone but in addition to and in combination with strategic decision support systems. Today, there are many strategic decision support methods, which can be grouped according to the following aspects: the purpose of use (situation analysis, setting strategic directions and goals, methods of strategy breakdown, strategy monitoring procedures), levels of analyzed and examined environment (micro, industry competition -, macroenvironment) the position of the examined environment in relation to the company, or the possibility of influence (tools for analyzing the external and internal environment) and the complexity of the methods (simple and comprehensive methods).

The special relationship between financial indicators and strategic decision support methods lies in the fact that financial indicators can not only complement the tools for measuring and analyzing the environment and strategy, but in many cases are essential elements for an accurate and comprehensive assessment of strategy and the corporate environment (excellent examples include tools for measuring and analyzing corporate life cycle, product life cycles, and industry trends, among others). (Ansoff 1957, Levitt 1965, Porter 1979, 1980, 2008)

Let's review the above-mentioned thoughts through a case study!

The company sells children's furniture and is present in the domestic market and neighbouring countries (Austria, Slovakia). It is among the

market leaders in terms of sales in Hungary, it entered the international market in Austria 5 years ago and in Slovakia 6 years ago. It has 30 years of manufacturing experience in Hungary. The centre is located in Győr, where there is also a warehouse and a showroom, and abroad there is a showroom connected to 2 warehouses. One in Vienna, another in Bratislava. Orders from customers can be placed in person at all three locations, and payment methods can be by credit card or cash. Another ordering method is possible through the website, it is in Hungarian, but customers can choose from 3 locations, so they can place their order in German or Slovak, which they can pick up or deliver from the appropriate centre, in case of online ordering the price of the ordered products must be paid in advance. Information about resellers is that the company expects a payment period of up to 60 days.

In order to track and plan for results, company management wants to create a scorecard that can track company performance. The goal for professionals is to help produce metrics that measure a company's performance.

Financial point of view

Target function: Within the company's total revenue ratio, the share of foreign revenue should increase by at least 10% compared to the previous year, increase the share of revenue to corporate customers in domestic revenue by 10% compared to individuals. Another expectation is that the company group should sell 15% more of the key product each year!

Indicator:

1. *Value of an average order for an individual/company broken down by country on an annual basis*

Average order value: Considering a business year, we consider the period from January 1 to December 31. Total order value / total number of orders. The report is prepared on a monthly basis, and the result can be filtered by country. (Multiple years could be compared in this way, allowing you to keep track of, eg. the average order value for the last 3 years in March.)

2. *Distribution of revenues by country, broken down by year, showing separately the values of individuals and companies*

The order counts for the country from which the delivery takes place! So, if you order from Győr to Slovakia, the place of sale is Hungary. (In this case, it would be useful to examine who are those who order from, eg. Slovakia, because Győr is closer to them, they get the product faster, and the same is the case in Austria. If there is a solution here, we can further increase revenue with the right business decision, this idea is not specifically related to the indicator -just a comment- could it be a problem with the employees or the foreign branch itself?)

3. *Top10 Revenue from sales of key products / total revenue*

Top10 Key Product: Most sold products. Here we examine products that we have been selling for at least 5 years.

Customer perspective

Target function: increase sales from top customers by at least 15%. Increase sales of key products by top customers by 20% and increase the ratio of payments via credit card and bank transfer by 20%. (TOP10 buyer: Companies that order in the highest value in their country within a year, those belong here who order for at least 20 million HUF in a year. (Individuals will not belong here because the purchase of 1-2 pieces of furniture in a year is typical there)

Indicator:

1. *Top10 customer indicator*

The ratio of Top10 customer purchases to total company value and total annual revenue, broken down by year and country.

2. *Individual ratio*

The ratio of the value of purchases made by all individuals to total sales. Annually broken down by country.

3. *Top10 key product buyers indicator*

The proportion of sales of top10 key products sold in a given year among customers by country. (it is worth examining the results of the last 5 years at most, due to entering a foreign market)

Internal processes point of view

Target function: To increase sales of products launched in the last 3 years by 20%. (New product: product introduced within 3 years.)

Indicator:

1. *Sales indicator*

The ratio of revenue from new products to total revenue. (by country, broken down by month)

2. *Number of products sold indicator*

How many pieces of the examined products has the company sold in the last 3 years. (by country, broken down by month)

3. *Product defect indicator*

The proportion of new products taken back from the customer because of some manufacturing defect compared to all new products sold. (packaging defect, damaged product, missing parts - broken down by country per month).

It shows how good the manufacturing technique is for the new products we produce. How do we want to grow if we produce it incorrectly? As a result, the value of other orders may fall, and the confidence of customers and buyers may decline.

Learning and growth perspective

Target function: To reduce the proportion of cancellation invoices issued by 20%. Improve the error rates of correct invoices by 30%.

Indicator:

1. *Cancellation invoice indicator*

What percentage of all invoices issued by billing clerks were cancelled. The report is prepared on a weekly, monthly, annual basis, and includes the name and ratio of the employee. The report is prepared by region.

2. *Top billing indicator*

In addition to the number of invoices issued by employees, the error rate is also indicated. (Assuming the billing program records the data of the creator as well.)

The report is prepared in daily, weekly, monthly, annual breakdown, it contains the name of the given employee, the number of issued pieces, and the error rate. The report is prepared by region. Employees are reported in descending order. The one who issued the most invoices during the given period will be listed above.

4. Conclusions

Financial indicators alone cannot provide a direction for the future. In our study, we presented two main aspects of this. First in the case of the individual financial statements the mechanical following of the recommendations can lead the irresponsible analysts to misleading conclusions. In our study, we illustrated the possible corrections with two examples.

Secondly, as financial accounting cannot provide adequate information to management, it does not support strategic decision-making, so managers need complex systems that can be used to plan for the future using data based on the past. In our study, we pointed out the link between financial accounting data assets and strategic decision support and used the case study methodology to show the connections between financial accounting data assets and the BSC, and also provided examples of the Balanced Scorecard, strategic goals and indicators suitable for measuring the goals.

Acknowledgement

This research was supported by project nr. EFOP-3.6.2-16-2017-00007, titled Aspects on the development of an intelligent, sustainable and inclusive society: social, technological, innovation networks in employment and digital economy. The project has been supported by the European Union, co-financed by the European Social Fund and the budget of Hungary.

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The role of financial literacy in auditing

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1. Introduction - looking for common ground

We need to be aware that change is constantly present in all areas of society and the economy, resulting in the disappearance, transformation and creation of new and new disciplines, specializations, forms of communication and entrepreneurship in a previously unmanageable extent. Concepts, activities and their results are given a new meaning. In this changed conditions, we can look for, with confidence, economic connections between seemingly distant areas, as in the last decade we have seen good scientific examples of connecting areas such as corporate accounting information system and environmental protection, “green” or in other words environmental accounting.

Based on this, we can map new forms of relationships with scientific need and examine whether, assuming given existing relationships between different disciplines, their existence can be proved. Of course, the scope of such research is significantly beyond the scope of this study, but it is possible still in this form to judge whether there is a chance that a hypothesized relationship will be proven later.

In the spirit of this, hereafter I will try to make a connection between a field that has a long history and is still very important in the current situation – **auditing** – and between **financial literacy**, the concept which appeared 15-20 years ago and has become increasingly significant. I formulate its perceptible connections for a possible future

research. In the course of my work, I use the following structure, which, in my opinion, is generally valid for answering all such questions:

- definition of selected areas
- overview of the content elements of the disciplines under study
- search for connections in conceptual systems and practical solutions
- summary, conclusions
- judging whether hypotheses about the existence of connections can be formulated
- assessing whether a scientific benefit can be expected from research on the topic

As stated above, the search for the connections between auditing and financial literacy is the topic of this dissertation, so the selected areas are given, the following is an overview of the content elements of the disciplines.

2. Overview of the content elements of the disciplines under study

2.1. Financial literacy

The name 'financial literacy', although it has already appeared in the most developed countries as a reference in the last century, looks back on the relatively short term, as its content has been started to examined and its concept to clarify in a scientific sense after the turn of the millennium. At this time, its examination and their results can be discovered in the works of several authors. (Husz & Szántó, 2011;

Béres, 2013; Kovács & Terták, 2016; Szemán & Gróf & Süveges, 2017). From a conceptual point of view, the opinion of Hung and co-authors is decisive for me. They accept the distinction between the concept of financial literacy and financial education, published in the President's Advisory Council on Financial Literacy (PACFL) 2008 Annual Report, as follows:

„PACFL provides a “consensus” definition The Presidents Advisory Council on Financial Literacy (PACFL, 2008), convened to “improve financial literacy among all Americans,” defines financial literacy and financial education as follows:

- **Financial literacy:** the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being.
- **Financial education:** the process by which people improve their understanding of financial products, services and concepts, so they are empowered to make informed choices, avoid pitfalls, know where to go for help and take other actions to improve their present and long-term financial well-being.” (Hung, Parker, & Yoong, 2009)

Béres (2013) and Bárczi and Zéman (2015) highlight that Hung and co-authors managed to identify nine approaches from the studies they processed. These are the follows:

- financial knowledge;
- understanding of financial processes;
- ability to apply financial knowledge and experience gained;
- knowledge of financial contexts and definitions;

- ability to make well-founded financial decisions;
- knowledge of the most basic financial concepts;
- ability to make simple (basic) financial decisions;
- ability to make well-founded and conscious decisions;
- knowledge of the effect of simple financial concepts.

The latter grouping brings us closer to our goal of creating a basis for comparison with the other area. Especially because some authors, among other things, point also to the **high-quality financial literacy**, in addition to a conscious corporate culture, as a **condition for improving competitiveness**. (Tóth, Gyurcsik, & Túróczi, 2019; Süveges, 2013). This requirement appears similarly, according to Tebelli: “The strategy of developing financial awareness formulates specific goals, related action plans and provides an organizational framework for the development of the financial literacy of the population, as the level of financial literacy and its quality are in the common interest of all economic actors” (Tebeli, 2018). Related to the previous, the question from Füredi-Fülöp and Várkonyiné Juhász: “While, however, the market is changing spectacularly, the knowledge of users of products and services adjusts to this only belatedly. Comprehensive financial knowledge would be needed to understand increasingly complex financial products, quantify risks, and make a conscious, well-founded choice between options. The question arises as to whose interest and whose task is the transfer of knowledge and the development of financial awareness, and in what form it can be

implemented in such a way that the whole society can benefit from it.”
(Füredi-Fülöp & Várkonyiné Juhász, 2018)

It can be seen also from these opinions that, approaches both from corporate and business, both from education and training sides, the quality of knowledge and skills is a determining factor in order to achieve the listed competencies.

2.2. *The audit*

If we look at audit in a simplified way, we could classify it as a control function, one of the elements of the system that controls activities. This is true in itself, but auditing has significantly more specificities and functions than this, as it can be described as a special, complex form of control performed on behalf of owners that is justified by a real economic need and forced by law, where independent opinion is extremely important. The aim can be targeted to verify the true and fair presentation of publicly provided information on the financial position and financial performance – for external and internal users. Auditing plays an important role in the economy, it is essential to establish and maintain market confidence, credibility and, if necessary, to restore it.

Auditing requires specific, multidisciplinary expertise – this is reflected in the International Educational Standards. On the one hand, in the preparatory process, the auditor candidates, and on the other hand, in the course of their work, the auditor professionals themselves, face requirements that can only be met with a high level of professional performance. Let's review what personal and comprehensive professional goals auditors, as professionals need to consider when performing a particular task.

The expectations toward the auditor – as a person – can be interpreted in the profession itself, these are well-recognized, also internationally consistent expectations incorporated in professional and ethical standards and moral norms.

Some expected requirements related to auditor are:

- Independence
- Integrity
- Objectivity
- Professional competence and due care
- Confidentiality
- Professional behavior
- Compliance with auditing standards
- Professional skepticism.

The overarching principles to be kept in mind when performing audit tasks have been formulated in internationally uniform professional rules – standards:

- “Obtaining reasonable assurance that the financial statements (annual financial statements, consolidated financial statements, etc.) as a whole are free from material misstatements, whether due to fraud or error, enabling the auditor to express an opinion on whether the financial statements have been prepared in all material respects, in accordance with the relevant financial reporting framework, and

- To report on the financial statements and communicate as required by the ISAs, in accordance with the auditor's findings" ("Könyvvizsgálati standardok 2021. január 1-től: 200. Témaszámú Nemzetközi Könyvvizsgálati Standard, International Standard on Auditing 200.", 2020)

Of course, in addition to standards, each country can apply rules made in its own national jurisdiction, complementing international requirements that clearly determine auditing work. This is to ensure that the auditor's report as a result of the auditor's work is of adequate quality, in the case of a clean opinion, to ensure that the financial statements issued by companies are free from material misstatement and, in the case of all other opinions, to state the reasons for qualification.

The brief overview also provides an opportunity to recognize that compliance with expectations, the prevention and detection of bad decisions, bias and fraud can only be ensured by achieving adequate quality audit performance.

3. Searching for connections in conceptual systems and practical solutions

Examining the specificities, objectives and applicable methods of financial literacy and auditing, it is obvious that both areas prioritize quality as a determining aspect. How can we draw a parallel between the competencies that are appearing as expectations in an appropriate-level financial literacy with the requirements to be met in an audit activity? Because both areas focus on quality, the quality assurance and control can be the suitable solution.

In Hungary, the requirement of quality control has been incorporated into the audit system in an institutional form, on the one hand for the auditors of public interest companies supervised by the Public Auditing Oversight Body, and on the other hand as the task of the Quality Control Committee of the Chamber of Hungarian Auditors. In recent years, with no definitive data for 2020, the following quality control reviews have been carried out:

- Quality controls of the Public Auditing Oversight Body:

Table 1: Results of quality controls of individual engagements in 2016-2019

Results achieved during quality control	Quality control of individual engagements in 2016-2019							
	2016		2017		2018		2019	
	(pers)	(%)	(pers)	(%)	(pers)	(%)	(pers)	(%)
Passed	23	77%	13	32%	12	55%	11	73%
Passed, with comments	1	3%	12	29%	2	9%	2	7%
Failed	6	20%	16	39%	8	36%	3	20%
Total	30	100%	41	100%	22	100%	15	100%

- Examinations of the Quality Control Committee of the Chamber of Hungarian Auditors:

Table 2: Results of quality controls
of individual engagements in 2016-2017

Results	Quality control of individual engagements in 2016-2017				
	2016.		2017.		Deviation 2017/2016 (%)
	(pc.)	(%)	(pc.)	(%)	
Passed	346	85,2	361	76,2	89
Passed, with comments	43	10,6	76	16,0	151
Failed	18	4,4	37	7,8	177
Total	406	100	474	100	-

Table 3: Results of quality controls
of individual engagements in 2018-2019

Results	Quality control of individual engagements in 2018-2019.				
	2018		2019		Deviation 2019/2018 (%)
	(pc.)	(%)	(pc.)	(%)	
Passed	402	76	417	74	-2
Passed, with comments	82	15,5	59	10	-5,5
Failed	45	8,5	90	16	7,5
Total	529	100	566	100	-

It is a functioning system that carries out planned activities, is uniform in its governance, as the public oversight body, as the final authority, also oversees the Chamber's quality controls, and is up-to-date in the awareness of new audit issues through its international relations. Based on these, both bodies regularly organize further trainings, aiming to ensure the professionally expected quality during the quality control reviews. A rating of "failed" or "passed with a comment" will result in varying degrees of retaliation as defined in the regulations. This process can be aligned with financial literacy competency expectations. The continuous control of the quality, in addition to the mandatory continuing professional development of auditors, facilitates the auditor's efforts to maintain and develop an appropriate level of their personal professional competencies.

I note that the Chamber's solutions of the above-mentioned compulsory continuing professional development – in my opinion, in a supportive manner, expediently – can also be associated with the conceptual framework of financial literacy within this study. Like all continuing professional development, the one organized by the Chamber of Hungarian Auditors seeks, similarly to the previously introduced category of financial literacy, to expand the professional knowledge of auditors with the new knowledge needed to perform its tasks in order to achieve “financial well-being”. This is also in line with other efforts of the Chamber to support the performance of chamber members and other approaches formulated on the issue of financial literacy, such as the ability to make founded and conscious decisions.

4. Summary, conclusions

As part of this study, I undertook to prepare for a possible study examining the correlation of financial literacy and auditing. Accordingly, as an overview, based on a literature review, I was looking for possible connections that could serve as a basis for formulating hypotheses in this regard. The first question I asked was to assess whether hypotheses about the existence of correlations could be formulated. Examining the available literature, it can be concluded that there are a number of high-quality resources available in both the field of financial literacy and auditing, potentially assisting the future research work.

Based on these, in my opinion, on the one hand, the **pursuit of quality** can be achieved in both areas, and on the other hand, especially in the case of auditing, there are theoretically grounded, internationally valid **practical expectations** that provide a reasonable opportunity to

formulate scientifically correct assumptions. These are primarily related to the quality control and the performance of closely related audit tasks.

Scientific benefits can be expected from research on this topic with the effect of the financial literacy:

- in the development and evaluation of the content and methodology of the quality control of auditors performed by the Chamber and the Public Auditing Oversight Body,
- in the design and content development of compulsory continuing professional development training programs and trainings for professional qualifications of auditors,
- in determining the composition of audit teams designated to perform audit tasks.

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Integration of the Instant Payment System into Hungary's payment infrastructure¹⁵

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Introduction

Speaking of cash flow, we can distinguish many types of transactions that we can use every day to settle debts. Most often, we come across cash during financial transactions. The use of cash and cash flow in Hungary make up a very significant proportion of payment transactions. The cash position is approximately HUF 7,000 billion. (Csányi, 2020) This is equivalent to 350 million 20,000 HUF banknotes, which, if placed on top of each other, could build a 420 km high tower out of it. To this day, people prefer cash over other payment options when making payments. In addition to the ability to use cash, credit institutions provide customers with a variety of payment solutions to meet their needs and regulatory requirements (Pintér, 2017)

In March 2020, a new type of transfer option was launched in Hungary, which can process financial transactions significantly faster, thus being able to transfer bank account money from the payer's current account to the payee's current account in seconds. This is an

¹⁵ With the support of GINOP-2.2.1-18-2018-0010

instant payment, a transfer method that ensures that customers can initiate a transfer for eligible transactions that will make the transferred amount available to the payee's account within 5 seconds. These transactions, which, like other transactions, do not take place directly between banks, but by the Hungarian clearinghouse with the participation of GIRO.

During the introduction of the Instant Payment System (AFR) we can assume significant challenges both from the central clearing side and from the bank's implementations, starting directly from the fact that the launch of the Instant Payment System was not armed in Hungary on July 1, 2019 compared to the originally planned date, but was postponed. The system finally came into operation in Hungary on March 2, 2020.

First settlement systems in Hungary

In the absence of banks and technological development, there was neither demand nor an opportunity to provide central settlement in Hungary for a long time, so the establishment of settlement turnover could only start with the development of financial institutions operating in the country. According to Pál (2014), the development of Hungarian settlement traffic can be divided into 4 major stages:

1. The first period can be traced back to 1893-1948 when the legal predecessor of today's GIRO Zrt. And KELER Zrt., The Budapest Giro and Pénztáregylet Részvénytársaság, was established and started operating in Hungary.
2. The second phase lasted from 1948 to 1994, when the operation of the nationalized Budapesti Giro és Pénztáregylet Rt. Was transferred

to the Hungarian Central Bank. At that time, the specialized field was still performing this activity on a manual basis.

3. The third period is counted from 1994. From then on, the credit institution's settlement turnover will be performed automatically by GIRO Elszámolásforgalmi Rt. (Now GIRO Zrt.), Established for this purpose.

4. The fourth development phase can be considered to be the simultaneous or almost simultaneous settlement and settlement, which took place in Hungary from the middle of 2012 (Pál, 2014).

The need for automatic settlement was created in 1987 by the two-tier banking system, and consequently the creation of several new banks. "With the establishment of new financial institutions, there was a need to develop a state-of-the-art payment system in which the credit institution clearinghouse provides its services with computerized IT and telecommunications systems. Thus, interbank payment settlement is entirely electronic; the calculation and settlement of the interbank position will be updated; the amount of money on the road decreases; information related to payment transactions will become more accurate and appear faster. " (Paul, 2014, p. 25)

GIRO Elszámolásforgalmi Központ Rt. was established on December 19, 1988, and then in November 1994 the self-developed Interbank Fat System (BZSR) was launched (GIRO, 2021). The possibility of automatic settlement has opened up space for the clearing members joining it so that interbank transactions can take place automatically and electronically.

It is important to mention here that the possibility of the automatic settlement required banks to provide the possibility to settle transactions in their electronic infrastructure. Within 10 years of the establishment of the two-tier banking system in 1987, transactions between credit institutions were automatically settled electronically.

From this, we can conclude that the banks had to start building their own central account management system almost at the same time as their appearance, which they will be able to use for automatic settlement in a few years. The basic IT infrastructure of the banks present in Hungary at that time was defined at this point. Their first account management systems were put into operation by banks in the 1990s. These systems ensured the management of bank accounts and related balances.

Interbank settlement systems before the appearance of instant payment

Before the introduction of the instant payment system, the Interbank Clearing System (BZSR), an automated interbank settlement system that had existed in Hungary since 1994, was later replaced by the Interbank Clearing System (ICS), which still provides interbank settlement in Hungary. The ICS is operated by GIRO Zrt. The company is an entity offering a settlement system owned by the Hungarian Central Bank (MNB) and services to banks. (GIRO, 2021a)

In addition to the ICS operated by GIRO Zrt., The MNB also operates its account management system. This is the Real-Time Gross Settlement System (VIBER), in which domestic credit institutions are required to maintain their accounts. In the following, we will examine the aforementioned settlement systems and the settlement methods

within them, so that we can later position the spot payment system operating in the ICS properly. It is important to emphasize at this point that the Instant Payment System is part of the ICS nowadays, but we will deal with its operation in a separate chapter. In this chapter, I describe the pre-payment settlement methods in more detail.

Interbank Clearing System (ICS)

The Interbank Clearing System (ICS) can be considered the successor of the Interbank Fat System, the operation of which was armed in 2009. The BZSR system was a self-developed service of the clearinghouse, the operational tasks of which were also performed by them. In the case of ICS, on the other hand, we can say that GIRO Zrt. Has already implemented this development by using external suppliers. From then on, in the vast majority of cases, GIRO procured its newer systems with the help of external suppliers. (GIRO, 2021a)

In ICS, banks have the opportunity to transact transactions with households and companies. The clearinghouse provides the service to the banks (clearing members) using the settlement by the business rules and for a fee for the service specified therein. It is important to mention that GIRO offers several services to banks, but in the present research we only deal with ICS and certain services found in it.

Within a clearing system, we can distinguish 3 different settlement methods. These are InterGIRO1, InterGIRO2 and GIROInstant. With the launch of the ICS in 2009, the InterGIRO1 (IG1) settlement method became the first to be armed.

InterGIRO1 (IG1)

IG1 settlement can also be called night-time settlement mode in practice. The name derives from the time of settlement, as IG1 transactions are settled during the night, once a day on banking days. Overnight settlement takes place in two stages.

“During the settlement, GIRO Zrt. Performs a margin check and only settles the orders with the margin. When examining the collateral, GIRO Zrt. Bases itself on the amount available on the Clearing Members' account with the MNB and the total amount of the intraday credit facility provided by the MNB, as well as the credits received during processing. GIRO Zrt. Shall transfer the settlement results - one claim and one payment obligation per Clearing Member - to the MNB for performance, and the MNB shall settle the account of the Clearing Member. (GIRO, 2021b)

The second stage only takes place if a transaction has been submitted during the extraordinary dispatch stage or certain orders have been left uncovered. During the processing, a position matrix is prepared for the MNB from the result in both stages, based on which the settlement takes place.

Nowadays, retail and non-retail collection orders are processed through the IG1 settlement method, and the Hungarian State Treasury transfers pensions through this settlement method.

InterGIRO2 (IG2)

Customers in Hungary will be able to use the IG2 type settlement method from 2 July 2012. IG2 is a system capable of multiple intraday clearing, which was then considered a major financial infrastructure

development of the era. Until September 2015, the system accounted for submitted items every two hours during the system's business hours. From 2015, transactions were accounted for on an hourly basis. (GIRO, 2021a)

“Giro Zrt. Settles the received and covered orders ten times a day and transmits the results of the settlement to the Clearing Members and the MNB for execution. In each cycle, the amount of collateral required is determined in parallel with the preliminary calculation of positions. The actual coverage of the settlement is the amounts collected on the settlement technical account of GIRO Zrt. Maintained in VIBER. Unsecured orders will be rolled over to the next cycle or canceled at the end of the day. After the settlement, the settlement takes place in VIBER by emptying the settlement technical account, ie by transferring the balances calculated with the settlement position. ” (GIRO, 2021b)

Until the introduction of instant payment, the population used the IG2 settlement method to carry out individual transactions until March 2020, when the Instant Payment System was launched in Hungary. Group transfer orders (except a part of the transactions of the Hungarian State Treasury) and batch orders are also processed in this settlement method.

Real-Time Gross Settlement System (VIBER)

"VIBER (Real-Time Gross Settlement System) is a domestic payment system operated by the MNB and has been in operation since 3 September 1999. VIBER is used to settle high-value, urgent payments, which are final and irrevocable after they have been executed automatically in real-time. Following payment, the members

concerned shall be notified immediately. It uses the SWIFT system for messaging. Payments will be made if there is sufficient coverage. In addition to the positive balance of the current account and the securities, the free intraday credit facility provided by the MNB serves as collateral, the amount of which can be adjusted within a day. Efficient liquidity management is aided by a central queue management system, the use of priorities and a breakdown algorithm, and a monitor. VIBER operates daily from 7:00 to 18:00, within which the time for receiving customer items is one hour less.” (MNB, 2021a)

Thus, the operation of VIBER is directly related to the Hungarian Central Bank, a completely different system from ICS, but in contrast, ICS services build on VIBER. GIRO Zrt. Also has a technical account in VIBER, which is necessary for the proper operation of the payment methods operating in ICS. These technical accounts are used to maintain liquidity and ensure coverage. In the case of ICS transactions, the process through VIBER is technically significantly different.

An important fact is that the VIBER system is not only open to credit institutions and state bodies but the public and companies can transact through it through banks. Thus, before the introduction of instant payment, there was already a settlement system in Hungary that was able to automatically settle transactions in real-time on a gross basis. Nevertheless, its use by the general public has always been negligible, due to high transaction costs and limited opening hours, as VIBER operates exclusively on banking days between 7 am and 6 pm. (MNB, 2021a)

Instant Payment System

On March 2, 2020, a real-time settlement method was launched in Hungary, which provides an opportunity for payment transactions to be executed within 5 seconds in the case of transactions that meet certain conditions. This payment method is described in the introductory 35/2017. (XII. 14.) of the MNB calls it an instant transfer. However, in addition to the name Instant Transfer, the MNB promotes the service to the public under the name Instant Payment, as can be seen in the logo made for the service.

Instant Payment System is the ecosystem in which instant transfer transactions take place. My personal experience in banking has been that the credit institution sector uses the term Instant Payment System instead of using the term Instant Transfer System for the instant transfer system. The standard abbreviation has not been defined by the regulator, so several are widespread in practice, which is used alternately in the various publications already available. The abbreviation AFR is most often used for the Instant Payment System in practice, but we can also come across the abbreviation AFIR.

General characteristics of AFR

The introduction of AFR in Hungary and its detailed regulations are regulated by Decree 35/2017. (XII. 14.) of the MNB, which obliges all domestic credit institutions to make the fast payment service available to consumers. The regulation specifies in detail which transactions are to be executed by banks in the context of instant payment and at what speed. The special feature of the regulation is that it not only requires the introduction of the system but also that transactions that meet the conditions must be carried out through the instant payment channel.

Although the basis of the policy focuses on the introduction of instant payment, it also sets out several rules and convenience services based on instant payment. This type of service, which must be provided by the bank, is a secondary identifier, which can be a telephone number, an electronic mail address, and even a tax number. The secondary identifier provides an opportunity to replace our current account number with this information instead of the bank account number. Another service is the payment request, which is not mandatory for all credit institutions to provide to consumers, the service is only optional. A payment request service is an AFR-based tool that allows you to initiate a payment transaction from others in the form of a request. After the invitation to initiate a payment transaction, ie the sending of the payment request, the target person may decide to accept or reject the payment request during the validity period of the request. The operation of these services is highly dependent on AFR, but in my research, I will not go into these services further. My research is basically about the part of the AFR implementation that allows for instant transfer.

AFR provides the ability to process payment transactions in a few but no more than 5 seconds on any day of the year. Under the Regulation, a domestic transaction must take the form of an instant transfer which:

- Individual transaction
- Transfer order for HUF amount
- It is debited from the payer's account kept in HUF
- The maximum amount is HUF 10 million
- It does not include the debit day following the date of receipt

- Submitted electronically
- The payment service provider processes it automatically in a way that does not require human intervention
- They are not submitted in batches unless they meet all of the previous terms.

Taking all these aspects into account, it can be said that individual transfer orders initiated by the population are settled through AFR up to the amount of HUF 10 million.

An additional advantage of AFR compared to the payment methods known so far is that it is available to consumers 24/7, ie in addition to the normal bank opening hours, it is possible to use the service in the same quality at any second of the day on weekends and public holidays. The maximum time for an instant transfer initiated at any time must be within the statutory 5-second interval.

The specialty of the Hungarian AFR is on the international level

Systems that allow instant or near-instant payment are not a great rarity these days, but they are not widespread either. There are several instant payment systems in the world, with significant operational differences. From a technological point of view, a significant difference is that the speed of each system varies. From a business point of view, it can be observed that the initiator of instant payment can be the central bank, but even an independent consortium of several banks. Another important business difference is that the use of the system in some places is only an optional separate service and in others the use of the system is mandatory.

The Hungarian Instant Payment System can be said to be a unique payment solution on a global scale. AFR is the first system in the world to be mandatory for 35 credit institutions. The emphasis is on the mandatory term, as neither country's supervising credit institution or national bank has introduced an instant payment system that all credit institutions were required to join (Kovács, 2020).

Presentation of our research

The successful and stable operation of the Instant payment System, which was launched on March 2, 2020, was preceded by lengthy preparation, planning implementation, and testing. The creation of the system can be seen not only as a minor cash flow innovation but as a major project based on national, complex, and multi-stakeholder cooperation. My research examines the preparation, planning, and implementation of the Hungarian instant payment system, highlighting the implementation of instant payment capability in the systems of banks. The process involved redesigning existing infrastructure and integrating the systems needed to provide AFR capability. In the course of my research, I conducted professional interviews to get to know the implementation better, as the Hungarian implementation does not have an extensive literature background and advanced research. In the following, I intend to present the results of my research chronologically in terms of AFR development, starting with the time before instant payment.

Research methodology

Instant payment, which is a novelty in the history of settlement and payment systems, does not have deep, written publications with professional experience and research in Hungary, as the Hungarian

Instant payment System has been operating since March 2020, and the start of domestic development dates back to 2017. Internationally, we can already find several publications on instant payment or settlement systems, but the number of these dissertations is also a bottleneck.

Thus, in addition to processing the relatively small number of domestic and international written sources, I needed to get to know even more about the introduction and operation of the Hungarian system. We collect information through personal interviews with the involvement of volunteer experts. The purpose of personal interviews is to obtain information related to the new salary in Hungary that is not yet available in writing. I synthesize this information with currently existing sources, so this set of information forms the basis of the theoretical background of my research.

Importer of instant settlement in Hungary

The Hungarian Central Bank has had cash flow strategic goals since 2010, the aim of which is to reduce the high use of cash in transactions involving the general public and to prioritize electronic, cash-substituting channels. In 2012, household cash use accounted for nearly 90% of cash flow. The MNB aimed to gradually reduce this value. The ultimate goal is an approximate 50% cash utilization rate, ie half of payments should be made electronically.

In the middle of 2010, the MNB increased the turnover of card transactions as a result of its incentive measures. As a result, it has managed to significantly reduce the number of cash transactions. Due to the spread of card shopping, the turnover of electronic channels has increased. "In 2012-2013, the number of card payments increased by 20-25% per year almost year on year. Thus, the cash-electronic

payment ratio showed an improving trend in line with the MNB's ambitions. ” (Varga, 2021) Damage pay, on the other hand, had significant limitations then and today. Smaller shops could not afford POS (Point of Sale) terminals as their operation was a significant cost to them in proportion to traffic. The situation of the retail transaction was not yet sufficiently mature for customers at the time, its use was either cumbersome or only available to a limited extent.

The MNB wanted a payment solution that serves as an excellent alternative to cash, ie it carries the simplicity, speed, reliability, and availability of cash payments. In 2015, it seemed that the cash substitution tools of the future could be instant payment systems, so the MNB started to examine such systems. It was only then that it could do so, because only then could the technology that could be used by banks be able to process messages one by one, without batching. Between 2015 and 2017, the Hungarian Central Bank actively researched the topic of instant payment systems. The two-year research period began with an active exploration of opportunities, which resulted in a study available to the banking sector. The involvement of domestic banks has already taken place during the preparation of the study, thus ensuring continuous consultation between the participants and stakeholders.

The MNB examined several countries with existing payment systems. The selected countries are Denmark, Sweden, Poland, and England. A 2019 study was written about the countries also selected by the MNB, which compares the major instant payment systems already in place before 2015. It examines the systems of Mexico, the United Kingdom, Poland, Sweden, Singapore, and Denmark. The table below

summarizes these systems, in which I also included Singapore in addition to those examined by the MNB:

Table 1 Comparison of instant payment systems also available to the public

Country	System name	Year of departure	Speed	The upper limit of transactions
United Kingdom	Faster Payments	2008	15 seconds for confirmation, maximum 2 hours for complete transaction	GBP 250,000 (?EUR 277,000)
Singapore	FAST	2014	Up to 15 seconds	SGD 200,000 (128EUR 128,000)
Denmark	Express Clearing	2014	Up to 10 seconds	DKK 500,000 (?EUR 67,000)
Poland	BlueCash , Express Elixir	2012	Maximum 15 minutes	BlueCash : PLN 20,000 (?EUR 4,700) Express Elixir: PLN 100,000 (?EUR 23,300)
Sweden (mobile payments only)	Payments in Real-Time	2012	1-2 seconds	SEK 150,000 (14EUR 14,500)

Source: ECB, 2019

It can be observed from the table that the speed of the first system providing instant transfer is the lowest. At the beginning of the development of the Hungarian AFR, the starting point was the systems of these countries capable of instant payment.

There were also consultations during the preparation of the study, but the more active consultation started only after the study was completed, where most domestic credit institutions shared their views on the concept plan. In this concept plan, there were already several specifics related to the main parts of the system, to which the MNB insisted, as the previously mentioned strategic goal, ie the substitution role of cash, can only be achieved by instant payment if they are met. Such a cardinal element was the 5-second transaction rate, the mandatory connection to the system, and the fact that banks must provide this service as a basic service.

The participants in the banking sector responded positively to the draft concept. The need for innovation was certainly considered important, if only because they felt the threat posed to the industry by FinTech and BigTech players (Pintér, 2016), (Pintér, 2013). Because of this threat, some banks were particularly supportive of the possibility of introducing the system. However, some credit institutions raised several concerns about hearing the mandatory elements of the concept plan. They were in the majority of respondents who did not initially find the existing market demand significant, which was also supported by research. As a result, the banking actors jointly took the position that, contrary to the MNB's plans, the service should not be introduced on a mandatory basis, but should be an optional option. In addition, banks envisioned instant payment as a premium service. Another challenge was that the IT specialists of the banks saw a significant challenge in the implementation of the business-friendly system, supported by the bank's business side. The biggest problem with the design was considered to be the time criticality of the service. In the interbank consultations, which were facilitated by the professional

forums of the Hungarian Banking Association, we finally managed to develop a concept that is suitable for everyone.

Outlook for next year

With the introduction of AFR, the MNB has created a platform that will be able to actively serve the customer experience for a long time. “There’s one more thing that is missing is the convenience of cash. We need to develop that instant payment is equally convenient in any payment situation. ” (Varga, 2021) The MNB is open to proposals from banks in the future to supplement the current regulation with rules that could represent a forward-looking development for the sector. One such change was the processing of batch transactions through AFR, which to date is an optional service of the system, and as a result, it can be observed that for some of the companies interviewed, some actors do not currently use this service. It is important to note, however, that the next step is on the side of banks, i.e. to introduce AFR-based applications and services that customers are happy to use. AFR was a significant leap in the development of cash flow. There are now 3 settlement methods available in the ICS. This, on the one hand, can be good, as these systems can serve a wide range of needs, but on the other hand, the operation of 3 different systems is more burdensome. The future goal may be to rethink the need for these systems and prepare for their possible phasing out. Banks have been actively initiating developments and launching pilots for various services since AFR's 1 year of existence. The MNB is very pleased to follow these developments and is ready to continue to support AFR-based services in the future. Currently, some banks have already launched the optional payment request service, but there are some institutions where the service is still in the development phase.

The payment request service is expected to be completed in the next period.

The introduction of the Hungarian Instant payment System is currently a unique project in the world, as there is no country where the national bank has obliged credit institutions to join and provide the service as a basic service by decree. The banking IT systems in Hungary are old, which had to be taken into account during the developments. Each domestic credit institution solved the connection to the system with a ballast system and entrusted the vast majority of the developments to an external supplier. There was a credit institution that carried out part of the development as internal development, and some banks created their systems using the experience of the parent company. During the developments, it was initially not possible to properly assess the condition of the existing systems, as a result of which some credit institutions lagged with the development. The process was further complicated by the fact that several domestic banks entrusted the implementation to the same supplier. Suppliers overtook themselves, resulting in a lack of resources. Seeing the lag of individual domestic players, the MNB postponed the sharpening by 8 months. These 8 months were actively spent by banks on testing to improve their systems. Following the weekly breakdown of the test period, Hungary's Instant payment System was launched on March 2, 2020. The whole implementation project was a significant challenge for all actors, but the implementation was extremely successful. Nothing proves this, such as the continuous operation of the system without experiencing system failures and the constant possibility that our small-value referrals will reach their destination any day of the week, at any hour of the day, within 5 seconds.

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A brief introduction of the past, the present and the possible future of artificial intelligence – with special focus of its impact on economies, societies and on the financial market

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Introduction

Artificial Intelligence, or AI for short, is one of the hot topics of nowadays' scientific, economic and social debates. Even though the history of AI is relatively short, its importance and possible impacts are enormously great. Only a half of a century ago it was only an abstract scientific theory, something, in which the public did not have any interest at all. But for AI, it took only a couple of decades to become unavoidable in most of the different parts of our life. By the 2020's AI is present both in the economy and in our personal lives, as it plays a massive role in production, communication, logistics etc., while being with us through smartphones, self-driving cars or financial applications. This study aims to briefly introduce the past, the present and the possible future of Artificial Intelligence – with special focus of its impact on economies, societies and on the financial market.

The Birth and early years of Artificial Intelligence

The origin of the term *Artificial Intelligence* goes back to the 1950's when John McCarthy, an American computer and cognitive scientist from Dartmouth College teamed up with fellow peer scientists Marvin Minsky, Claude Shannon and Nathaniel Rochester to research Intelligence, Automata theory and Neural networks. As a result of their

research AI as a term started to spread rapidly in the 50's and the 60's mainly thanks to the first, widely known and acknowledged program: the GPS (General Problem Solver) a problem-solving computer designed to imitate the protocols of human problem solving. In 1976, Allen Newell and Herbert A. Simon formulated their notorious hypothesis on physical symbol system: "A physical symbol system has the necessary and sufficient means for general intelligent action".

The first, specifically designed AI-programs were developed by IBM such as Herbert Gelernter's geometry theorem proving machine and Arthur Samuel's notorious Draughts-playing program.

From business perspective the first successful program was R1 (internally called eXpert CONfigurer or XCON) a production-rule-based system used by DEC (Digital Equipment Corporation). R1 was designed to help in ordering computer systems by automatically selecting the computer system components based on customer's requirements. By 1986, the program saved more than 40 million dollars for the company. By the 1980's AI and its related industries were not limited for the United States only but went into the international arena. As an example, in 1982, Japan's Ministry of International Trade and Industry (MITI) announced its initiative the Fifth Generation Computer Systems (FGCS) a program to create computers that are using logic programming and massively parallel computing.

During the 1970's and 1980's the focus of AI development slowly changed from neural networks towards statistics. Physicists, such as John Hopfield have used methods of statistical mechanics to analyze the storage and optimization properties of networks, treating a set of simple neurons as a set of atoms. The statistics-based approach

remained the primary approach for AI development even until today. As for the possible future directions of AI development Russel and Norvig (2005) suggests that efforts should be put on the utilization and further thinking of already-existing theories rather than creating completely new ones. They also believe that instead of intuitions, claims should be based on rigorous theorems and strong experimental evidence, while relevant results should be presented not in fictional environment, like games, but on real problems.

Definitions for Artificial intelligence

While there are countless definitions for AI the authors would introduce only a few approaches, those that they believe could summarize greatly the very nature and essence of Artificial Intelligence.

Edit Sántáné Tóth defines AI as a particular subfield of computer science that deals with the development of intelligent computer systems. She suggests that these software / hardware systems can solve complex problems completely independently by drawing conclusions typical of the human way of thinking by communicating with their environment and learning from their experiences.

Peter Jackson suggests that Artificial intelligence is a subfield of computer science that deals with the design and application of computer programs that emulate a person's cognitive abilities, such as problem solving, visual perception, and understanding natural languages.

According to Horváth (2016) one approach to define AI is to divide it into two groups (narrow and general) by its capabilities. By narrow,

Horváth means that the given AI-based solution is designed to solve a specific problem, such as parking cars, forecasting the weather, or playing GO. By general, on the contrary, Horváth means AI solutions that are capable to solve very complex problems by self-learning, adapting and acting on a human-like manner by even building its own personality.

The development of AI is happening extremely rapidly and even though it became more and more professional and well-known around the globe there is still an enormous field for improvement, Horváth suggests. She also warns, that despite knowing a lot about AI what it is really capable of and what it possibly could be are just yet to come.

Dr. Dudás (2017) gives a couple of examples for the utilization of AI according to its field of application and according to the method used:

<u>According to field of application</u>	<u>According to method used</u>
Proof of item	Knowledge representation
Automatic programming	Knowledge extraction
Symbolic calculation	Learning techniques
Vision, image processing	Inference techniques
Robotics	Search techniques
Speech recognition	Evolutionary techniques
Processing of natural languages	Uncertainty management
	Symbolic programming

Restriction satisfaction action plans
Generation
Expert systems
Artificial neural networks
Data mining
Agents, multi-agents
Logic games

Utilization of knowledge
Problem representation

AI and its possible future economic and social impacts

McKinsey, in a comprehensive research, studied and modeled the economic and social impacts of Artificial Intelligence on the world. They concluded that, over the next decade, it could increase world GDP by an average of 1.2% per year, adding around \$ 13 trillion by 2030. On the other hand, McKinsey warns that AI is likely to bring significant social changes as well, and not only positive ones. (Modellezték, hogyan hat a mesterséges intelligencia a világgazdaságra, 2018)

In their model, seven elements have been examined, however, research emphasizes that these elements may expand in the future. Three elements are related to the *internal operation of companies*. In the case of a change in internal operation,

- expansion (AI could help using labor and capital more efficiently),
- substitution (technology replaces traditional factors of production, as they became more efficient) and
- innovation and expansion of products and services.

External factors include the economic benefits of increasing global flows, wealth creation and reinvestment, transition and implementation costs, and the negative externalities that could arise. (Bughin, Seong, & et al., 2018)

By 2030, according to study, 70% of companies will use at least one Artificial Intelligence solution, but most large companies will use the full range of technology. In its examination of national economies, McKinsey found that leading countries in the field of AI, especially developed economies, could achieve 20-25% more economic benefits than they do now (Bughin, Seong, & et al., 2018).

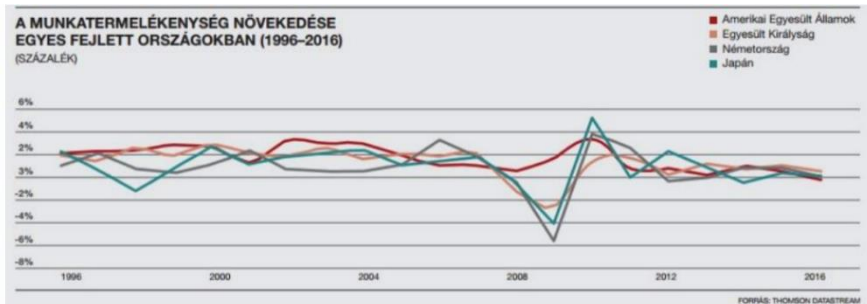
Nowadays, competition is primarily between the United States and China, with both great powers spending huge sums on research. In case of China, the spread of AI may have a particularly large impact, as its labor productivity is currently lower than the global average. First, Artificial Intelligence could greatly improve the efficiency of its supply chains and manufacturing processes, and second, one of the important drivers of the Chinese economy is already consumption, something that AI solutions could largely boost in the future. However, looking to the future, by 2030, on the one hand, activities requiring particularly high digital skills will increase to around 50% while the number of jobs that do not require such skills (or only to a negligible extent) falls to around 30%, which could lead to an enormous wave of job losses and a spectacular increase in income disparities. (Modellezték, hogyan hat a mesterséges intelligencia a világgazdaságra, 2018)

The study concludes that companies that are already investing in AI solutions will be the successful ones, despite the fact that technology is costly and payback is slow. The result of the model is that early-

stage investors, who will make widespread use of AI solutions over the next five to six years, may even double their cash flow by 2030, while those that do not invest enough can post a loss of about 20%. (Bughin, Seong , & et al., 2018)

In Hungary, several counties and settlements are currently struggling with labor shortages, but progress is constantly being made in relation to Artificial Intelligence, and news is emerging about the massive job-destroying effects of robotization, which can fundamentally lead to serious social problems. The spread of robots has accelerated in recent years. This is partly due to technological developments, the need for more efficient and faster production, and partly to the scarce labor supply in many sectors. By 2025, the number of robots could rise to 4-6 million, according to the BCG. Interestingly, the automotive industry is currently the largest user, with 39% of robots operating in this sector. The World Bank estimates in 2017 that 57% of jobs in OECD countries could be automated over the next two decades. The output of the economy and thus the well-being of society depends on the productivity of all factors of production. In this regard, two factors, the efficiency of capital and labor should be examined. Given that there have been several problems with them in recent years, potential signs of concern may arise (Móro, 2018).

The following chart illustrates the development of labor productivity over the last two decades:



(source: <http://concordeblog.hu/2018/06/19/robotok-es-amesterseges-intelligencia/>, 2020)

On the chart, we can see the increase – or the relative lack of increase with other words - of labor productivity in case of four developed countries between 1996 and 2016 (The US as red, the UK as orange, Germany as green and Japan as blue). The conclusion of the chart is that labor productivity remained relatively stable and did not increased largely in the past two decades. The development and spread of robotics and Artificial Intelligence may give the developed world a much-needed productivity boost that would have been needed for a long time. Leaving everything unchanged, a constant labor supply with an increased and more efficient capital stock would allow for greater total social output. (Móró, 2018)

In an efficient, market-based, competitive, high-investment economy, growth also leads to an increase in labor demand. And if automation is high, total societal output will simply grow faster. One logical question, of course, is who and to what extent will benefit from this. If the productivity surplus is concentrated in too few hands, the

benefits will be smaller and the available output growth will be less than possible. (Móro, 2018)

For the future, it is unknown what jobs will be in demand, but skills that manage human-human interactions well will be sought. With the development of Artificial Intelligence and machine learning, robots will be able to perform increasingly complex tasks that will work cheaper, more efficiently, and become increasingly indispensable to humans. (Móro, 2018)

Artificial intelligence in the financial sector

Applying AI is transforming not only our personal finances, but the majority of financial services, including credit and equity markets, cash flow, credit ratings, and regulatory compliance. Among the technological innovations that have emerged in recent years Artificial Intelligence may have the most significant impact on the functioning of the financial sector in the short term. Globally, according to the expectations of leaders of the largest financial institutions, in the next two years, ahead of Big Data, cloud and blockchain technology, and the use of AI for financial purposes could transform the business processes of the sector to the greatest extent. This is also supported by the opinions of leaders of technology companies - although in this case, Artificial Intelligence was only in second place behind IoT (Internet of Things). In addition, the increasing use of Artificial Intelligence could lead to a high degree of concentration of banks, insurance companies and technology service companies. Technology players outside the current remit of regulators could seriously extend their influence to the financial sector. Because of all of this, the failure of a major AI provider can cause many financial institutions to malfunction. The lack of a uniform legal framework for the sector is a

risk. In particular, liability and ethical issues need to be addressed, as new types of liability situations arise. This is because the responsibility for decision-making shifts from the people to the machines and their manufacturers. (Szikora & Nagy, 2020.)

JP Morgan, a global leader in financial services, uses Artificial Intelligence in fraud detection, fraud prevention, and defense against cyberattacks. Their latest area of research is the analysis of facial expressions with a combination of robotics and machine learning and the mapping of expected customer reactions (Németh, 2018.).

Kovács and Terták (2019) suggests, that “The financial sector has reached an inflection point. It entered the most profound era of change since the 1970s, which brought index mutual funds, discount brokers and ATMs. No financial service provider remains immune to the ongoing disruption; each company must have an adequate strategy to harness the powerful advantages of the new financial technology (“fintech”) revolution.”

Some examples of the most commonly used areas of AI in banking processes are:

- Customer rating, credit evaluation

There are several systems that use machine learning tools to more reliably determine the likelihood that a borrowing consumer will repay his debt in the manner and on time specified in the contract. This way, a customer’s loan eligibility can be determined more precisely. In order to do so, the system analyzes a huge amount of consumer data and uses machine learning algorithms to develop credit risk models

that can predict the likelihood of consumer default. (Szikora & Nagy, 2020.)

- Personalized financial services

There are many applications that use AI to manage people's personalized finances. These apps that automatically help consumers optimize their spending and savings based on their own personal habits and goals. They are able to analyze factors such as monthly income, current balance and spending habits and then makes its own decisions and transfer the money to the given savings account. (Szikora & Nagy, 2020.)

- Fraud detection and prevention

Artificial intelligence is also used in fraud detection and prevention, and in defense against cyberattacks. Some FinTech companies, as well as traditional financial institutions, also use platforms to prevent fraudulent attempts during online payments. These applications perform data analysis that is suitable for detecting transactions as well as attacks aimed at taking control of customers' current accounts. The system is able not only to prevent the fraud but also to inform users immediately about it. (Szikora & Nagy, 2020.) This is highly important as “commercial and central banks worldwide consider transparency a very important factor in their success” (Kovács, 2017)

- Contract review, legal due diligence

The auditing firm Ernst & Young uses Artificial Intelligence in the legal due diligence of contracts. At one of the largest U.S. investment banks, JP Morgan Chase, Artificial Intelligence is reviewing

commercial credit agreements using COiN platform. (Szikora & Nagy, 2020.)

According to Tamás Schenk, a partner in Deloitte's Business Consulting business, the rise of Artificial Intelligence in the financial sector can give a new impetus to the growth of cost efficiency and the development of the customer experience. However, there are still lots of field for improvement in areas such as data consolidation, and regulation. (A mesterséges intelligencia a pénzügyi szolgáltatások új mozgatórugója, 2018)

Summary

There have been successful periods in the history of AI, but there are also cycles of false enthusiasm and decline due to declining funding. There have been years of introducing new creative approaches and refining the best ideas. The development of AI has accelerated over the last decade due to the wider application of scientific methods in experimentation and comparison of approaches. It is very difficult to assess the expected impact, as newer and newer applications of robots and Artificial Intelligence are emerging.

We have already seen countless examples of automation, like ordering through a terminal on site at domestic McDonald's restaurants, just to mention a very simple example. There is also scope for increasing productivity in sectors that have not yet been reached by automation. A good example of this is the medical profession, where many standard diagnostic tasks can be automated, leaving doctors working hours for tasks that really require human intervention. However, many previously unaffected professions can be transformed by Artificial Intelligence and automation, which can, on the other hand, also have

negative effects on the labor market. The use and management of Artificial Intelligence requires very special skills, something that a significant part of the society do not have at the moment. However, majority of experts agrees that the impact of robots and Artificial Intelligence on society will be detrimental, that could lead to the displacement of workers, the increase in income inequality and the disintegration of social order.

To sum it up, Artificial Intelligence has all the potential to have an enormous impact on future economies and societies – if it does not have it yet. On the other hand, there have been a couple of breakthrough technical innovations in the history of humankind already and the world have always been able to adapt to them sooner or later accordingly. From the present, it is certainly not possible to say for sure that this will happen with Artificial Intelligence as well, however, the future of AI is currently still in human's hands and is evolving according to its will. Let's hope it will remain this way.

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Is there a gender gap in FinLit?

- Women or men are the real finance ministers (of the families)?

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Introduction

Janet Yellen, a 74-year-old Brooklyn-born economist, is the first female Treasury Secretary in the U.S. history. In 2014, she also pioneered when she was elected as head of the Fed, also for the first time as a woman. Hungary has never had a female finance minister, and if we look at the governmental practices of the rest of the world, we can also say with confidence that the number of female finance ministers is extremely small. The names of the more well-known women finance ministers can typically be recalled based on their other positions. Certainly, Indira Gandhi and Benazir Bhutto both became famous as prime ministers, not as former. Christine Lagarde is also known as President of the European Central Bank and not as a female member of the French government. Thus usually the chair of the finance minister is reserved for men.

However, in families, “women are the finance ministers”, and the family budget? is often in the hands of women. Is the logic different when managing the budget? of a family and a country? Is there a gap in women’s and men’s attitudes toward money, financial literacy, and

their disparate financial decisions? We are looking for answers to such and similar questions in this study, with the help of international research and studies.

Basics of the personal financial knowledge and decisions

Financial literacy has been shown to be a crucial determinant of financial decision making. However, examining financial culture is one of the youngest disciplines. Looking back on history of barely a decade, the financial crisis erupted in 2008 contributed greatly to its development and international spread.

The paramount importance of any knowledge is especially manifested in difficult situations, or in moments when knowledge provides some opportunity for development in our lives. We should go so far as to give confident financial knowledge - equally, with no difference in gender, age, nationality and social status - to open up opportunities for people to raise their standard of living.

The OECD INFE has defined financial literacy as follows: ‘A combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing.’¹⁶

All three factors - knowledge, behavior, and attitude - are necessary for the long-term balance of a household’s budget, understanding financial product offerings, selecting the right product for the person’s needs, and actually using them. In case of different age groups,

¹⁶ <https://www.oecd.org/finance/financial-education/49319977.pdf>

countries, lifecycle situations and in case of the three mentioned finlit factors, we try to examine whether there is a gender gap or not.

Finlit and gender gap in varied situations

A growing body of empirical research documents **the existence of a gender gap in financial literacy** in many developed and developing countries (Lusardi and Mitchell, 2014).

Under the G20 Japanese presidency, a concrete and ambitious **strategy was set for G20 countries** to achieve **gender equality** by “Closing the Gender Gap for New Prosperity”. It was recognized that women’s economic empowerment also requires women’s social advancement. This includes taking into consideration women in all their diversity, as women and girls are not a homogenous group. They have different interests and constraints based on their education level, ethnicity, age, disability, sexual orientation, gender identity, religion/belief, economic status or place of residence.

A) Starting at school - *there is no significant difference in students’ financial knowledge (OECD PISA 2018)*¹⁷

The OECD Programme for International Student Assessment (PISA) examines what students know in reading, mathematics and science, and what they can do with what they know. Thirteen OECD countries and economies and seven partner countries participated in the PISA 2018 assessment of financial literacy. (Hungary was not a participating

¹⁷ ARE STUDENTS SMART ABOUT MONEY? https://www.oecd-ilibrary.org/education/pisa-2018-results-volume-iv_48ebd1ba-en

country, but it is planned to join next time in 2021.) Some 117 000 15-year-old students made the test, representing around 13.5 million students.

Many 15-year-olds face financial decisions and are already consumers of financial services. They are likely to face growing complexity and risks in the financial marketplace as they move into adulthood.

Boys scored a small but significant 2 points higher than girls in the PISA 2018 financial literacy assessment, **on average** across OECD countries/economies. Overall, this survey shows virtually **no differences between girls' and boys' financial knowledge**¹⁸.

And this is intriguing because in adults, women typically tend to underperform men. However, it may give us hope that in the future this gender gap will be reduced.

B) Young people in higher education - Hungarian scope

*A survey*¹⁹ *from the State Audit Office of Hungary / Állami Számvevőszék (ÁSZ)*

¹⁹ The State Audit Office of Hungary / Állami Számvevőszék survey 2020 <https://www.penzugyiszemle.hu/hirek/nemeth-erzsebet-penzugyileg-tudatosabbak-a-felsooktatásban-tanuló-fiatalok>

Figure 1: OECD PISA 2018 Gender gap in finlit

	"Gender differences in financial literacy performance (girls - boys)"
	Score dif.
OECD average	-2
Indonesia	18
Estonia	-3
Latvia	4
Spain	1
Canadian provinces	-6
Italy	-15
Serbia	6
Poland	-7
Russia	-5
Lithuania	4
Georgia	12
Finland	6
Australia	-2
Chile	-5
Portugal	-1
Brazil	2
United States	-6
Slovak Republic	-1
Bulgaria	19
Peru	-10

Note: Values that are statistically significant are marked in bold.

Source: OECD, PISA 2018 Database, Tables IV.

The aim of the research was to provide a view on the financial literacy and awareness of young people studying in different disciplines of higher education (2557 respondents in the 2020 survey) and to assess how students' financial knowledge, attitudes and behavior have changed in the seven years following the previous research on the subject. The results show that the level of financial literacy did not change between the 2013 and the current survey in 2020. Both studies found that **young men**, studying financial and economic knowledge in higher education, and those who had lived abroad for a longer period of time were **more informed about finance** (Németh 2021).

Some of the gender relevant findings of the survey:

- 61 % of respondents were women, which is equivalent to a **higher proportion of female students in higher education**.
- The **salary²⁰ of the respondents women is lower** than men.
- In terms of forms of savings, **men** definitely choose a higher proportion of **higher risk investment forms**, such as: government securities, securities, investment funds.

Highlighted the gender difference in financial circumstances and in financial decision factors in case of young adults, and there is an unjustified risk aversion that can also have a negative effect, as it **can deter young people –especially women - from becoming**

²⁰ Salary could be here: salary, scholarships, pocket money, other youth benefits, etc.

entrepreneurs or launching financial transactions that could contribute to increasing their well-being.

C) **Adults: Fearless-Woman-Research** (Lussardi, Mitchell 2021²¹)

The survey experiment shows that women tend to disproportionately respond “do not know” to questions measuring financial knowledge, but when this response option is unavailable, they often choose the correct answer. The research leaders estimated a latent class model and predicted the probability that respondents truly knew the correct answers. It is found that about **one-third of the financial literacy gender gap can be explained by women’s lower confidence levels.** (Lusardi at al. 2021)

Highlighted that **both knowledge and confidence matter for financial behavior.** Women who are financially literate are also less likely to be fragile financially.

Specific finlit women characteristics

- **Financial inclusion**

Financial services can help drive development. They help people escape poverty by facilitating investments in their health, education, and businesses. According to the 2017 Global Findex²² 1.7 billion adults around the world are unable to use financial services. Those

21 Fearless Woman: Financial Literacy and Stock Market Participation
<https://gflec.org/wp-content/uploads/2021/03/Fearless-Woman-Research-March-2021.pdf>

22 <https://globalfindex.worldbank.org/>

most disadvantaged by this situation are women, people with low income-small-scale farmers and businesses.

- **Lag in digitals**

The benefits from financial inclusion can be wide ranging. For example, studies have shown that **easy, quick digital payments** – like mobile money services (which allow users to store and transfer funds through mobile phone) can help improve people’s income-earning potential and thus reduce poverty.

- **Lower lifetime incomes (salary, pension salary)**

According to the OECD (2018)²³ survey, **women earned 39 percent less** in 2015 than men; however, there are significant **differences between countries**. The largest differences were found in Japan, Korea, Mexico and Chile, within Europe in the Mediterranean countries, the German-speaking countries, the Netherlands, the Czech Republic, and the smallest - below 30% - in Eastern Europe, the Scandinavian countries and Portugal. **Consequently, women need to make even smarter financial decisions; they should manage money matters even better because of less income.**

- **Effects of family care taking (shorter education, career interruption due to childcare)**

It is critical for women to make financial decisions that accommodate their unique circumstances. More than ever, it is important for women

²³

https://www.oecd.org/dev/development-gender/OECD_DEV_W20-report_FINAL.pdf

to become **resilient and financially secure, as there is a multiplier effect because women care for others.**

- **Longer life expectations**

The longer life expectancy of women, who **live on average four years longer than men**, cause in general, a higher risk of pension deficiency and poverty in old age for women than for men. The different levels of earnings, part-time work and low-amount childcare allowance are significant difficulties. Since women generally have less money to accumulate wealth, it is even more important to invest their money very well.

- **Different attitudes**

Women and men have **different strategies for dealing with extreme situations**: women tend to cut expenses, while men prefer to find ways to earn extra money.

In terms of savings, the **need for security is more important for women** than for men. That is why many women leave their money on their deposit savings? accounts, with dramatic consequences due to extremely low interest rates. Money does not thrive there because it is consumed by inflation.

Development paths, tools, opportunities

A) Bridging the digital gender divide²⁴ (OECD 2018)

Digital technologies offer leapfrog opportunities and help empower women. The internet, digital platforms, mobile phones, and digital financial services, offer great opportunities for all and can help giving women the possibility to earn (additional) income, increase employment opportunities, and access knowledge and general information. Female users currently tend to use fewer services than men and are less confident using the internet. For instance, while mobile money accounts offer an effective way to boost financial inclusion, it remains the case that fewer women are likely to own and use such an account. **Online or video-based upskilling and tutorials may help women to make better use of digital tools and extract more value from them.**

B) Boost female entrepreneurship – Hungarian model: Dobbantó (Throwing) Program

Female entrepreneurs are under-represented in the overall entrepreneurial sector compared to their role in society: only one third of the leaders at the forefront of domestic enterprises are women. According to a survey²⁵ conducted in Hungary by Budapest Bank at

²⁴ <https://www.oecd.org/digital/bridging-the-digital-gender-divide.pdf>

²⁵ The representative research was carried out by the NRC on behalf of Budapest Bank, between 25 February and 13 March 2020, in the economically active target group aged 18-59, on a sample of 1,000 people. Research Method: Online questionnaire survey using the CAWI research panel.

the beginning of the year 2020, the majority of women are mostly hindered by the lack of self-confidence or lack of relationships in starting a company, in addition to financial factors. 61% of women who run a business say they have difficulty in their daily lives due to financial insecurity, 51% have doubts about self-confidence, and 36% have delayed starting a business due to the lack of proper networking. The result also shows the need for initiatives such as the "Throwing, Budapest Bank - about finance for women" program, which since 2010 has aimed to **support women in expanding their entrepreneurial skills, building relationships, helping them to set up and develop companies.**

C) Women's communities

Financial blogs and information portals are also useful tools for women, who want to take control of their financial decisions and investments. For example, the Her Money, Fortunalista, Geldfreundinnen, Madame Money Penny or the Smart Purse financial coaching portal – in Hungary: buxa.hu, Pénziránytű, PÉNZ7, Seed - **pages contain a number of articles on a wide range of topics that provide financial knowledge on the one hand, and tips and ideas for investing money effectively on the other.**

D) Iconic women for inspiration

Queen Máxima

Queen Máxima of the Netherlands, the former investment banker, became one of the most prominent fintech supporter in the world. Queen Máxima has been lobbying for years in the Netherlands and abroad to increase access to financial services, improve consumer protection and enhance financial literacy. In 2009 Queen Máxima was appointed the UN's Secretary-General's Special Advocate for Inclusive Finance for Development. Her Majesty is the Honorary Chair of the Money Wise Platform in the Netherlands.

Inspirational messages from Queen Maxima²⁶ :

“If we want to help young people use all the opportunities available, we will have to provide them with the ability to handle their finances adequately.”

“Whilst financial inclusion is particularly important for women's economic empowerment, today 60% of the 400 million financially excluded adults on the continent are women.

So what is standing on our way, to make digital financial inclusion for women a reality?

- *First of all access to a mobile telephone and internet connection is an extremely necessary starting point. But Sub-Saharan Africa has a*

²⁶ Keynote speech Queen Máxima at the virtual G7 Partnership High-Level Event: Catalyzing Digital Financial Services for Women Across Africa: Supporting Recovery, Resilience, and Innovation During COVID-19 Speech | 23-09-2020

41% gender gap with regards to mobile internet use. This disparity could be reduced.

- *Also having regulation in place that allows for mobile money and agents that are close to where women live and work, is an important prerequisite to use digital financial services for COVID-19 response.”*

Sallie Krawcheck, the pioneer

Former Merrill Lynch manager Sallie Krawcheck has learned one thing in particular during her career: the financial sector is typically cultivated by men for men. Male investment advisers offer solutions to male investors - which are often unusable for female investors. Krawcheck saw this as the main reason why women are low in financial markets. He set out to change that, and in 2014 he founded Ellevest, a digital asset management company. Fintech startup investors include Melinda Gates. Ellevest, meanwhile, has more than 90,000 members - but its offerings are currently only available in the US.

Professor Annamaria Lussardi

Annamaria Lusardi, an Italian-born emblematic international expert in financial culture development, is a professor at George Washington University School of Business, where she also serves as the Academic Director of the Global Financial Literacy Excellence Center. In 2014 she was elected chair of the Research Committee of the OECD/ INFE. Her dedicated work was fundamental for the developments of international measuring of financial literacy and financial education.

Inspirational messages from **Professor Lussardi:**

“ Financial literacy is like reading and writing, it is an essential skill for the 21st century ”

“Small steps are not enough, we need to empower women so they can be fearless and financially secure.

The pandemic offers an opportunity to reimagine the future and change course. History should not continue, we need to break the cycle!”

...and finally... The Mothers – the BEST ambassadors of the financial literacy

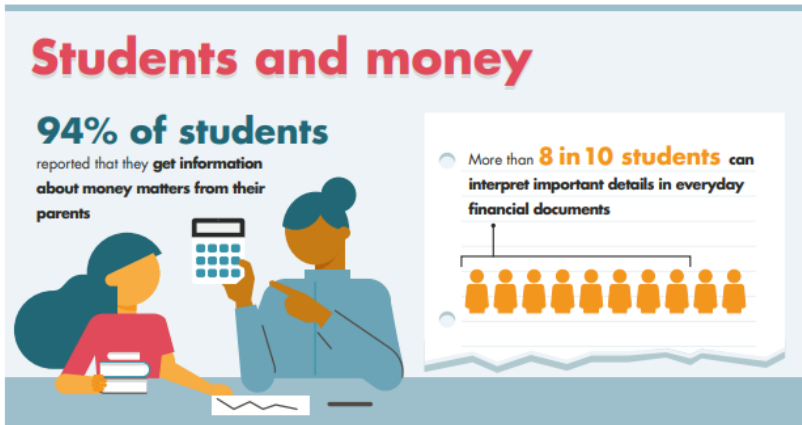
Financial literacy is traditionally part of a **society’s collective wisdom** - parents also pass on eternal knowledge through their own example and proverbs enshrined in our social traditions, as well.

The latest OECD PISA 2018 survey highlighted:

„Parents, guardians and other adult relations were **students’ most common source of information about money matters: 94% of students reported obtaining such information from their parents**, on average across OECD countries/economies.”

„After accounting for student characteristics, **students who look to their parents as a source of information about money matters outperformed** students who do not do so by 27 score points in financial literacy, on average across OECD countries and economies

Figure 2: OECD PISA Students and parents together in money matters



Source: OECD PISA 2018

In search of the answer to the question of whether a woman is the finance minister of a family or not, we can summarize that women play a primary role in everyday spending, in the allocation of kitchen money. However, in determining family long-term financial goals and behaviors, such as borrowing, savings, and retirement savings, men typically have the decisive say in classical family models.

Therefore, the development of women's financial competencies should be included among the highlighted directions for the improvement of financial awareness.

GO financially conscious super women! We need you!

.... and the bright FUTURE!

On the closing date of this article, encouraging news arrived:

There is a valuable project, the European Money Quiz, which is Europe's biggest financial literacy contest and attracted nearly half a million game plays in 2021, up from about 160.000 in 2019, via the Kahoot platform. The quiz was launched in 2017 as an initiative to promote financial education by national banking associations in Europe, under coordination by the European Banking Federation. The European Money Quiz is one of many activities organised every year during the European Money Week.

In 2021 - despite the pandemic situation - the **EMQ brought together over 50 000 students across Europe**, with 55 national finalists representing 28 countries in the European online finals on the 20th April 2021.

...and the winner of the 2021 European Money Quiz Final was a 15-year-old Hungarian national finalist, **Ms Zsófia Strasszer, a girl student** from Budapest.

Figure 3: Winners of the European Money Quiz in 2021

GO GIRLPOWER! YOU HAVE THE FUTURE!



EMQ 2021 video: <https://www.ebf.eu/europeanmoneyquiz/>

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Cryptocurrencies as payment alternatives

Zsolt Pál, PhD, Associate Professor, University of Miskolc

Introduction

Bitcoin was designed to operate as digital cash. In the last decade, the number one cryptocurrency became much more an investment instrument (often referred to as digital gold), and cryptocurrencies matured to a conventional new asset class. However, in this study, I focus on the payments and decentralised finance related functions of Bitcoin and other cryptocurrencies.

The king of cryptocurrencies

The days when Bitcoin (BTC) was the only known cryptocurrency are gone. Over the years, countless blockchain projects have been created, and today there are about 10,000 different cryptocurrencies (altcoins) beyond Bitcoin). However, we still should consider Bitcoin number one for many reasons, including the following main ones.

- Bitcoin's dominance in the cryptocurrency market is approximately 45%, while the second-largest Ethereum (ETH) hangs around 14%. This is an absolute leader position for BTC at the moment. However, BTC dominance is likely to decrease in the long term. There are also experts expecting Ethereum to overtake Bitcoin in the not so distant future. This hypothetical event is called the flipping. (ETH is already the top cryptocurrency held on several platforms in terms of U.S. dollar amount. Dominance is calculated based on market

capitalisation: the Bitcoin market capitalisation is close to 1 trillion dollars - about 45 per cent of the total cryptocurrency market capitalisation of around 2 trillion (in April 2021). (Coingecko, TradingView)

- BTC is the 'first mover'. Market experiences show that Bitcoin predominantly leads the market in terms of price changes.
- Bitcoin is the first one. BTC has been around since 2009.

Characteristics of Bitcoin making it unique:

1. Clearly-defined monetary policy
2. Permissionless, peer-to-peer system
3. Open-source, transparent, and decentralised ledger
4. Highly fungible, durable, portable, and divisible
5. Digital money

From a payments point of view, we have to devote much attention to the second and fifth characteristics.

Bitcoin as a form of payment

Bitcoin enables instant payments using peer-to-peer technology to operate with no central authority. The transaction management and money issuance are carried out collectively by the network of the decentralised digital currency. (Murányi, 2018a)

Permissionless, Peer-to-Peer System

In traditional centralised financial and payment systems, actors have to rely on a slew of institutions: banks, intermediaries, in some cases, third-party financial institutions and service providers. Trust (in these

institutions) is a crucial element of the centralised financial system. (Kovacs 2019, 2017a-b)

Using the Bitcoin Network, intermediaries like banks or payment processors are no longer needed to oversee transactions. Bitcoin's peer-to-peer model allows users to have complete control of their assets without the need to trust any institutions or third parties. (Murányi, 2018b)

Digital Money

The importance of digital currency is that the money we use can be easily programmed to do highly customisable things.

Money in bank accounts is not programmable because the money in each bank is technically different. Dollars in OTP Bank and Barclays have different legal agreements and have different logic and constraints.

There is no ledger referencing the money stored in different bank accounts, making it hard for money to be programmed to follow specific rules. With Bitcoin, there is the Bitcoin ledger where programmers can set rules to program escrow, notaries, design payouts and dividends. This concept of universal cash will become increasingly important as we move towards machine-to-machine payments in the future. (Lewis, 2020; Veresné, 2004)

The role of blockchain technology

The Bitcoin Network relies on a shared public ledger called the blockchain. In this chain of blocks, all confirmed transactions are included. It allows Bitcoin wallets to calculate their spendable balance

to verify new transactions, thereby ensuring the spender actually owns them. The integrity and the chronological order of the block chain are enforced with cryptography. (Füredi-Fülöp et al, 2017; Süveges 2019)

Speed

The Bitcoin Network can only handle around seven transactions per second (TPS). By contrast:

- Hungary's instant payment system (GIROInstant platform) faces around 60 TPS on any given day and can scale up to several times more than that. (Pintér-Bagó, 2020)
- Visa handles around 1500-2000 TPS, and it can handle 65 thousand TPS if necessary.

As block speed and block size cannot be changed without compromising speed, the only way is to process BTC transactions outside the Bitcoin Network. The solution is the so-called Lightning Network, which consists of a series of interconnected payment channels created by two parties on the Bitcoin Network (not a blockchain). Over 50,000 Lightning Network payment channels worldwide speed up Bitcoin payments, but it is hard to measure the speed increase. Faster blockchains are existing though, including Ethereum (20 TPS)²⁷, Polkadot (1000 TPS), Avalanche (4500 TPS), and Solana (65000 TPS). (Coin98)

²⁷ Ethereum 2.0 promises up to 100,000 transactions per second.

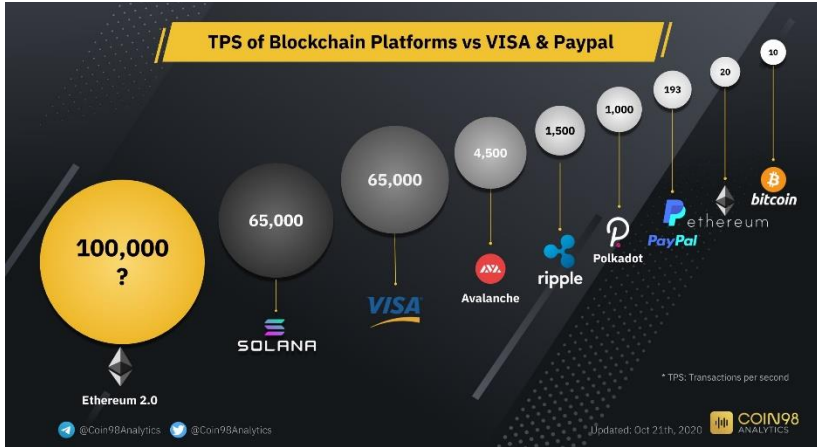


Figure 1: Speed of blockchain platforms compared to traditional payment solutions

Source: Coin98

Where to pay with crypto?

While buying and selling Bitcoin and other cryptocurrencies is becoming increasingly mainstream, our opportunities are somewhat limited due to its volatility when it comes to spending virtual currencies.

However, a growing number of companies across industries embrace cryptocurrencies, allowing customers to use them as an official payment method for their goods and services.

Some of the biggest and more well-known companies using and accepting cryptos are AXA, Microsoft, Starbucks, Expedia, Tesla, PayPal.

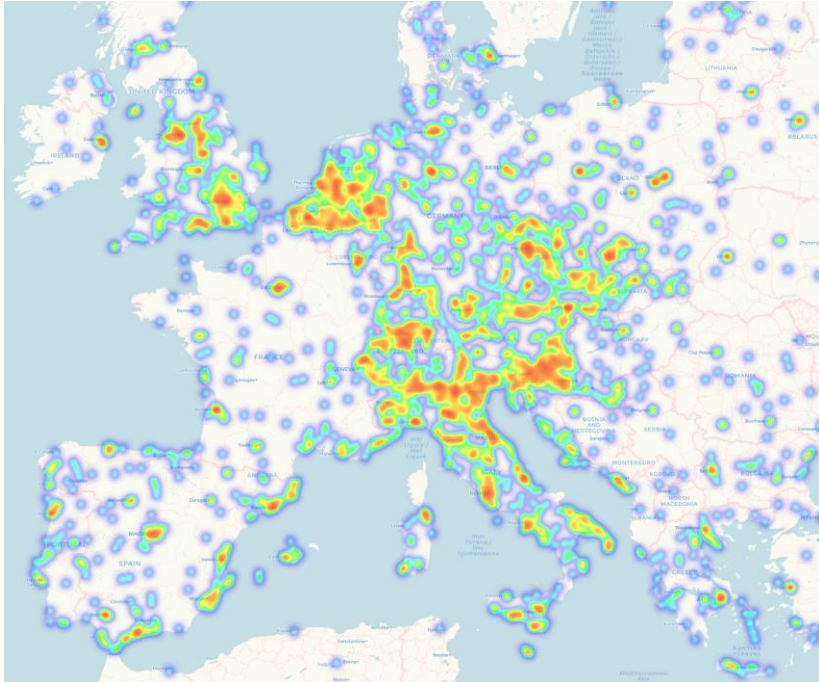


Figure 2: Heatmap of crypto ATMs and merchants accepting cryptocurrencies in Europe

Source: coinmap.org

Crypto cards

Visa and Mastercard are also taking the crypto train and offer cryptocurrency cards in cooperation with exchanges, among other blockchain developments. That is a huge step towards mass adoption; paying with a crypto card is not a cryptocurrency payment in the strict sense, however. Service providers exchange the cryptocurrencies of the customers to fiat at the moment of the payment.

Summary

When Bitcoin launched 12 years ago, it promised the possibility to transfer money without needing a bank as an intermediary. From a financial literacy point of view, this expected payment revolution meant severe development potential.

First of all, it promised that billions of customers who cannot access traditional banking services (unbanked people) might be able to stop relying entirely on cash. This would have been a crucial global financial inclusion evolution and a big step toward entirely cashless payments in developed countries. (Savchenko-Kovács, 2017; Gróf et al, 2017)

There are about 10,000 cryptocurrencies and more than 400 cryptocurrency exchanges. Roughly 14% of adults in the USA own cryptocurrency, and many more plan to buy some. We also have potential BTC legal tender implementations in some countries, Bitcoin ETF's, and more.

However, volatility, environmental concerns, transaction fees, and other factors have hampered Bitcoin's adoption as a form of payment. Even so, several big companies do rely on cryptocurrency, and there

are more and more merchants who accept Bitcoin or altcoins. Actors in the financial sector also follow the good old rule: "If you can't beat them, join them!". (Pásztor, 2018)

Traditional payments services adopting blockchain technology and offering cryptocurrency-based services using their strong market position may achieve a win-win situation.

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Analysis of financial inclusion in Ukraine in the situation of instability

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Sumy State University, Ukraine

In the current conditions of economic and political crisis in Ukraine, the issue of ensuring financial security at various levels of the economic system comes to the fore from the finances of individual households to national finances. Analyzing the practical experience of developed countries, it can be argued that one of the main drivers of financial security may be the implementation of the principles of financial inclusion, which is to expand access of ordinary citizens, businesses to financial products and services, regardless of consumer status, age, activity or place of residence.

Financial inclusion, accompanied by confidence in the financial and credit system by individuals and businesses, stimulates the direction of savings in the investment sphere, helps to reduce the shadow economy, increases the financial stability of economic entities, and as a consequence increases government revenues and financial security. The globalization of the economy, including financial globalization, has intensified the analysis of the issue of financial inclusion of society at the local and global levels.

Analysis and research of the content, essence, principles and features of inclusive economic development and opportunities to

achieve it in countries with different levels of socio-economic development are at the center of scientific research of many countries and international institutions, including the Organization for Economic Cooperation and Development (OECD), United Nations Development Programme (UNDP), European Commission, International Monetary Fund (IMF), World Economic Forum (WEF), World Bank, International Center for Inclusive Growth Policy.

The term “inclusion” was first used in the 1970s in the United States, but then only social inclusion was singled out (the process of increasing the participation of all citizens in society through access to opportunities and fair distribution of labor results), but over time, the concept has become widespread in the economic space.

At present, neither scientific nor governmental circles have paid due attention to the study of the essence of the concept of “inclusive growth”. Analyzing the various sources and scientific interpretations of “inclusive growth”, it is appropriate to conclude that the breadth of the essential features of this concept allows us to consider it in two aspects - as economic growth, which guarantees a favorable environment for all without exception, thereby reducing poverty and inequality, as well as the process of involving a larger population in order to benefit each sector of the economy.

Inclusive growth is a concept that provides equitable opportunities and equity for economic participants, accompanied by the benefits of each sector of the economy and different segments of society. That approach extends traditional models of economic growth and includes a focus on equality of health, human capital, the environment, social protection and food security as global security factors in a broad sense.

The concept of inclusive development implies that each economic entity is important, unique, valuable to society and has the opportunity to meet their needs. Inclusive economic growth is a prerequisite for the development of society, so it is a multifactorial and multilevel process, because it is based on the economy of maximum employment and interaction of all actors.

According to the World Bank data [3], more than 100 countries have or have already developed a national strategy for financial inclusion. Unfortunately, the level of financial inclusion in Ukraine remains quite low. A project of the World Economic Forum's System Initiative on the Future of Economic Progress, which is well-known as the Inclusive Development Index (IDI) that is aimed to measure how countries perform on eleven dimensions of economic progress in addition to GDP only confirm an underdevelopment of financial inclusion in Ukraine. Ukraine, ranked 49th out of 74 possible, is the only European country with a declining inclusion index. Its inclusiveness has decreased by 6.8% in 5 years [4].

An opportunity for future development of the financial inclusion process in our country is greatly depends on the global crises of health COVID-19 pandemic caused by coronavirus. The COVID-19 pandemic has a significant impact on the development of all areas and financial sector was not an exception and was affected perhaps the most.

The level of financial inclusion and tendency of the pandemic influence can be determine using the key indicator of financial inclusion - the presence of a bank account in the adult population. According to the World Bank [3], at present the high level of financial inclusion of the population has already been reached by certain

countries, including Denmark, Sweden, Norway, the Netherlands and Australia. According to the World Bank, the share of the population of Ukraine over the age of 15 who has an account with a financial institution in 2017 was 63%. Currently, this situation is positive, compared to 2011, when this figure was - 41%, but still lags behind the world average (69%). And this, of course, is an indicator for future developing of financial services in Ukraine.

The ability of all participants of financial processes to have convenient and secure access to all financial products and services is the main criterion of financial inclusion. Ukraine is not inferior to the United States in the number of banking and post offices, and is ahead of Poland in the distribution of ATMs in terms of population, but lags far behind these countries in terms of banking coverage due to low Internet penetration and mobile banking services.

The growth of non-cash transactions is possible only if the infrastructure is sufficiently branched to make card payments.

According to the National Bank of Ukraine [2], the share of non-cash transactions in the country in the total volume of transactions using payment cards increased from 25 percent in 2014 to about 50 percent at the end of 2019. From the beginning of 2018, the network of trade payment terminals (POS terminals) grew by 13.6%. About 79% of the country's network of trade terminals allow contactless payments. In 2020, due to the COVID-19 pandemic, Internet banking is growing, and about 60 percent of the country's population already has access to financial products and services through a digital identification system. However, the quality of digital financial services in Ukraine needs to be further improved.

Financial stability is also closely linked to the level of financial literacy. Understanding the capabilities of financial products by the population allows markets to operate more successfully and profitably and reduces threats to the stability of the entire system, because bad financial decisions do not become catastrophic.

An analysis of a study conducted by the International Partnership for Financial Stability Project and InMind [1] suggests that the level of financial awareness of the population in Ukraine is quite inadequate. In addition, self-assessment of financial literacy, assessed by testing, is significantly overestimated. Ukrainians do not feel comfortable using financial services or interacting with financial institutions, but they do not try to take action to learn more. It is obvious that Ukrainians are only interested in financial topics that are personally important to them.

The study emphasizes the low financial awareness of Ukrainians, which limits them in the correct assessment of their financial capabilities and needs. This situation does not contribute to the spread of credit services of financial intermediaries, and investment opportunities of households are mainly reduced to the placement of deposits in banks. For the vast majority of Ukrainians, the use of financial services leads to the payment of utility bills and the use of bank payment cards.

The results of the study also confirm the fact that the place of residence, settlement and region significantly affects the level of coverage of financial services. It is clear that in rural areas and in small settlements, which are far from the possibility of modern financial services, there is a more negative attitude towards financial services.

The biggest determinant of financial behavior, inclusion and literacy in Ukraine is the age and property status of respondents. Not surprisingly, young people and Ukrainians aged 34-45 are now more responsive to changes in the financial sector related to the introduction of innovative financial services and products, while the older generation (aged 45-60) and people older people trust financial institutions and their innovations less, almost completely avoiding inclusion in the newest financial sphere.

The level of education and well-being is also an influential indicator of financial inclusion, as respondents with higher education, on average, use all financial services without exception, and especially currency exchange.

According to the study, we can identify the following factors that hinder the development of financial inclusion in countries and Ukraine, in particular: not high level of infrastructure development, which prevents safe and unimpeded access of all groups to financial products and services; ignorance of the population in the financial sphere; reducing the number of professionals with a high level of qualification in the labor market; difficulties in doing business and corruption in the state; great toning of the economy, which blocks the direction of national income to economic development; improper environmental situation; a significant share of the population at risk.

Thus, while Ukraine is trying to take a number of important steps to increase financial inclusive growth and development, there are still many open issues and weaknesses that all financial sector participants need to focus their attention on in order for Ukraine to have a place in a number of countries with sufficient inclusive economic development.

The government must actively work in its political and legislative activities in the segment of the financial system.

According to the Strategy for the Development of the Ukrainian Financial Sector until 2025, one of the priorities of the National Bank of Ukraine for the next five years is to increase financial inclusion. Among the urgent tasks are to increase the availability of financial services and increase their level of use, strengthen consumer protection, and improve the financial literacy of the general population. All this will contribute to the sustainable and inclusive development of Ukraine's economy and increase the welfare of its citizens.

However, at present there is a problem of cash in the shadow economy. Non-cash payments are the driver that can stimulate economic development, because cash payments are actually a shadow economy, and non-cash payments are something that can fill the budget in the future and be an incentive for business to develop, because there is an understanding of where money goes flows as they go, as controlled; the population has an understanding of how to manage their flows, there is a greater tendency to save.

To achieve the appropriate level of financial inclusion in current conditions, Ukraine can use the principles of innovative financial inclusion developed by the Organization for Economic Cooperation and Development (OECD), which include a set of practical recommendations for the whole world. The principles do not constitute a harsh interpretation of actions, but rather provide advice for maintaining financial stability and protecting consumers in the country.

Therefore, we will form approaches to improve access to financial services and resources, as well as to ensure active financial inclusion in Ukraine:

- creating the necessary regulatory environment to ensure access to accounts;
- expansion of access points to financial services;
- stimulating scale and viability through large government programs, such as social contributions to customer accounts;
- focusing on the development of financial literacy among certain social groups: low-income populations, vulnerable groups, rural population;
- encouraging the use of financial services;
- development of educational activities in the field of financial services;
- providing a system for protecting the rights of financial sector clients;
- ensuring legal protection of clients and the financial system;
- creation of new financial institutions, development of new products and technologies used to cover virgin or inexperienced markets.

The implementation of the above areas in the future should lead to the successful spread of financial inclusion in the country. It is worth noting that there is no single template solution that would suit all countries without exception. Currently, more than 100 countries implement various financial literacy programs, based on the needs of the population and the economy, existing resources and strategic goals of the state. An adequate level of financial inclusion in Ukraine develops the competitiveness of the state and contributes to the full

satisfaction of the needs of the population, because in the future it is the high standard of living of society that will ensure a developed financial system.

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Twin deficit in the European Union – a cross-country analysis based on the Polak model

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Introduction

The Polak model is a monetarist approach to explain the linkage between the internal and external indebtedness of a country. This model was invented by Jacques Jacobus Polak Dutch economist and a former vice-president of International Monetary Fund in 1957. (Polak, 1957) The model is optimal to understand the core reasons of the economic problems of seriously indebted, open economies.

This paper examines the relevance of this model by examining linkage between the internal debt (public debt) and the external debt (foreign debt) between 1995 and 2019 in the counties of European Union. The raised question was, how strong is the linkage between the internal and external debt among the European Union. A simple regression analysis was used.

The Polak model – theoretical background

The standard Polak model is very simple using limited number of variables. (Szalkai, 1990) Therefore, it is very compact, with minimum data requirements. The model needs as inputs only banking data and trade data. (Fülöp-Várkonyiné, 2018) These sets of statistics are generally available in all developing countries. Moreover, it can be flexibly applied and explained with relative ease to policy makers with no experience of empirical modelling (Musinszki – Lipták, 2020). The

Polak model integrates monetary, income and balance of payments analyses, and consists of a set of four equations. The model contains two behavioral relationships: the demand for money function and the function of the demand for imports, and two identities: for the money supply and for the balance of payments.

The Polak model (later Model) does not consider the role of interest rates and the exchange rate to affect the real economy and the money velocity rate and the import rate (detailed below) are considered to be stable over long term.

The Model's starting point is the basic equation of monetary programming, namely:

$$NFC + NDL = CASH + SD + TD = M2$$

Where

NFC – net foreign claims of the banking system = foreign claims – foreign liabilities

NDL – net domestic loan = public debt + private debt (corporate and household loans)

CASH – cash in turnover

SD – deposit in sight

TD – term deposit

Let us this equation:

$$\Delta NFC + \Delta NDL = \Delta M2 = \Delta CASH + \Delta SD + \Delta TD$$

Where

DNFC - change in the net foreign claims of the banking system,

DNDL - change in the net domestic loan of the banking system,

DM2 - change in the money supply.

Look an application for the model. Assume that the country is heavily indebted (i.e. NFC is highly negative). The situation needs to be improved, DNFC needs to grow. What can we have to do about it? Enhance ΔNFC from the equation:

$$\Delta\text{NFC} = \Delta\text{M2} - \Delta\text{NDL}$$

To reduce the foreign indebtedness, banks' deposits are needed to increase while net domestic borrowing should decrease. To reduce net domestic borrowing, public borrowing (through a smaller general government deficit) and/or the willingness of the retail-corporate sector to borrow should be reduced. Savings need to be strengthened. Reducing the budget deficit is the responsibility of fiscal policy, encouraging household savings and reducing corporate/retail credit is the duty of the monetary policy. The monetary authority provides less refinancing loans and reduces direct budget lending, thereby reducing the monetary base.

If there is no monetary capital movement, the current account and the DNFC are the same. The current account can be written in the following way:

$$\text{DNFC} = \text{CAB} = (X - M + \text{NFY} + \text{NT}), \text{ where}$$

CAB - current account balance over a given period,

X - cash inflow from exports of goods and services during a given period,

M – cash outflow for imports of goods and services during a given period,

NFY - net factor yield - balance of money received for the use of production factors - interest received from abroad, dividends, wages minus interest transferred abroad, dividends, wages,

NT - net unreveled transfers - received unreveled transfers - paid unreveled transfers.

Another option for improving net foreign claims is to increase exports and curb imports (in foreign currencies), as current transfers are generally outside the remnant of economic policy.

The Model demonstrates the effects of changes in money. Its main message is to explain the phenomenon of twin deficits, i.e. how a budget deficit leads to a current account deficit when imports are liberalised and the exchange rate is fixed.

In the model, there are exogenous variables that affect the amount of money, but their size is determined not primarily by changes in the amount of money, but by other factors. These are:

1. $DNDL$ change in net domestic loan = change in public debt + change in private debt

The size of the budget deficit is determined by fiscal policy and the monetary policy cannot affect it, because the State is creditworthy in domestic currency at any interest rate. The private debt is influenced

by the monetary policy, and this is interest rate sensitive. So, the size of nominal interest rates plays a crucial role in the development of the overall domestic loan by modifying the amount of private debt.

2. X – annual export

Exports depend on the quantity of marketable domestically produced goods, and at fixed exchange rates monetary policy has only an indirect and ambivalent effect on its size. The restrictive policy shifts some of the goods to export markets as a result of the tightening of demand, but on the other hand, an increase in interest rates can put some farmers in a difficult situation, and the recession could lead to bankruptcy and thereby eliminate their exports.

3. $NFY + NT$ – production factors' and unrevered transfers

Their extent is determined by the country's net foreign debt, direct working capital investments, privatisation revenues and aid movements. (Kántor, 2016)

The Polak model is illustrated in the following illustration:

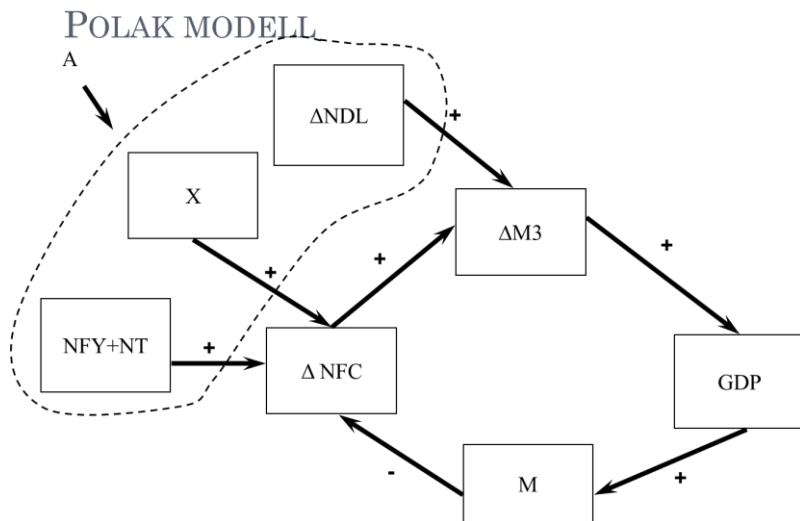


Figure 1 – The linkage between public and current account deficit by the Polack model

In the figure, the positive relationship is marked by +, i.e. if the quantity increases, the other's stock will also increase. Similarly, the negative relationship is marked by -.

Start the explanation with the net domestic loans.

If D NDL increases, so will the amount of money (M2). The explanation is in the basic equation of monetary programming. In fact:

$$DNDL + DNFC = DM2$$

If the amount of money increases, the nominal GDP will increase. According to the Fisher formula:

$$M2 * v = GDP = Y$$

The current income Y is the product of M2 money supply multiplied by money velocity. If the money velocity is constant, the Y will increase with the same proportion as the M2. That's a strong assumption.

A specified proportion of current income is indicated to spend for import in an open economy. M is called import ratio, which shows how much of the current income is spent for import. The increase in nominal income increases imports. Assume that the size of this is also constant. Then:

$$M = m * GDP = m * v * M2$$

If imports increase, net foreign demand decreases. Since:

$$DNFC = CAB = X M + NFY + NT$$

The above equation shows that the balance between net transfers and non-monetary capital movements is a factor increasing net foreign claims.

The main message of the model is the following:

If the budget has a large deficit, the net domestic loan increases, which increases the money supply. The extra money supply creates current income, which leads to higher import. And the increase in the import account worsens the current account and the country's debt increases. If the country's main problem is indebtedness to the rest of the world,

its net domestic debt should be reduced. The question is in what form this will take place.

If the budget refuses to treat its own deficit, the stock of corporate and retail loans should be reduced by monetary policy instruments through raising the interest rates. The more successful the budget expenditure cut and revenue increase, the smaller interest rate increase is needed to achieve the desired effect. (Zsombori, 2013) The IMF's recommendations generally call for the latter solution, since it is assumed that the private sector spends more rationally in terms of economic performance than the public sector. A sharp increase in interest rates could lead to a large-scale recession, increasing welfare losses and dampening exports, so the ultimate goal is not to reduce debt.

It is particularly important for the State to take restrictive measures if there is a high level of indebted business or population indebted. In fact, the restrictions applied with high corporate leverage significantly increase welfare losses. (Szemán, 2017) In the context of the last crisis in Southeast Asia, several people criticised the recommendations of the IMF, who proposed strict monetary regulation to solve the crisis. An interest rate increase to limit money would have bankrupted heavily indebted large companies en masse and significantly reduced the performance - and exports - of the economy. Of course, foreign capital investors would have opened the door and bought up companies in financing need but with high production capacities cheaply.

Methodology and database

The examination of the twin deficits stands in the center of this paper. The analyzed term was the period between 1995 and 2019 and the 27 current European Union countries were examined. To test the validity of the Polak model, the linkage between public budget surplus/deficit (used as a proxy to the change in internal debt) and the current account surplus/deficit (used as a proxy to the change in external debt) (Süveges, 2019). Because the public deficit can cause inflation and GDP growth respectively, we should neutralize these issues. That is why, both balances (i.e., the public budget balance and the current account balance) were divided by the nominal GDP of the current year.

The Polak model supposes a causality, that the public deficit causes the external deficit, so the independent variable was the public deficit between 1995 and 2018, and the dependent variable was the current account deficit in one year later (i.e., between 1996 and 2019).

The countries were ordered by the strength of correlation and the slope of the regression line was also calculated. The results are in Table 1.

Table 1: Regression statistics between the public deficit and the current account deficit in the European countries

Countries	Correlation	Slope
Greece	0,72	0,31
Czechia	0,72	0,57
Germany	0,72	0,85
Finland	0,71	0,60
Poland	0,68	0,68
Hungary	0,67	1,43
Malta	0,58	0,93
Croatia	0,52	0,24
Ireland	0,48	0,00
France	0,46	0,23
Portugal	0,45	0,13
Netherlands	0,43	0,01
Luxembourg	0,42	0,38
Romania	0,40	-0,22
Lithuania	0,26	0,10

Countries	Correlation	Slope
Belgium	0,26	0,09
Italy	0,25	-0,11
Sweden	0,20	0,30
Slovenia	0,20	-0,24
Slovakia	0,09	-0,01
Austria	0,04	0,55
Bulgaria	0,02	-1,56
Cyprus	0,00	-0,60
Latvia	-0,02	-0,78
Spain	-0,12	-0,62
Estonia	-0,15	-2,13
Denmark	-0,15	-0,35
Average	0,33	0,03
Std. Deviation	0,29	0,74

The countries are grouped into four categories by the strength of the linkage. The first country group (Greece, Czechia, Germany, Finland, Poland and Hungary) have a strong linear linkage between the public budget balance and the current account balance, and the way of linkage is positive. (Kovács et.al, 2020) What links these countries together is the high openness of their economy. The export of goods and services compared to the nominal GDP is very high and the size of industry in GDP is also high compared to the rest of the countries except of Greece. It means that the countries can flexible react on asymmetric shocks, so if there is any austerity measures in the budget, and the money supply falls, the industry is able to export. The flexibility of the economy is measured by the slope of the regression line.

Greece is an exception here. The flexibility is not so good, but the correlation is extremely strong. The reason here is simple. Greece made huge public deficit, which causes high current account deficit without having a competitive industrial capacity.

The next group (Malta, Croatia, Ireland, France, Portugal, Netherlands, Luxembourg, Romania) has a semi-strong connection, but except of Malta the slope of the regression curve is flat and not steep. In case of Romania the slope is even negative. At the first sight nothing common can be considered in this group, but there are here very open and competitive economies like Ireland, Luxembourg and Netherland, France. The competitive economies always have got current account surplus regardless the current state of public deficit. (Pál Zs., 2020) In Malta, Portugal, Romania and Croatia a significant part of population works in abroad and the salary transfer helps maintain the current account in balance.

In the next group which is the most populated group, the linkage between the public deficit and the current account deficit is weak. Generally, the reason is that the size of public balance and current account balance is limited in this group.

There are few countries where even a very weak negative linkage was measured. The reason here, that the public balance is often positive, however the private debt increased especially in Spain and the Baltic countries before the 2008 crisis, which makes the current account balance to negative in this period regardless the public budget surplus. After the 2008 crisis these countries also suffered from the strong twin deficit.

Conclusion

The twin deficit is an existing phenomenon in the European Union. The average correlation coefficient among the European Union countries between 1995 and 2019 is 0,33 which indicates a weak connection. However, the standard deviation is also high which indicates that the countries cannot treat as a homogeneous group.

The Polak model has got the biggest explanation power among those countries who are open and have a strong industrial base. The most competitive members of the EU have semi-strong connections between the public deficit and current account deficit. Those countries where the size of factor yields are significant the linear connection between the internal and external balance is weak.

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Data asset management and representations in a large enterprise environment

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Corporate digitization is one of the most important tasks today. Organizations have already recognized the potential of this. In addition to streamlining operations, digitalisation also has a positive effect on increasing competitiveness. The flexibility and market adaptability of a digital organization is significantly greater than that of a traditional organization. The effects of the transformation are already visible in almost every industry. This process is clearly reflected in the development and transformation of the financial sector over the past few years (Pál, 2020). Banks and financial services created on a purely digital basis have emerged, which already play a significant role in some market segments and are forcing other market participants to take steps to maintain their position (Pintér – Bagó, 2020). This is a huge challenge for traditional players in the sector with a long history, who, although they have been able to record significant results in recent years, are still following a traditional or only partially digitized operating model (Kovacs - Tertak, 2019). The digitalisation process of these actors is significantly influenced by the IT system architecture built over the years, which, while performing day-to-day tasks,

provides stable operation but does not provide the degree of flexibility that digital organizations today have (Narayan, 2020).

One of the direct effects of digital transformation processes is that organizations need more data-driven business solutions that provide companies with a higher degree of automation, more efficient use of resources, and decision support at both the strategic and operational levels. These types of applications create the IT and operational background of digital organizations (Kotorov, 2020).

In contrast to traditional IT solutions, automated operation independent of human intervention has a significantly greater role in these solutions. The data here is not just “descriptive”. Not only do they record the properties or numerical values of the objects in a given process, but they also participate in the management of the process, in evaluation and decision-making tasks without human intervention (Jackson - Carruthers, 2019). In such highly automated digital processes, the importance of data and quality indicators associated with data is increasing. Thus, already at the beginning of the digital transformation, the data, its quality, and the metadata describing the business and technical properties that can be linked to it are centralized.

In the course of its day-to-day corporate operations, a significant amount of transactional and other business-relevant data is generated (Gáspár, 2021) in various IT solutions. Properly managing this, exploiting their values, is an important task regardless of the digitization process. Today, various data mining software play a significant role in everyday practice. The market demand for these solutions is constantly growing. The palette includes solutions such as various report generators, analysts, data miners systems and, more

recently, artificial intelligence components are applied too. The practical success of these solutions is clearly determined by the data management background of the given organization, the accessibility, timely availability and quality of the data (Fisher, 2020).

In summary, data has a central and prominent role in both digital transformation and data exploitation work in the traditional sense. Significant results in these areas can only be achieved through conscious, enterprise-level data asset management. This approach can ensure that data, as an asset capable of producing business results, is at the heart of corporate operations.

First of all, it needs to be clarified what we mean by data management, data asset management. It is an enterprise-level data management function that ensures the quality, integrity, security, and usability of the data collected by an organization (Castanedo, 2017). This process ranges from the actual generation or collection of the data to the time the data was deleted or archived. Throughout this data lifecycle, data management focuses on making data accessible and easily useable for all concerned (actual human users and IT solutions) (Lin, 2014). In addition, it must ensure that data subjects receive a high-quality, integrated picture of the data. Including business and IT definitions of the data, as well as quality indicators for location, up-to-dateness, consistency.

Almost all organizations have negative experiences with the authenticity, purity and usability of the data. In addition to data quality, the criticism extends to IT solutions that implement data management (Redmen, 2008). The key task of data asset management (data management) is to create or restore and continually increase trust in data and data management. Without this, it is inconceivable that

organizations will commit themselves to significant steps in building a data-driven business or digital transformation. Figure 1 summarizes the three strategic aspects of data management, these proper practical implementations are able to keep user confidence high (Eryurek et al. 2021).

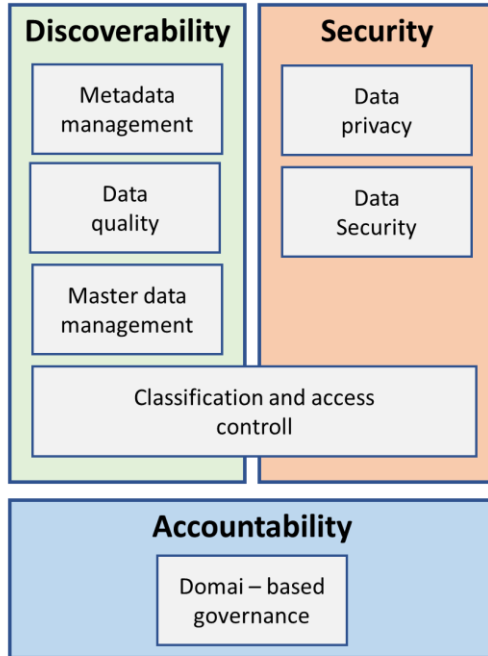


Figure 1. The three strategic aspects of data governance

Discoverability: Data discoverability includes comprehensive metadata and data quality management. Central data repositories are not only involved in establishing the integrity and integrability of data, but also in their classification, evaluation, and access control.

Security: includes all necessary policies, procedures, and physically implemented security solutions.

The above two aspects are already able to create the usability of data as an asset (Eryurek, et al. 2021). In this way, they can be integrated into various data-driven and data-exploitation solutions in a controlled manner.

Accountability: makes the production and use of data measurable and accountable. Each business domain also learns about the key features of using data sets and the resulting costs.

It is typical that even today the organizations do not have a data management and data asset management solution that fully complies with the above aspects. There are also shortcomings in the regulation, functionality and scope of data management. It can be observed that organizations that already implement the metadata management function include only a fraction of the corporate data assets within the scope of the implemented procedures. Ensuring data quality in measuring and data purity can also vary significantly from one data group to another within a given company.

In a large enterprise environment, the physical representation of data assets is typically identified by a data warehouse solution. The schematic structure of the architecture of such a system is presented in Figure 2.

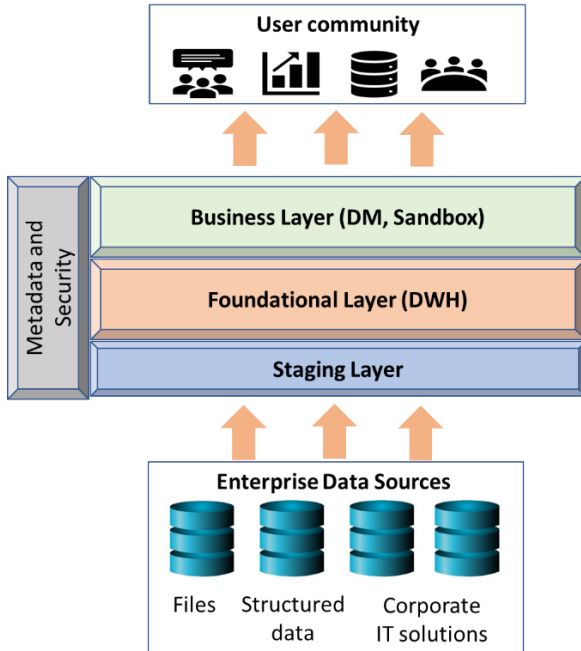


Figure 2. Traditional Data Wareerouse

The construction and application of data warehouse type solutions has a decades-long tradition (Inmon, 2005). Operation according to the above architecture is also capable of collecting and processing detailed large amounts of elementary-level data, as well as generating derived data (Kelly, 1997). The collected data set is updated several times a day or even within a day. These updates mean not only loading newly created data, but also timestamping existing data. This allows you to manage not only static but also time series datasets.

Data access is typically through the Business Layer. Its query-optimized design allows exploit software to connect directly to it. Typical areas of application: pre-generated report and report preparation, management decision support, support of specialized, planning and analytical tasks in the entire vertical of the company, data mining (Kimball – Ross, 2002).

In data warehousing systems, the continuous collection, cleaning, processing, and interconnection of data has created data quality and integrity levels that did not previously exist in other systems. Here, data points supplemented with individual metadata cannot be used from the perspective of an island-specific domain system, but an integrated, consolidated and refined image compiled from a number of integrated data sources. This has significantly changed previous customer and product evaluation options. Demand for the higher value and quality data generated in this way has increased within the company. Thus, the basic functionality of data warehousing solutions should be expanded with data transmission and interface functions, which connected them to the enterprise complex system and interface network. In traditional enterprise operations, this type of data asset management and exploitation functionality has proven successful.

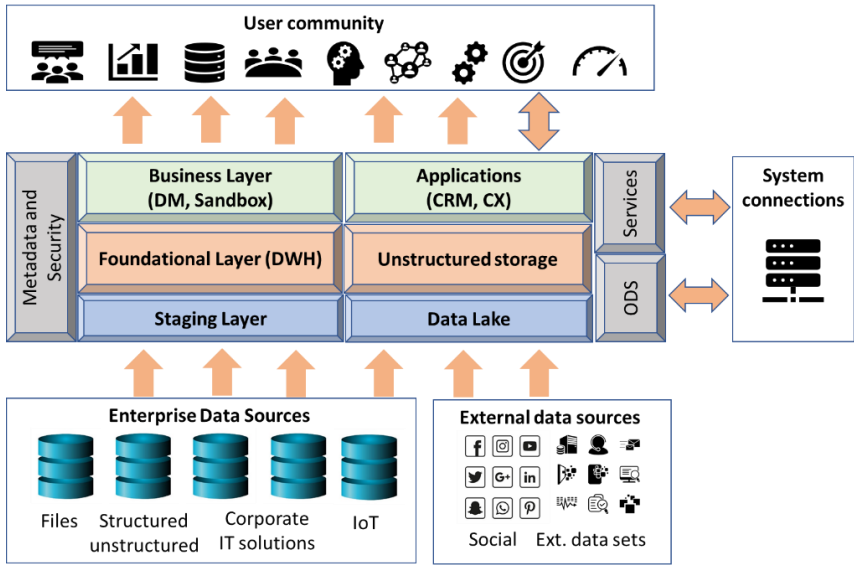


Figure 3. Modern Data Ecosystem

The development of automation and digitization (data-driven) organizational capabilities brings with it the need for data asset systems to handle the widest possible range of data. There is also a need to integrate unstructured data from external sources. In addition to the traditional data warehouse exploitations, the expanded data assets must also be able to be connected to the operative operation of the company through real-time connections and various data and function services. As a further development of the data warehouse architecture, complex enterprise data ecosystems will be developed taking these aspects into account, Figure 3. shows this schematic framework.

Creating such a complex data ecosystem today is not yet part of most companies plans for the near future. Nevertheless, it can be observed that certain components are already unintegrated. The lack of integration or its low degree significantly reduces the usability and profit-generating ability of data assets.

The amount of data generated in the corporate environment is limited and has only content related to corporate activities. This is sufficient in a significant number of cases. On the other hand, in the digital competition environment, there is little to maintain the market position and gain a competitive advantage. It is only possible to move forward here if we can get the fullest possible picture of the customers and their behavior. This goes beyond traditional corporate data sets. The importance of data from external data sources, social media, which are able to give a more complete picture of the customer's behavior, closer to reality, is increasing. The number and variety of data will thus increase drastically. The whole mass of unstructured data is now widely available. Managing, integrating, and leveraging these poses entirely new challenges in data asset management. In addition to the technical aspects, a number of regulatory issues need to be addressed.

Nevertheless, it is clear that competition in the digital space is forcing the emergence and day-to-day use of increasingly complex and extensive data asset management solutions, complex data ecosystems.

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Fundamental risk management in trading stocks

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Introduction

In the past year tens of millions of people started their online career in trading stocks. These retail traders poured the financial markets with an enormous amount of liquidity. In my humble opinion this extra liquidity and enthusiasm helped out markets from the extreme valley experienced in 2020 April and did contribute to the facts that major stock indexes (S&P, NASDAQ) closed at record highs in 2020 December.

I find it quite disturbing that these aspiring traders are completely uninformed, they lack savvy knowledge of how financial markets work. As witnessed recently in the “GameStop game” greed, revenge and credulity characterize most of these people. In fact 80 percent of retail accounts lose money in the markets according to the official risk statement of one of the innovative brokers. Personally, I believe on the longer term this is rather 90 percent and above. Even astute traders don’t realize that the markets are continuously changing, they might be very successful for some time, until the market breathe and conditions change.

Retail traders approach the markets without clear strategy or plan. They believe it is something everyone can do. They easily act on tips from acquaintances, friends, from different news sources and chatrooms. I literally heard one person buying a stock because its

ticker sounded fancy, and he had absolutely no idea what the company behind the ticker was.

Smart traders everywhere

In the title above I used the word „smart”, but what I really meant was that these retail traders use their smart devices (phone, tablet, etc.) to reach out the financial markets. Most of us have seen movies about the stock markets. In these movies they like to show the armada of technology, which is used by professional brokers, traders. This is not exaggeration. A professional trading station consists 6-8 screens, the latest iron with huge amount of memory. Not because we like to have lots of screens, or these traders like to brag. The reason is that the information which must be processed is almost unlimited. It makes our life easier that we don't have to change between workspaces, while we could miss important data on the hidden workspace. This edge is already incomparable to a simple smart phone. To me it is mind-blowing that retail traders think they can ever compete with professional trading firms (Kovács – Terták, 2019).

Still what motivates millions of people to risk their hard-earned money in trading stocks? The brave ones trade such instruments (CFDs, crypto products) which even experienced professionals must take a deep breath before touching them.

My research shows that the reasons behind are:

- Widespread of technological innovation
- Simplification of legal environment
- COVID-19 pandemic

Technological innovation boosted market share of smart phones and tablets in the past decade. Together with telecommunication cornerstones such as 3G, 4G, LTE created the online space in almost every area of our lives. Hard to admit, but nowadays we create and live a part of our life in the digital space, we shop, bank, get information, meet others and play on the Internet. Why wouldn't we invest online? Smart phones and high-speed Internet together created the so called fintech companies which provide financial services without geographical boundaries. These companies (Revolut, EToro, Robin Hood Trading, etc.) expanded their clients base with tens of millions of people in the past 5 years. They completely redesigned banking and trading models. Cheap fee structure together with technical innovation contributed to the success of the fintech sector. They gained incredible market share from traditional banking institutions which were reluctant to employ such measures. Now they start to feel the pain as more and more people turn their heads to fintech companies. (Arslanian – Fischer, 2019).

Certainly, this boost was also supported by the harmonization of the legal environment. In the traditional banking industry, it used to be impossible to open an account without personal appearance and to leave the bank without a stack of paper signed on every page. Online applications and account opening procedures were the key to the success. Practically it takes less than ten minutes to open a fintech brokerage account nowadays. The entire process is paperless, identification is based on selfies taken with smart phones. Afterwards the forms and photos verified against government databases (WEWEGE – THOMSETT, 2019). Right after the account is ready for funding - speed and simplicity is guaranteed.

In my opinion COVID-19 pandemic plays important part in the widespread of fintech brokerage accounts. Fundamental changes in work habits - such as home office - created enormous free time for a lot of people. Government regulations limiting free movement locked people in their homes. The lack of entertainment - such as sport events - affected sport betting and gambling industry negatively as well. All these people were bored and wanted to turn their heads and assets into new directions. The answer was obvious.

I believe the dear reader has known such people (even if not himself/herself), who opened accounts at fintech companies and dabbled in online trading. Most people think trading is a natural ability, everyone can buy or sell “something”, in this case financial instruments without any respective knowledge.

Unfortunately, my survey in my inner circle confirms the statement above. This is the interests of the fintech companies as well. The less educated the clients are the more trades will happen and thus more revenue the fintech companies will generate. On the other hand, no one can be expected to read three-four book before risking his/her own assets.

Fundamental analysis, the mandatory starting point

In the latter part of the article I will describe some basic fundamental ratios, which can provide quick and clear picture about any company. These fundamentals will not assure successful trading decisions, nor they provide any hint or tip which companies to trade. And more complex knowledge of corporate finance will be required to base trading decisions on fundamental analysis (Kovács – Terták, 2019).

In this case what is the sense of knowing these basic fundamentals before placing a trade? In 2020 March due to the widespread of COVID-19 virus world economy collapsed including the rental car market. In short period of time rental car stocks lost 90% of their value. It was obvious that this event was unique and unforeseen. The decrease in stock prices was a result of the panic surrounding the pandemic. Companies enjoyed similar financial health as they had 1-2 months ago. Uncertainty created a panic selling in stocks. Hedge funds and institutions quickly positioned themselves into cash and safe assets.

After the run-down millions of people looked at those bargain stock prices. In the rental car industry most of the players lost over 90% of their market capacity. Hertz Global (HTZ) and AVIS Budget Group (CAR) were two of the most prestigious and solid companies in this field. Based on technical analysis both charts looked promising, at least providing a profit taking rally. Astute traders who took their time to look at and compare the basic fundamental ratios of these companies immediately realized serious ongoing financial problems at Hertz Global, while the financial health of AVIS Budget Group was adequate. In the pandemic situation revenues quickly disappeared, Hertz Global was unable to pay its debts and was forced to file bankruptcy. The stock was liquidated from the primary markets and was moved to the pink sheets. The stock price itself never recovered from the lows. On the other side AVIS Budget Group stock prices gained almost 1000% in short time and by the end of summer 2020 it was back to January levels.

Until the late 90's fundamental analysis ruled financial markets. The world was ticking at a much lower pace, it was unconceivable to get the same amount of information what we have today's. Retail investors

focused on medium and long term. Having real time quotes were the privilege of a few pit traders who actually made the market during trading hours at the exchange. The rest of the world could read the printed reports the next day or even next week in the financial press (Investors' Business Daily, Barron's Weekly Report) (Thomsett, 1998). The widespread of Internet opened financial markets to millions of retail traders. Technological development and increase in computing speed provided calculations and automatization which was impossible before.

Fundamental analysis and corporate finance are complex science. It takes years to learn all nuances and pitfalls. However, I believe that by studying some of the ratios, we can draw a conclusion about the financial health of any company. This will not make us financial analyst and we won't be able to pick growth stocks with high probability (Kovács – Terták, 2019).

In the next paragraphs I will detail the fundamental ratios which in my sole opinion help to create a general picture of any company.

Revenue: is the amount a company receives from selling goods and/or providing services to its customers and clients, often described as **sales** or **service revenues**. Hence, revenue is the amount earned from customers and clients **before subtracting the company's expenses**. It is the most basic indicator. Generally speaking, if the company's revenue is growing then the company itself is growing. However, after a certain period and certain level of revenue the growth rate will become smaller and smaller due to the natural limitation even for the largest multinational companies. (Thomsett, 1998). When we examine the revenue over time, we would like to see that it is growing. Important is the trend.

Net profit margin: compares the sales and the profits. It divides the net profit with the total sales. Net margin is one of those comparative figures that should be steady over time. The more consistent the better. One important characteristic of a well-managed company is the consistent net profit margin. This is especially true if the revenue is growing period after period because in this case the management can cope with the growth problems (Brealey - Myers – Marcu, 2001).

P/E ratio: it is a division between the stock's current price per share and the annual earnings per share of common stock. The ratio shows what the market thinks a dollar of earning worth. In other words, how many years it will take for the company to earn the current value of its shares' price. If the P/E ratio is very low (under 5) then the shares of the company are not interesting for the investors. As a general guidance higher P/E ratio means higher than average growth potential. However higher ratios have to be handled with reservations because the market might assign great importance to future growth, which places a lot of pressure on the management. (Thomsett, 1998). The P/E ratio is a useful indicator because it compares the stock price with the fundamentals. It is imperfect like most ratios, because it is reporting in a stationary manner. When the ratio is fluctuating around the same values over time it is a sign that the market is thinking similarly about the stock. (Brealey - Myers – Marcu, 2001)

Current ratio: measures the company's ability to pay its short-term debt, typically those which due within a year. We can calculate it by dividing the current assets with the current liabilities. It is a very useful ratio because it shows immediately how liquid the company is. Values under 1 signals danger, because the company has little assets (cash,

receivables, inventory) to cover the interest payments. Values over 3 are considered too high because the management is not able to use the assets optimally. In other words, the money is just lying there and not creating any value. Values between 1-3 are generally accepted. (Thomsett, 1998).

Debt to equity ratio: is calculated by dividing the total liabilities by the shareholder equity. It is an important metric; it shows the ability of shareholder equity to cover all the debts. Obviously, a high value means high debt. D/E values around 1 mean a turning point because then the company just have enough assets to pay back its debts, so the creditor has to consider the risk that there is not enough collateral to cover the debts. (Thomsett, 1998).

Return on equity: is a measure of financial performance. It is calculated by dividing the net income by the shareholder equity. It is a measure of profitability in relation to stockholder's equity. In practice it shows how our investment will perform (Brealey - Myers – Marcu, 2001). For the ROE it is more meaningful to use it as a comparison between other companies or sectors.

Now that we have gotten familiar with the above ratios the next step is to know how to use them correctly. Very important to note that these ratios and fundamental analysis as a whole never projects the future. It shows the past and the present status of the company and nothing guarantees that past trends will continue in the future.

Still knowing the past and the present gives us useful insights about the trends and the probability of possible outcomes. It allows us to draw conclusions and to get a general feeling about the company. For example, if the debt is growing from year to year in addition the

revenue decreases then we can assume obscure outlook for the near future (Thomsett, 1998).

It is also very important to examine the indicators as a whole interrelation system. For example a 10% net profit margin is a solid value itself, but if we check back past periods and the value has been decreasing from 20%, then it is definitely a sign to take a deeper look and search for other ratio to understand if and why the profitability is in a downtrend.

But we don't only compare series of historical data with each other, we can extend our research to check how competitors perform and where the company ranks in the sector. Are the ratios below or above industry averages? Important to remark that ratios do not necessarily need to increase all the time. Infinite growth is a false expectation. Even well-managed multinationals will reach their limits at some point. Stability and consistency can be as indulging as growth (Thomsett, 1998).

I have not mention one key concept so far. Managements have vested interest in providing better and better financial data in their reports to make company's stock more and more desirable for investors. In the past we witnessed many cases where the management reported false numbers (for example falsified sales data). Certainly, this is called fraud and yes, these fraudulent data can easily mislead investors.

Companies usually like to cosmetic their numbers between the legal boundaries which are set by accounting laws. General accounting laws and guidelines are so diversified and complex that many interpretations are possible and acceptable. Top executives generally receive part of their payments in out of the money options. These

options will worth a fortune if the stock price rises enough. These opportunities often prompt top managers to manipulate numbers between the legal boundaries to make sure that short-term targets are met (Brealey - Myers – Marcu, 2001).

When we consider the original goal of the article, which is prescreening and decision supporting for possible stocks that we can trade based on our rules, let them be based on technical analysis or anything else. The fundamental data which is freely available on the Internet is more than adequate for the aforementioned goals. I personally use stockanalysis.com, morningstar.com and microtrends.net. These sources are free, and the data is reliable and extensive.

Next we will analyze two companies Hertz Global and Avis Budget Group with the help of the previously detailed ratios and models. We will use fundamental analysis as a decision support tool to favorize trading one company towards the other.

Table 1: Hertz Global

	2019	2018	2017	2016	2015	2014	2013
Revenue (bln \$)	9779	9504	8803	8803	9017	9475	10775
Net profit margin	-0,6%	-2,4%	3,7%	-5,6%	3%	-0,9%	2,8%
Current ratio	1,83	1,61	1,76	1,5	1,86	0,63	-
Debt to equity ratio	10,70	15,39	9,78	12,60	7,81	6,49	6,35
ROE	-4,2%	-20,2%	32,2%	-31,2%	12%	-3,3%	12,6%

Source: own editing using data from microtrends.net

Table 2: Avis Budget Group

	2019	2018	2017	2016	2015	2014	2013
Revenue (bln \$)	9172	9124	8848	8659	8502	8485	7937
Net profit margin	3,3%	1,8%	4,1%	1,9%	3,7%	2,9%	0,2%
Current ratio	0,96	1,27	1,26	1,03	1,08	1,11	1,24
Debt to equity ratio	25,37	33,29	22,37	56,11	28,07	17,16	13,92
ROE	65,3%	37,5%	114,3%	46,4%	58,1%	35,4%	2,2%

Source: own editing using data from mictortrends.net

By comparing the two tables above it is obvious that AVIS Budget Group has more favorable numbers. If we listen to these fundamentals, we have to skip trading Hertz Global because it does not reach our minimum criteria or at least seems way riskier than the other company.

The revenue is trending upward for AVIS Budget Group which is a very positive sign. The growth is equable which is in line with the economic performance of the past years. The revenue is one of the most important indicators because it is a data which is very hard to manipulate. Companies must report sales of goods and income from providing services as they arise. If sales are rising the company is growing. In fact, rising sales are the most consistent method for defining growth. (Thomsett, 1998).

On the other side Hertz Global numbers are not as rosy. Sales are decreasing or at least stagnating in the past 7 years. We could take a deeper look into the numbers but as a prescreening tool we do not need meaningful analysis of the underlying causes. Our goal is to be able to quickly decide if a company is tradable or not.

The second ratio which we have is net profit margin. For Avis Budget Group the margin is positive and consistent over the years. We have learnt before that rising sales together with steady margins characterize solid companies. Hertz's numbers are very controversial. The company failed to make money four out of seven years. Again, we don't need to know the reasons behind maybe it was due to unsuccessful acquisitions, management mistakes but at our level it is not important.

Current ratio shows how well the company can finance its short-term debt. Values are moving in a healthy range for both companies. Hertz Global shows higher stability with the 7 years average over 1,5. Current ratios have equal weight in our verdict.

Debt to equity ratio is high in both tables. I believe it is irrelevant due to industrial standards. Rental car business is strictly tied to leasing industry. Most companies in this sector lease their fleets and this results in high debt ratios. Typically fleets are less than one year old. Whenever a car reaches either the first service date or one year it is being liquidated from the fleet and replaced with a new car. Danger lies in a specific event when these companies are unable to rotate their fleets because the second hand market cannot handle the supply. Thus, the fleet running cost escalates and quickly deteriorates companies' financial health. Any unforeseen and specific event like Covid-19 pandemic creates death spirals which spreads from sector to sector. In this case collapse of second hand market negatively affected fleet rotating speed which left car makers with huge unsold stocks. (Source: Class Wagen Inc. executive interview)

The last ratio is return on equity which is haptic for Hertz Global and steady for Avis Budget Group. Based on this Avis Budget Group is a safer choice.

The above comparison takes a few minutes but provides a clear edge to the trader. If we assume the technical setups of the trading decision to be near equal, then analyzing fundamentals provides support for the investor. The danger in the above example was real because Hertz Global filed for Chapter 11 bankruptcy in May 2020. Whilst the stocks of AVIS Budget Group skyrocketed and gained near 1000% in a few months.

Summary

The example before studied an extreme case. However, for the retail investors who risk their own savings must have minimal knowledge about fundamental analysis and how to apply them. On the U.S. markets we can find almost ten thousand companies which are not required to submit any financial reports, still their stocks are freely traded on popular brokerage platforms. The astute retail investor realizes that any edge is a treasure for him/her. I strongly believe that fundamental analysis is such a tool and I hope by reading this article saved a few fellow investors from making bad trading decisions in the future.

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Banking sector's human performance management

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Antecedent

We see that the modern, big company expectations reached the banking sector, it is necessary to be efficient his work in the same environment, than in other, different organizational structure with a similar profile employee, characteristically in privately-owned companies' case.

The information technology changes, the integrated corporate management systems (ERP) and the introduction of other innovative IT solutions and his spreading the human resources put the role of company into other context inside the organisations. His popularity increases continuously among the companies, since keeping a mirror, makes those characteristics measurable, which ones the single areas may contribute to it fundamentally you are all even to an organisation's optimal function.

The leading companies consider the human informatics solutions supporting their function a strategic key issue. The economic players may not expect special competitive advantage of the application of the module of the integrated corporate management systems like this already on a global level at the same time

This basis expected already the everyday life the support of IT, since ERP the introduction of systems turned into the condition of staying in the competition already. Suitable stook are not at the companies' disposal in all cases despite this to the introduction of the eligible integrated informatics system solutions. This human evaluator is especially true for systems, because the main direction is the administrative support of the mentioned function, the fundamental one many times – GDPR rules tangent – the treatment of data, including related financial informations possibly with the colleague's salary

The corporate management one is related to systems despite economic expectations, the big number of the introduction projects unsuccessful, since the decision process of the initiations setting it off is not prepared properly, the decisions are made in the company's inapposite life cycle you are in time they drag on, the projects exceed the companies' resources being available often because of this. The system it is not possible to entrust introductions to information specialists in the deficiency of organization science knowledge. The software developers abilities specified by the management already only are capable of his forming.

The organizational management is difficult for the business specialists because of his software developers' incognizance at the same time to recognise the opportunities residing in the systems, because of this the companies already ERP systems fight that of introducing. Currently on the market ERP solutions exceeding the complexity of systems significantly turned into available one.

The market-leading big companies already a trend creator they are in a period, which is technology, will yield change, I consider it important one because of this to examine, the state companies the

function change of a human performance evaluator's systems, the future commissioner the role of technologies the border of the informatics and the management science.

The timeliness of the topic

The primary function of the informatics supporting systems was the increase of the organizational efficiency and the cheque of the organisation's function according to the definition of the company management until now. This function focused on the head activity fundamentally. The today's, market and organizational circumstances changing quickly demand the existence of the systems laying the foundations for the corporate informational base at the same time, on a human side, but already not only merely as an administrative supporter.

Control shirt from a viewpoint examining these systems, himself the human resource management it is favoured on the human policy planning, on the cheque of the plans, the economic analysis and it was made of this through reports; with the co-ordination of the human resource management processes and for the organizational claims with the mapping of truth. Here the human resource owes management's efficiency and his efficiency his examination. We measure it and we concretize the expenses of related decisions and his benefits with the human resources

The informatics developments bring a necessary change of view and this the process leads to the increase of the number of the informatics projects with a human concern. To the successful realisation of the projects necessary managerial knowledge does not stand for a provision at most companies, requests exterior advisers' withdrawal

because of this. The suitable data basis to the use of evaluative devices not sufficient the extension of the corporate structure, onto spotlighting the control shirt is according to need and the business aspect system of the control shirt, it is necessary to rethink the organizational information flow and the questions of the organizational coordination along the extensions being based on the informatics systems.

The information base standing for taking action for the companies key issue, the suitable performance indicators (KPI) his compilation. At the same time its question, that actually, which is worthy of indicators, to concentrate and with what kind of relative weight, a question was management exclusively till now. They may call the management's attention to new, organizational opportunities neglected in the ones until now, with the evaluation of the KPI reason standing for taking action for the management and the definition of new, indicators supporting the strategic fruition better

Waiting between the realisation of the necessary action plans and the appearance of the change happening in the performance indicators spoils the organizational answer ability on a large scale. With the help of the integrated informatics systems, the company is able to accelerate on the velocity of the data processing, the necessary informations get more quickly to the decision promoters and the decision makers hereby

The companies' reactivity makes progress in big one opposite new environmental conditions, at the same time important to examine, that the continuous monitoring with a what kind of effect, is onto the human resource. In as much the system spoils the efficiency of the human resource and a surplus generates a mistake it is necessary to

think the application of the systems over the control shirt and according to the aspect systems of the strategic leadership

Can be foretold the not only the consequences of managerial decisions with a human character, including the hidden and expenses arising on long distance. The quantified data of the expenses and the benefits the leadership turns into financial one which can be communicated on a language towards it, furthering the decision making.

The benchmarking and the human control shirt being attached to this not method, but strategic process: integrativ, evaluative thinking and calculation to the judgement of the human policy decisions, affected they his economic and social consequences.

An one like that is device, which helps to accomplish a rational, human resource management sensitive onto expences. On an exact manner definable indices-system we measure the use of the resources with his help for the management, assuring continuous feedback of the changes for the leadership.

Several of his benefits a control shirt appears in the different, related functions on a side, than the forming of the compensatory strategy contributing to the employees' stimulation insuring competitiveness on the labour market, staff number farming, reporting system, the analysis concerning the scope of activities, planning, assessment, you are the trainings, the examination of development opportunities.

The analyses accountancy from a viewpoint necessary, detailed expense profit analyses can be prepared as the compensation of the decentralisation prevailing in the human policy work.

The human resource of which use was made by the organization the basis of the realisation of examinations, his measurement difficulty, the organization contributes to the fact that the human resource is management only on an indirect manner as a so-called supporting activity his value creation processes. Everything measurable, it is necessary to find it to it only the equivalent (gauge) indices.

The benefit of the system like this, his strength, that with a modular construction, his database with employees related everything stores information. Apart from the employee's personal data registrable his qualification, his certificates, his competences, his promotion, his managerial experiences. The system the motivating and on the area of career planning efficiently applicable. His part the competence basis performance evaluator module, which helps it,, but the performance evaluator does not substitute it talk

This module of the system is able to compile suitability and qualification profiles with the help of his results, it is possible to provide their suitable training, but it serves as his basis to unique career planning.

The integration of the human informatics systems used by them, a lot cause a big challenge in a case for the companies the systems, fragmented from each other separated they work. The data are loaded manually, from one of the systems into the other one, filtering, since everybody presupposes that the data were examined at the time of the first getting in already. This does not come true in many cases unfortunately, the wrong data may generate a loud noise in the end use systems because of this.

It with bigger accuracy and better decisions and the strategy adjusting to the market trends better will be able to be formed choosing from more opportunities. With the increase of the single companies' and supply chains' informatics integration, the markets' integration is growing expectedly.

The increase of the integration of the informatics systems contributes to the development of new corporate abilities. The companies to informations companies at which access is not are placed at strong competitive disadvantage and they fall out from the market.

The market dynamics with a type like this lead to the decrease of the market player number of the single industrial branches

Benchmarking techniques

It is possible to measure the organisations', the leaders' working there and inferiors' performance with increasingly more accurate and more subtle methods, techniques, The performance management system his important part the performance for management, which is the leadership one and a managerial science, and one of the youngest branches of abilities. The leaders have to be aware of the benchmarking techniques primarily, since their colleagues have to be valued continuously quasi, as what their own chiefs, all of them all value them continuously though informally the inferiors.

The performance management system between frameworks by agreement, on planned strategic, tactical and operative aims and on levels founding, forward the device of the achievement of particular performances. The performance consists of related qualitative and quantitative elements with the fulfilment of tasks assigned by the result

of a some kind of activity and the organization always. From the viewpoint of the firm the performance management a process, as which the firm's leaders identify it on his row,, the aims are set, what the single characters have to make in order that the company's strategic aims should come true how. Follows from this, that not only the individual one, but it is necessary to aim for increasing the organizational performance.

In our days the performance the part of an increase for a system in which the stimulation and system of allowance, the competence development are connected, and the quality assurance. Not chance, that many people deal with the organisations' performance management inside a company for example: the single sections' leaders, the human resources specialists, and inner and exterior management consultants. A separate section deals with all of the performance management's branches at bigger firms

The Performance Management System as an accurate instrument

Individual assessment of two kinds exists beside each other formally in most organisations, the informal one and the formal one. The informal assessment builds upon the leaders' thoughts, his opinions, since they believe it throughout always, which employee accomplishes it how the expectations. This assessment form but quite subjective, personal contacts, individual cultural tastes, different political views may deform it, to lean on this exclusively so not expedient. This may complement the formal assessment well however, masks a complete system, that his help regularly (particular interval) and systematically, setting an objective standard verifiable the colleagues' efficiency.

The performance management system it is necessary to respond to his fundamental questions at the time of his introduction already, like this not only it, that from a what kind of aim we apply the assessment, but, that who, what, with a what kind of method appreciate, what we consider a performance and how we communicate it.

The judgement of the leaders' and the employees' work is not only included in the more important general aims of the assessment, but serves a basis to the distribution of the salary, serves concerning a basis to the promotion, relocation, a dismissal. The low one and the leaders with tall competence and employees identifies it, values the previous training programs and the previous workforce may authenticate it selection methods, techniques.

His working direct leader made the assessment of the individual performances exclusively quasi through many decades. You are the driving served separately one once two times with the inferiors in a year, and revealed his opinion about the colleague's performance. He confronted the expectations with the real output. The valued employee had an opportunity for the review of his opinion, the presentation of the circumstances naturally, the potential one expected him onto explaining a level.

Although the individual benchmarking happens based on actual index-numbers in most cases, generally cannot be let apart from attention (sure only on a sprint) the so-called one influencing the performance magántényezők – for example illness, close relative's death – neither. It is not allowed to abuse the emotional intelligence requested of the leaders, i mean it is not possible to refer to privacy factors often.

The result of the benchmarking has many consequences. The payment, the bonuses, the professional development one are with being effective in a positive and negative sense among other things and onto the establishment of the promotion opportunities, and onto the performance objective of the next period. The result oriented assessment important feedback for the employee. In as much from a scope of activities which can be measured well is a word, the performance assessment may happen exclusively based on the results, absolutely (for example income from sales), concerned on a relative manner (for example customers/clients' index), you are compared to the requirements even (taking the results of a given time as a starting point).

The evaluative person's definition

A person makes the assessment of the individual performances today mostly (about the new methods, the details comes later), because of this not it doesn't matter, that who is it evaluator. The performance evaluator's selection depends on the aim of the assessment, the type of the conditions of the assessment between a quite complex task, many people, and his valued individual characteristics.

Let the evaluator be person who is able to have the inferior's activity, his behaviour in sight the best possibly, and not only his results, but is aware of his performance in his process. Obvious so, that the evaluator generally the direct superior. This rule is not carved in stone, it is possible to choose it from a number additional solution because of this: the evaluator may be the employee himself (self-evaluation), but may express expert opinion on apart from the organization partner, you are a client being in a contact with the colleague even.

When the leaders and/you are HR a section knows it punctually and communicates it towards the employees, what at the given firm the performance, how it is distributed, and we the good performance, it is necessary to publish the so-called kind criteria of the assessment then.

Certain scopes of activities but cannot be manifested easily the results, the aim is necessary to his achievement in this case behaviours, activities, concerned they the proportion of his incidence worthy to appreciate. It on the other hand, with abilities defined in order for the valued leader or an employee to behave according to the expected ones, habitus (intelligence, preparedness, commitment, stb.) has to take action. Like this with the assessment of the personality tickets can be judged the competence supply of the valued person, him being disposed towards work.

A scope of activities may not be number on his case shuts only one out from among the above assessment kind criteria to apply. It occurs often that the assessment happens based on more, an integrated kind criterion. The management and HR the organisations may choose from more individual benchmarking methods already today as the result of the fast development of a science and practice.

Techniques appreciating the individuals' performance in himself so among other things (descriptor assessment, evaluative scales, stb.), and the comparative techniques (for example ranking). The self-evaluation, the behaviour is applied often basis watch and assessment, the competence basis assessment, it employee and talked over assessment being based on an objective, the 360 degree between the leader feedback and assessment, and the evaluative centres. From among the abundant method and a technical arsenal worthy to emphasize the latter one two.

The 360 degree method

Most many companies apply it in our days, the so-called one 360 degree assessment method, which is quite time-consuming, little imply a subjective element at the same time. His essence it, that a person not only his chief, but all those (you are a part of all those) with who he has a working relationship are valued. For example from the assessment of a sales colleague's activity his chief asks an opinion, you are HR section from the sales department's colleagues, so from the direct colleagues.

An opinion is asked of the companion classes' colleagues likewise (marketing, financial affair, stb.), With who it is in a valued regular contact. but they are not left out the asked his row the exterior contacts (bank administrators, customers, potential magisterial contacts, stb.) neither.

Generally the least ten inner and exterior opinions, assessment are being gathered in from the valued one, and the circle is closing with this (it is called 360 degree because of this). The the direct leader arrived in from assessments then and/you are HR a section compiles the year assessment, which is talked over with the employee. This thorough and rather objective benchmarking technique takes up much time though (on a corporate level particularly), but is worth it, a lot dared laterally appreciates, gives an answer to many questions and practically cannot be corroded. It provides safety, lucidity beside this appreciate for him.

Summary and inferences

The organizational one and strategic KPI laying the foundations for efficiency further the definition of performance indicators being equal to a dimension that human one systems, which ones the assessment, all of them all help it the control shirt tasks. These his help all inferences like that deductible and decision can be prepared, which one the human resources management to the operating of functions, to the planning his part which cannot be released already by today for an organizations.

Summarized so the existence of the suitable information and informational systems, the corporate survival, and will turn into the key issue of market shares in the future, included the human resource management and it from within the assessment of the individual's performance, let it be state even, even private property, since it is necessary to be valid between market circumstances on the suitable manner on the same one.

Two factors are analysed mainly in connection with the corporate performance, the efficiency and the economicalness. From these two factors many other performance indicators can be deduced. His totality provides an organisation's efficiency to the employees' performance, so to the insurance of the efficient function essential the measurement of the single colleagues' performance.

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АСПЕКТИ ФІНАНСОВОЇ ГРАМОТНОСТІ

Матеріали Міжнародної науково-практичної конференції

(Суми, 22–23 березня 2021 року)

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Посилання на матеріали конференції обов'язкові.

Відповідальний за випуск І. В. Тютюнник

Комп'ютерне верстання І. В. Тютюнник

Формат 60×84/16. Ум. друк. арк. 29,86. Обл.-вид. арк. 38,58.

Видавець і виготовлювач

Сумський державний університет,

вул. Римського-Корсакова, 2, м. Суми, 40007

Свідоцтво суб'єкта видавничої справи ДК № 3062 від 17.12.2007.