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Overcoming methodological issues in measuring financial literacy of companies, a proposed measurement model

Éva Kuruczleki

In the past decade, individual and company financial literacy measurement methods went through substantial changes. To investigate factors contributing to financial literacy of both individuals and firms, scholars needed to reach out for new measurement methods other than the traditional knowledge tests widely used previously. This paper provides a synthesis of the most recent studies concerning both individual and company financial literacy regarding the dimensions of financial literacy and methods available for measuring and modelling financial literacy. The results highlight new emerging trends in the assessment: qualitative methods (e. g. interviews and case studies), for getting insight into very special segments of financial literacy, and more elaborate and complex models, such as OLS regression, bivariate and multivariate logit and probit models, which provide effective ways to get a deeper understanding of the interaction of factors forming and determining financial literacy both at the individual at company level. However, even though the toolkit of measuring financial literacy is getting richer and richer, the connection between the individual and firm-level models seem to be nonexistent. This paper proposes a measurement model with the help of which company financial literacy can be measured through the assessment of individuals and their relationship contributing to firm-level financial decisions.

Keywords: financial literacy, assessment, statistical methods

1. Introduction

Financial literacy, even though not being a completely new research area, gained momentum around the 2008 financial crisis. Many were blaming individuals for their inadequate level of financial literacy, making decisions that yielded no future benefits, but gave rise to the crisis. In recent years then focus shifted from the individual to the company level as academics realized that these groups, such as micro–businesses or small and medium enterprises (SMEs), face the same difficulties and the consequences of poor company financial literacy can be such as grave as of individuals.

The content and dimensions of financial literacy depend greatly on whom we try to analyse. We need to distinguish individuals and business entities from each other, as the dimensions of financial literacy are in most cases vary based on the aims of a given target group: even among individuals, different age groups need to face different financial challenges, meaning that the dimensions that are relevant for assessing financial literacy at firm level are also going to be different. Therefore, studies addressing different groups investigated an array of different factors contributing to both individual and company financial literacy using a wide variety of analysis methods, which makes it hard to compare and generalize results.

Many measurement models exist for assessing financial literacy at firm level, and most of these identify firm–level financial literacy with the financial literacy characteristics of the main decision maker. However, we cannot simplify our analyses to the application of individual tests at a business–related setting. Therefore, the main questions of my research are:

- Who are those actors and to what extent they contribute to company–level financial decision–making?
- How can we measure the outcome of company financial decisions?
- How can we link individuals contributing to the decision–making to the outcomes of the financial decisions?

As an attempt to bridge the gap between individual and company level, a proposed measurement model has been created. In the upcoming chapters I first introduce briefly the notion of financial literacy in firm setting and the already existing measurement models and then I attempt to provide a different view of assessing company financial literacy.

2. Defining financial literacy at firm level

Financial literacy as a notion raised many debates even regarding its name, not to mention its content. For both individual and company financial literacy exists an extensive variety of literature defining the notions many different ways, the aims of financial literacy being fairly similar, while the elements and assessed dimensions differing from paper to paper. The most widely adopted definition for both notions come from the OECD (Atkinson–Messy 2012, OECD 2015), but the interpretation of these definitions also differs for each paper using it.

In the case of company financial literacy, a good concept still awaits to be created. The definition of OECD (2015) even though mentions a few dimensions of SME financial literacy, such as knowledge, skills, experience and some key knowledge areas, what it fails to describe is the role of the different agents, such as leaders and subordinates in forming company financial literacy:

> „*SME financial literacy is a combination of* ***knowledge, skills and practice*** *of financial products, concepts, risks and regulatory and legal matters* ***to take the most appropriate finance–related decisions at every stage of SME life – cycle*** *to ensure further business development, growth and profit generation of the firm*" (OECD 2015, p. 11)

In recent years many surveys were published related to the financial literacy of either micro–entrepreneurs or small and medium size enterprises. One regularly appearing aim of these studies is to map the competences of companies in handling different financial issues and recovering their strengths and weaknesses in order to formulate training programs or recommendations on how to improve these faults. Another very common aim of these studies is to assess the effect of financial literacy on financial growth or firm success (in some cases equating these two terms, see

Abebe–Tekle–Mano 2018, Dahmen–Rodríguez 2014, Drexler–Fischer–Schoar 2010, Eresia–Eke–Raath 2013, Fatoki 2014, Hakim–Oktavianti–Gunarta 2018, Limpek–Kosztopulosz–Balogh 2016, Sucuahi 2013). In general, these studies succeed at determining if financial literacy has an effect on firm performance (the common answer is that it does, higher financial literacy levels contributing to higher performance and greater success).

Another similarity of these studies is the emphasized role of education and training in improving financial literacy, and as well many claim basic mathematical skills should not be ignored either (Brown–Saunders–Beresford 2006, Dahmen–Rodríguez 2014). Even though the results are mixed concerning what and how needs to be taught, the consensus is that financial literacy can be improved through training and that companies usually ignore the importance of continuous learning and development. Financial literacy of firms, beyond general and financial knowledge or education, can be affected by various other factors, as a few example, culture or trust towards company actors or even the use of technology at the company, as summarized in *Table 1.*

Table 1 Dimensions and determinants of company financial literacy

Study	Dimensions/determinants of financial literacy
Agyei (2018)	culture, religion, company governance, savings, investment
Brown–Saunders–Beresford (2006)	perceptions of financial awareness and literacy, business knowledge (e.g. finances, accounting, planning, sales, marketing etc.), financial education/training, confidence in own personal skills, basic literacy
Dahmen–Rodríguez (2014)	quantitative literacy, business management, general business practices, marketing, sales and revenues, business products and/or services, competition, inventory, accounting practices, employee policies and procedures
Eresia-Eke–Raath (2013)	perceived knowledge, financial training/education, records kept at the company
Fatoki (2014)	financial planning, book–keeping, understanding of funding sources, business terminology, finance and information skills, use of technology, risk–management (insurance)
Hakim–Oktavianti–Gunarta (2018)	SME age, age, gender and education of main decision–maker, credit access
Ország–Kosztopulosz–Kovács (2015)	*Remund* (2010) dimensions, trust towards company actors, information sources, family and company assets
Sucuahi (2013)	record keeping, savings, budgeting, financing

Source: own editing

Financial literacy at firm level is slightly more difficult to describe and, in many cases, relies heavily on individual characteristics. Studies concerning micro–businesses showed that the smaller the business the more it can be described by individual financial literacy, and financial literacy of these entrepreneurs can be improved the same way as of individuals, through any financial training (Abebe–Tekle–Mano 2018, Drexler–Fischer–Schoar 2010, Fatoki 2014, Sucuahi 2013).

The above summary of *Table 1* shows it well that firm level financial literacy thus is based on individual characteristics and financial literacy of its agents and is

expanded with a wide range of business–specific notions, such as accounting, marketing, technology usage or even employee policies. Therefore, even though one might think that company financial literacy might be a notion even more complex and hard to define, we might regard it as an extension of individual financial literacy: at firm level, personal characteristics of company agents and business related knowledge and experience form company financial literacy together.

2.1. Financial decision–making in the company

One major comment regarding the original model –as later described– was that financial literacy as the independent variable of the model was not clearly defined. Financial literacy as such –as seen in the above chapter– embodies many elements, knowledge, skills, attitudes, behaviour, thus both cognitive and emotional elements, some of which are easier to measure and some are not. However in this chapter I would like to take a look at another element of financial literacy, which often gets forgotten by those adopting the OECD definition of SME financial literacy which is the notion of taking „*the most appropriate finance–related decisions at every stage of SME life–cycle*" (OECD 2015, p. 11). Financial decision making process is something I have included among my research questions, however, never took a look at how the process of financial decision making really works.

Financial decision–making has been in the spotlight for many decades, even before financial literacy has been, as sound financial decisions can influence competitiveness, sustainability and profitability of any company. As Buchanan–O'Connell (2006) and recently Szántó–Zoltayné (2019) described it in detail, the study of decision–making dates back to way earlier than economics itself, and is an interdisciplinary field including ethics and philosophy, economics, statistics and mathematics, psychology and sociology as well. Studies focusing more on the economics point of view of decision making usually try to address questions such as *what makes a good decision* or *how rational decision–making processes look like*? Apart from that, essential elements of the study of economic decision–making are multi–dimensional (or multi–criteria) decisions, risks and uncertainties, as one important aspect of decisions is mitigating risks and facing future uncertainties (Szántó–Zoltayné 2019).

Buchanan–O'Connell (2006) in their study distinguishes between two main types of decision–making: one based on deliberation and gut decision–making. The latter occurs when decision–makers are faced with urgent decision–making situations, with little information provided and no precedents known, usually in crisis situations:

> "*Gut decisions testify to the confidence of the decision maker, an invaluable trait in a leader. Gut decisions are made in moments of crisis when there is no time to weigh arguments and calculate the probability of every outcome. They are made in situations where there is no precedent and consequently little evidence*" (Buchanan–O'Connell 2006, p. 39).

Gut decision–making happens in unexpected situations and is generally unpredictable. Some support it while others argue against it. Because of its unpredictable nature, most studies do not focus on it but on deliberation–based

decision–making which roots from the theory of rational behaviour (Buchanan–O'Connell 2006). According to mainstream economic theory, individuals act so that they satisfy their needs and make optimal (or suboptimal) choices along their preferences. In mainstream theory decisions are only and exclusively influenced by our preferences and individuals always seek to maximize their utility and always make optimal choices. Behavioural economics challenge the rational human's image, claiming that human decisions are by far not made along optimization criteria and through lengthy deliberation, as human beings face several cognitive and other limitations, such as the lack of time, information of knowledge to make any rational decisions. On the contrary, even though in most cases humans try to optimize, these decisions are only boundedly rational and even though they seem to be a purely rational and optimal decision along certain circumstances, they are rather suboptimal decisions, as argued by such psychologists and economists as Simon (bounded rationality), Gigerenzer (heuristics, bounded rationality) or Kahneman and Tversky (prospect theory).

The image of the rational human has been dominating mainstream economics for hundreds of years and the appearance of behavioural economics is assumed to be the invention of the second part of the XXth century. It is in fact true that the majority of papers studying the behavioural aspects of decision–making appeared after Simon's 1960 resurgence of the study of human behaviour as a contributor to decision–making, however, even the earliest economists like Adam Smith or John Maynard Keynes acknowledged that emotions or psychological factors both have a prominent role in explaining the outcomes of economic decisions (Szántó 2011). Hence behavioural economics have made their way into the study of decision–making and provide useful help in understanding how and why financial decisions are made at not only individual, but company level as well (McFall 2015).

Swami (2013) provides an overview of decision–making in company setting with special focus on managerial functions. As described by the paper, decision making is part of the executive functions of a company leader together with information processing (working memory and recall), motivation (self–motivation), emotional control, leadership (controlling one's behaviour), complex problem solving, thinking ahead, planning and monitoring. Decision–making, as defined by Swami (2013), "*refers to the mental (or cognitive) process of selecting a logical choice from the available options. In other words, it implies assessing and choosing among several competing alternatives"* (Swami 2013, p. 204). The paper describes many errors and biases in managerial decision–making and the use of heuristics such as the rule of thumb as common practice (and common source of error in decision–making) and as well sorts the four main practical aspects of executive decision–making, which can contribute to sound business–related decision–making, and which are the following:

- Intuition: similar to the above introduced "*gut feeling*", intuition–based decision–making can yield excellent outcomes if the decision–maker has enough professional experience and expertise, however can be greatly distorted by external factors (i. e. to make the same intuitive decision again, circumstances should be identical, which are usually not)

- Rules: when companies follow a pre–defined set of rules, they can make generally more accurate decisions than if they were following their intuitions. Both intuitions and rules are fast and easy to use when a decision–making situation arises, however if circumstances change, rules need to be updated, otherwise the decisions won't be that accurate anymore.
- Importance weighting: is a less intuitive but more analytical tool to use when making decisions. After identifying the most important factors (criteria) of a decision, their relative importance needs to be weighted, then alternatives can be evaluated along these pre–defined criteria. However, as a shortcoming of the importance weighting model, we can never be free of biases as the relative importance of each factor might be different for decision–makers.
- Value analysis: is a complex and realistic way of deliberation, when analysing the value of possible outcomes, analysis is done along multiple criteria and is less based on personal impressions of the decision–maker but on an outcome's value added. Value analysis ultimately leads us closer to what is called an optimization problem in economics (Swami 2013).

According to Swami (2013) then these four methods are generally used when making executive decisions at a company, including financial decisions as well. Linking these findings to the definition of financial literacy and what is the aim of financial literacy (contributing to sound financial decisions) we can easily acknowledge that the above techniques are similar to the elements of financial literacy: skills and knowledge are needed to conduct more elaborate deliberation methods, while attitudinal and behavioural elements play a greater part in intuitive decision–making.

2.2. Prior measurement models for measuring financial literacy at firm level

Financial literacy at firm level, as the previous chapters have introduced, can be approached from several different aspects, concerning either individual or firm characteristics, knowledge, skills, behaviour or specific topics. These different approaches require different measurement models. The toolkit for measuring financial literacy has grown greatly in the past decade, and focus shifted from simple knowledge tests to more intricate models using which even the effect of nominal variables (such as gender or attitudes) could be considered. However, these studies focus only at some sub–groups of the population or certain sized businesses and are not applied widely.

The most used methods for measuring financial literacy –or in most cases only financial knowledge of the respondents– are surveys and questionnaires that solely contain knowledge test questions, for which two attributes are available: correct or incorrect answer. Assessments carried out by OECD and Standard and Poor's Global FinLit Survey set a minimum amount of correct answers that respondents have to reach to identify them as having "good" or "high" level of financial literacy (see e.g. Klapper–Lusardi–van Oudheusden 2015), the former dividing the assessment to three key areas: financial knowledge, behaviour and attitude. The Standard and Poor's assessment, however, chose a much simpler methodology: the questionnaire

respondents had to fill in was rather short, comprising of four topics (risk diversification, inflation, basic financial concepts and compound interest) and one question for each topic, two for compound interest. Researchers set the minimal required level to 3 correctly answered questions out of five. In my opinion, it is not possible to deduce someone's financial literacy level with the help of such a short questionnaire but is neither useful to go towards the other extreme and embody several areas and dozens of questions.

At the very beginning, when turning towards business entities, assessing sole entrepreneurs and self–employed seemed a safe option, as in their case, personal and business assets were not really separated and as long as decisions are made by one person, financial literacy could be measured using more or less the same methods as for individuals. Studies assessing African micro–businesses and small enterprises used the above mentioned descriptive methods, complemented with rather simple hypothesis testing to assess financial literacy levels and found high levels of financial illiteracy, which had a seemingly negative effect on firm profitability and business growth (Eresia-Eke–Raath 2013, Fatoki 2014). Assessment became more complicated with larger companies where the original models that focus on one person could not be used, therefore, descriptive methods and knowledge tests could not be used anymore as the only methods to assess financial literacy, that gave rise to new, more polished assessments, which, even though are much complicated that the simple knowledge test, still utilize these methods to some degree, by using e.g. a simple knowledge test to determine financial knowledge levels.

With the appearance and spread of more sophisticated measurement and analysis methods financial literacy assessment became more refined as well. Even though most studies still use simple descriptive statistics methods or count the number or share of correctly answered knowledge test questions, some experimented with using inferential statistics and more complex modelling methods, such as OLS or logit regression models, ANOVA and ANCOVA, crosstabs analysis, rank correlation or even principal component analysis, just mentioning a few examples, without the need for completion. One might mistakenly assume that these methods only exist because of the rapid development of today's information technology, however there are a few earlier studies that employed e.g. clustering and bivariate probit models already at the end of the previous century (Alexander–Jones–Nigro 1997).

These methods generally aim at finding the most important determinants of financial literacy and use it as a dependent variable along with such explanatory variables as demographic variables, financial knowledge scores or even cultural determinants. *Table 2* contains a summary on the most commonly used methods. Correlation, analysis of variances and some Chi–Square test are generally used to uncover the relationship of pairs of variables, however, regression models are more widely used as they are not only able to show whether a significant relationship is prevalent between variables but can also describe causal relationships and can handle multiple variables in one model.

What immediately catches the eye on *Table 2* is the high number of studies using OLS regression: 17 studies in the below table utilised some sort of an OLS regression to analyze which factors influence financial literacy or to study the effect

of financial literacy on other factors, such as financial well–being (Bannier–Schwarz 2018) or business success (Limpek–Kosztopulosz–Balogh 2016). OLS regression is undeniably a popular method to use, thanks to it being easy to use and interpret, and its ability to cope with dummy variables which can account for such demographic variables as gender, education, employment status, or even cultural factors, such as religion (Brown–Henchoz–Spycher 2018).

Table 2 Analysis methods for assessing financial literacy

Study	**Analysis methods**
Abebe–Tekle–Mano (2018)	OLS regression, ANCOVA
Agyei (2018)	OLS regression, logit regression, ANOVA
Alexander–Jones–Nigro (1997)	bivariate probit model, clustering
Ali et al. (2018)	correlation, OLS regression
Bannier–Schwarz (2018)	OLS regression, principal component analysis
Bianchi (2018)	OLS and IV regression
Brent–Ward (2018)	OLS regression, logit regression (mixed, latent class, generalized multinomial)
Brown–Henchoz–Spycher (2018)	OLS regression, correlation
Carraher–Van Auken (2013)	OLS regression, correlation, logit regression
Drexler–Fischer–Schoar (2010)	descriptive statistics, OLS regression
Hakim–Oktavianti–Gunarta (2018)	descriptive statistics, OLS regression
Henager–Cude (2016)	ordered logistic regression
Hsiao–Tsai (2018)	OLS regression, principal component analysis, bivariate probit regression
Huzdik–Béres–Németh (2014)	Chi–Square test, ANOVA, t–test
Karakurum-Ozdemir–Kokkizil–Uysal (2018)	OLS regression
Koropp et al. (2014)	ANOVA, correlation, structural equation modelling
Limpek–Kosztopulosz–Balogh (2016)	descriptive statistics, Chi–Square tests, correlation, hypothesis testing, principal component analysis
Luksander et al. (2014)	OLS regression, ANOVA, correlation
Lusardi–Mitchell (2011)	multivariate probit
Lusardi–Tufano (2015)	clustering, multinomial logit analysis
Lyons–Rachlis–Scherpf (2007)	descriptive statistics, quantile regression, OLS regression
Romano–Tanewski–Smyrnios (2000)	principal component analysis, structural equation modelling
Sarpong-Danquah et al. (2018)	descriptive statistics, Chi–Square test
Servon–Kaestner (2008)	OLS regression *(and content analysis for the qualitative part)*
Stolper (2018)	logistic regression (probit, Tobit model)
Sucuahi (2013)	descriptive statistics, OLS regression
Ward–Lynch (2018)	dyadic–factors regression, OLS regression, factor analysis
Wise (2013)	principal component analysis, structural equation modelling
Ye–Kulathunga (2019)	principal component analysis, structural equation modelling

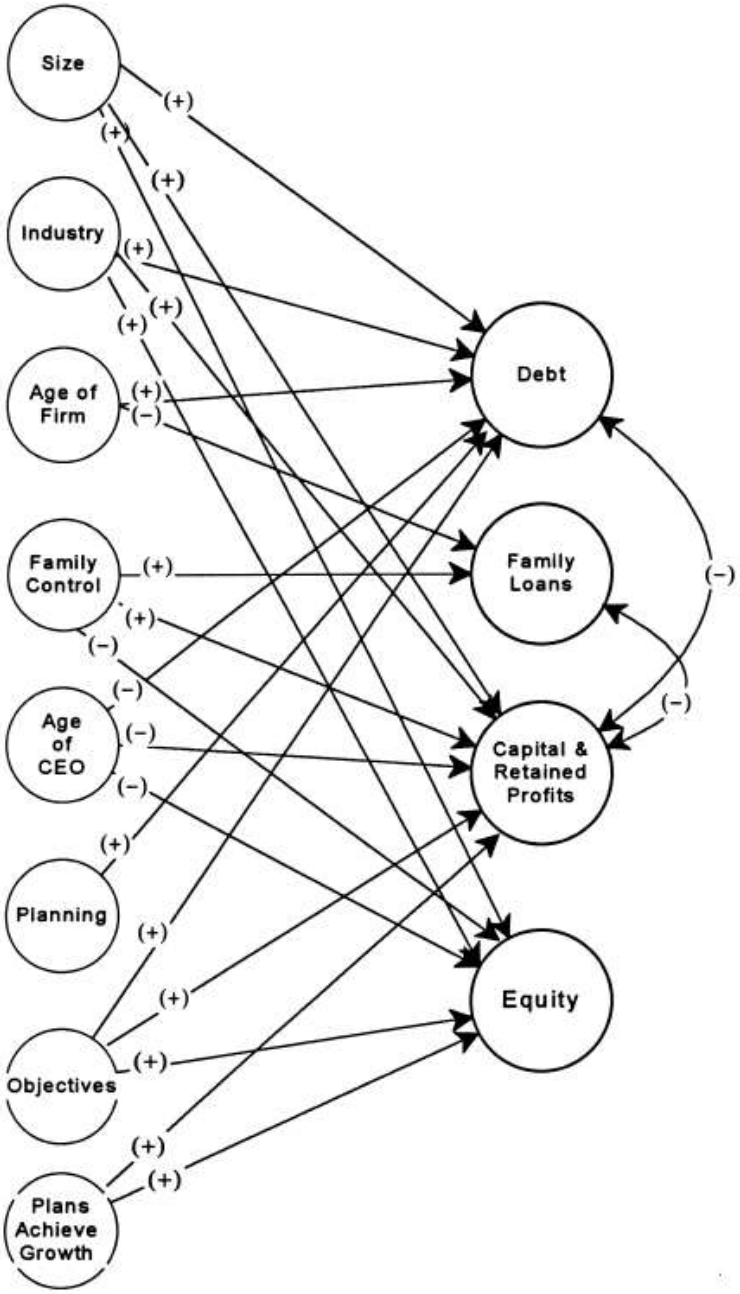
Source: own editing

Apart from OLS regression, logistic regression models are also quite popular among academics in this field. Logit and probit models have that advantage over OLS regression models that the dependent and independent variables in the models need not be solely metric or dummy variables but can be categorical variables as well. These models can be used to e.g. categorize individuals to a specific level of financial literacy as a function of their multivariate demographic characteristics, like educational attainment level, marital status or even profession (Hsiao–Tsai 2018) or to assess financial planning behaviour of elderly US citizens as a function of financial literacy dimensions and demographic variables (Lusardi–Mitchell 2011).

Another method which served as inspiration for formulating my own proposed model is the application of principal component analysis and then building a structural equation model using the obtained components. Many studies (e.g. Romano–Tanewski–Smyrnios 2000, Wise 2013, Koropp et al. 2014 or Ye–Kulathunga 2019) have applied this methodology to assess the effect of financial literacy on firm outcomes. The earliest study of the above, by Romano–Tanewski–Smyrnios (2000) was sought to examine financial decision–making processes, financial antecedents and outcomes in Australian family businesses and even though does not refer to the assessment of financial literacy explicitly, its aim is similar to what has already been explained by the OECD definition as the goal of financial literacy, namely sound capital structure decision–making.

As the authors explained it well, the study went *"beyond traditional finance paradigms by incorporating elements from divergent perspectives, including family businesses, finance, economics and management"* (Romano–Tanewski–Smyrnios 2000, p. 295) to explore how decisions are made at firm level. The model also included such parameters as the size and age of the firm, the industry it is operating in, objectives of the firm and whether it is planning to achieve growth or not. Their measurement model can be seen on Figure 1, the signs indicate the hypothesized relationship between the elements of the elements, e.g. plans to achieve further growth correlates positively with equity, hence firms planning to achieve growth are more likely to have more equity. This study proposes an excellent example on what methodology to follow, however what might make it unlikely to be used in the setting of my research is the fact that the input for building the model was a 250–item questionnaire, which is not likely to yield a huge response rate (neither did their survey, the response rate of that study has been around 29% of the 5000 item random sample they addressed the questionnaire at).

Figure 1 Model for family business financial decision making by Romano–Tanewski–Smyrnios (2000)



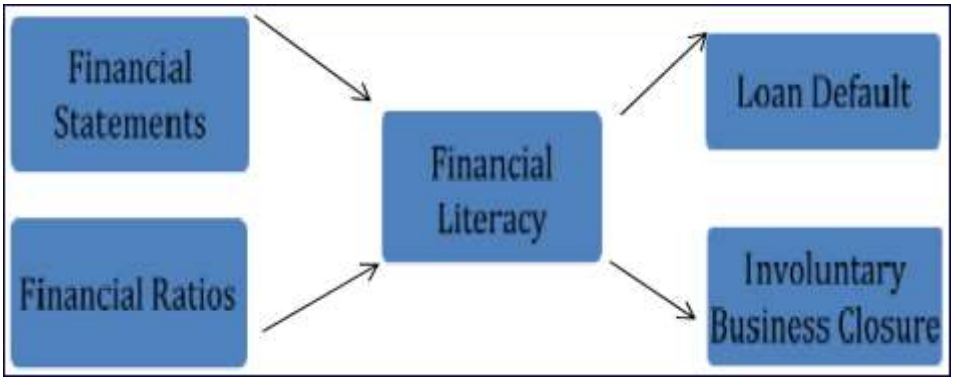
Source: Romano–Tanewski–Smyrnios 2000, p. 296.

The second example for the application of structural equation modelling is by *Wise* (2013). The paper assesses the effect of financial literacy on the survival of new ventures founded by young Canadian entrepreneurs and proposes a financial literacy framework (see *Figure 2*). According to their model

> "*an increase in an entrepreneur's familiarity with financial statements financial and ratios leads to an increase in financial literacy. An increase in financial literacy leads to less loan default and less involuntary business closure. Defaulting on a loan is impacts the chance that the entrepreneur will have to close the business*." (Wise 2013, p. 32)

The paper investigated financial literacy of young entrepreneurs taking part in a microcredit program using a questionnaire which consisted of questions about the respondents' financial knowledge, and their use of financial statements and ratios and whether they repaid the obtained microcredit and whether they had to close down the business following the credit program. The results of the structural equation modelling confirmed a positive relationship between the elements of the model, thus an increase in the use of financial statements and ratios (which indirectly indicates a more positive attitude by the entrepreneurs and an increase in their financial knowledge as well) leads to better financial literacy levels and better chance in repaying the loan, and as expected, in a less likely occurrence in having to close down the business.

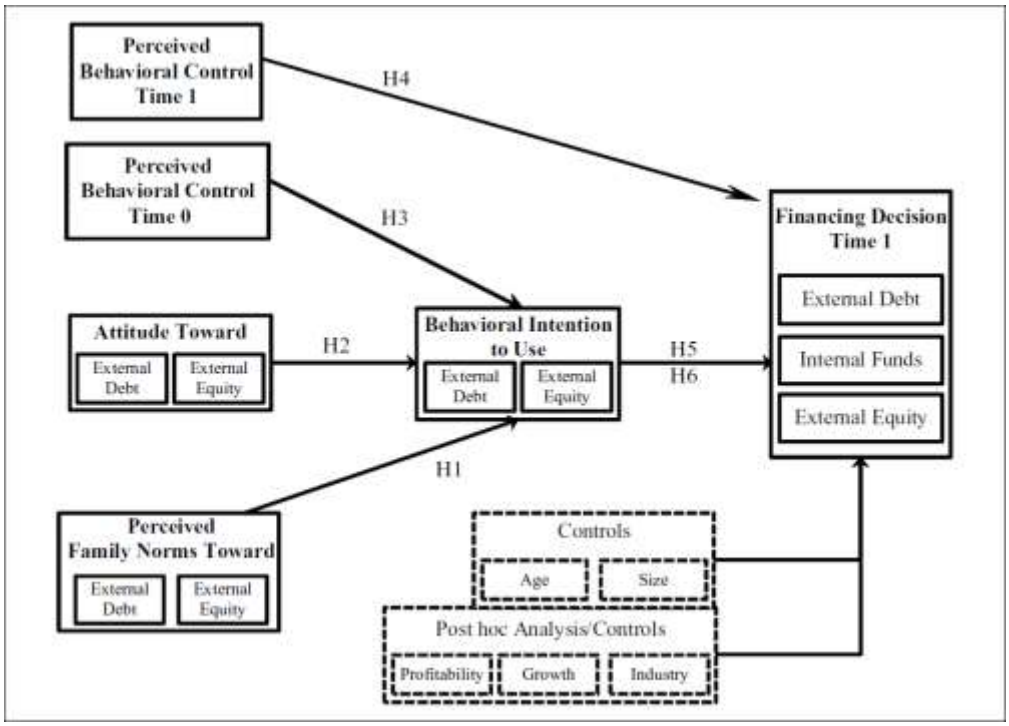
Figure 2 Proposed financial literacy model by Wise (2013)



Source: Wise 2013, p. 32

The third paper using structural equation modelling introduced here is fairly similar to the first paper as it focuses on family firms as well. The paper by Koropp et al. (2014) is applying the theory of planned behaviour to assess financial decisions of German firms. The aim of the study is to prove that financial decisions at firm level are largely affected by family norms, behavioural elements, attitudes and intentions and are not based entirely on the business perspectives. The input to the study has been again a questionnaire, however in this survey items were mostly measured in a Likert–scale to indicate whether respondents more agreed or more disagreed with given statements. The resulting model consists of much more elements than the previously introduced study, as it can be seen on *Figure 3*.

Figure 3 Model of financial decision making in family firms by Koropp et al. (2014)

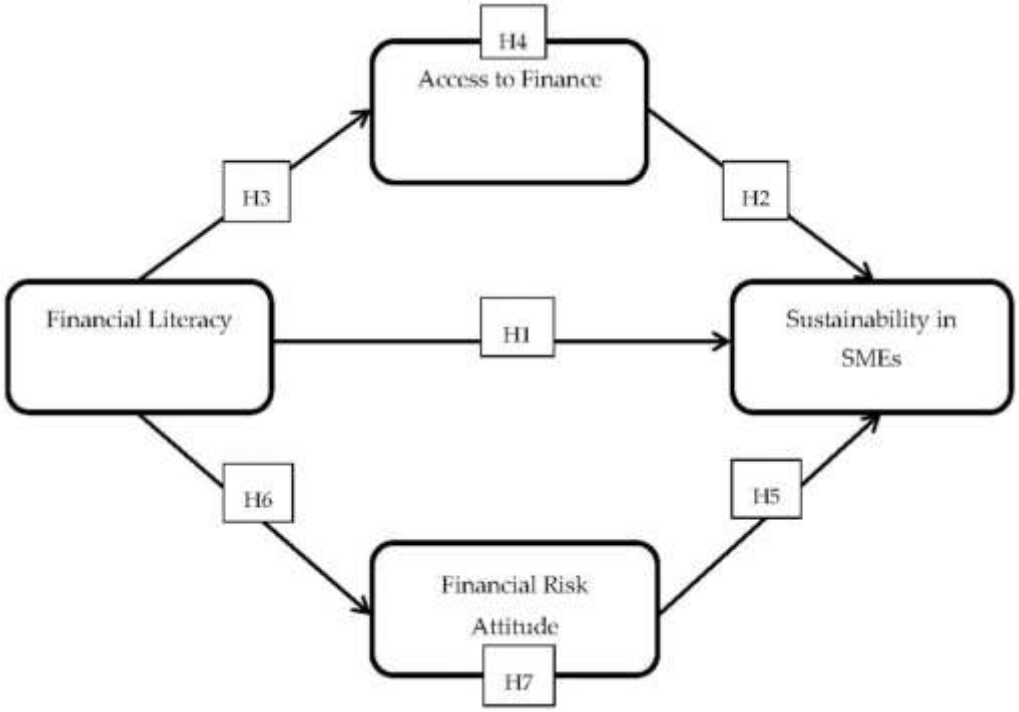


Source: Koropp et al. 2014, p. 310.

The elements of this model resembles the closest the above explained OECD (2015) definition as it embodies attitudes and behavioural elements in the model and as well has some links to behavioural economics as well, as one important element of the model is perceived family norms, which are nonetheless the most important elements of the planned behaviour theory as well, stating that agents might be more likely to make a certain financial decision of family norms are in support of that decision, otherwise less likely (Wise 2013).

The fourth and most recent example for the application of SEM models in assessing financial literacy is by Ye–Kulathunga (2019) and assesses the effect of financial literacy on the sustainability of Sri Lankan small and medium enterprises. The model is built from 4 main elements whose relationship is then analysed: financial literacy, access to finance, financial risk attitude and sustainability (see *Figure 4*). Financial literacy acts as the starting point of the model and is expected to have a positive effect on each elements of the model, hence the development of financial literacy (again similarly to almost all previous models) is expected to improve the chances of the firm. Each elements of the model are measured along several Likert–scale items which serve as the input variables for the latent variables of the model following a confirmatory factor analysis. This model is fairly similar to the model I am about to employ in my own research, however this model targets only one agent of the companies, the chief financial officers, as this study assumes that CFO's are the most involved in SME–level financial decision making.

Figure 4 Conceptual framework of financial literacy on sustainability by Ye–Kulathunga (2011)



Source: Ye–Kulathunga 2011, p. 7.

The results of the study underpin the positive effect of financial literacy on firm sustainability, which might impose that this model could be useful when applied to assess financial decision outcomes (assuming that more financially literate firms make better financial decisions). However, as this model only focuses on one agent of the firm, the application of this model might jeopardize my aim of discovering whom and to what extent can influence financial decision–making.

We can conclude that financial literacy research has evolved greatly in the past decade, and the trends show that scholars turned from simple descriptive methods to such model that are capable of a deeper analysis of financial literacy and its interactions with either individual or company traits. Financial literacy research today possesses a very rich toolkit; however, the introduced papers all focus on different societal or geographical sub–groups, therefore their findings can not be generalized and gives room for further analyses to be carried out. One major problem with this rich selection of available methodology, which has always made the comparison of results problematic, is the lack of harmonization between the methods, which is also a question and a problem to be solved in the future.

3. Planned measurement model for measuring company financial literacy

The first and most important shortcoming of models measuring financial literacy is that financial literacy as a notion itself is not defined. If I am about to run a PLS model, I would need to have indicators to describe the latent variable of financial literacy, without it the model would not be able to run. As explained above, the target of financial literacy is that companies should be able to make underpinned and sound financial decisions from which the firm can benefit.

Another main problem with financial literacy measurement models is that many models are expected to address the surveys at several agents of each surveyed companies. Can we really ensure that the survey will be answered by the proper person? Even when someone addresses a survey at just the main decision–maker of a company, one can not be sure that the main decision maker themselves will answer the questions, not to mention if someone is about to ask several agents of the company. Another limitation or boundary of these models is that even if we can ensure that the proper person will answer the questions, how can we find these persons, do companies even have all the roles separated (as it is quite common for SMEs for just a few persons possessing many roles at the same time) and if so, how can we know personally whom to address the questionnaire at? Such analysis therefore not only poses GDPR concerns but faces other limitations as well. This leads us to an important modification in the empirical study: should we really ask several agents, or should we just address the major financial decision–maker of the company? Because of these concerns I now find it more feasible to address the questionnaire at just one decision–maker, like all the other SEM–based measurement models did (Romano–Tanewski–Smyrnios 2000, Wise 2013, Koropp et al. 2014, Ye–Kulathunga 2019)

The earlier chapters introduced models that applied the PLS SEM methodology in their analyses. From these I want to highlight the study by Ye–Kulathunga (2011) as this study resembles the most what I would like to achieve in my research as well. The model is rather simple, the input variables consist of Likert–scale items and financial literacy is measured along a previously validated set of items, meaning that this subset of questions could be applied in the setting of my analysis as well. The statements used by Ye–Kulathunga (2011) in their analysis were the following, the respondents had to answer that on a scale of 1 (strongly disagree) to 5 (strongly agree) how much their companies comply with the following statements:

- "*We have the ability to analyze our financial performance periodically.*
- *My firm prepares monthly income statements.*
- *I have received training on book–keeping.*
- *My firm has bought formal insurance for our business.*
- *The management of this firm can compute the cost of its loan capital.*
- *My firm has a savings account.*
- *The entrepreneur can prepare basic accounting books.*
- *The firm is aware of the required documents to get a loan from a bank in order to fulfil our financial needs.*
- *I am aware of the costs and benefits of accessing credit.*

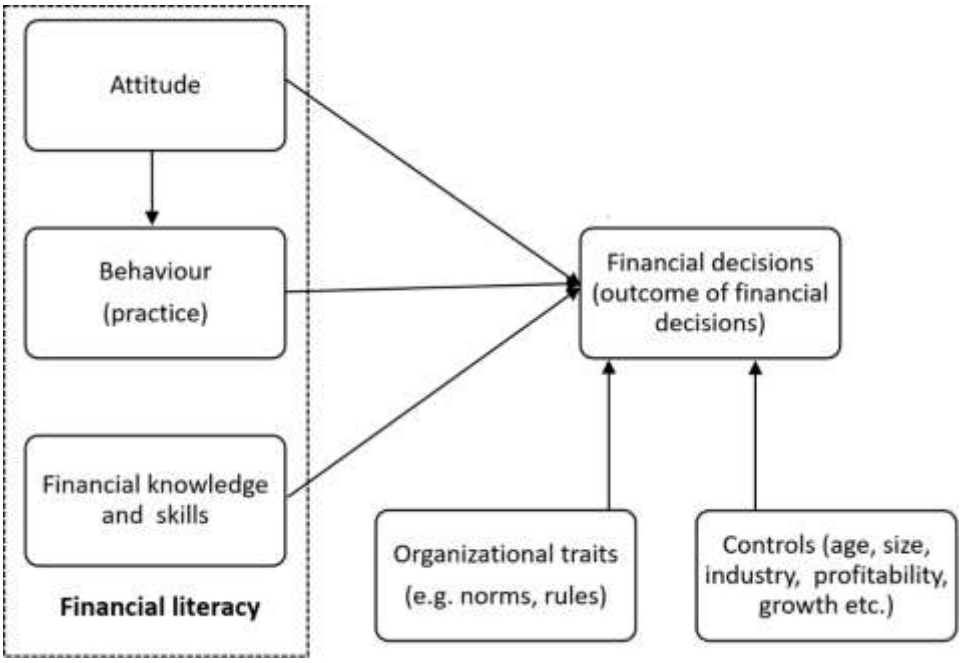
- *The firm is able to calculate interest rates and loan payments correctly.*
- *We have the skills required to assess the financial outlook for the firm.*
- *We have skills for minimizing losses by minimizing bad debts.*
- *The managers of this business have basic accounting knowledge.*" (Ye–Kulathunga 2011, p. 10)

The above statements even though not provide measures of actual knowledge (only about perceived knowledge), with simple modifications and the addition of question from earlier analyses (e.g. OECD 2015), actual knowledge (even though with the simplification of including only of the main decision maker or financial decision maker of the company) could be included in the measurement model as well.

Many models simplify their analyses by making the assumptions that agents of a company are "*just humans*" by themselves, therefore individual financial literacy measurement tools can be used to assess their financial literacy in company setting. Even though agents contributing to financial decisions are indeed "*just humans*", their financial literacy in the firm setting can not and should not be measured along individual dimensions, as employees and owners of companies are behaving and deciding differently when it comes to their everyday finances or company financial issues, not to mention their different motivations in both settings. As it is evident from the assessment of family firms (see above), sometimes individual traits can influence firm level decisions, however we can not generalize this for all companies. Such dimensions as attitudes, behaviour, norms –as seen before– can and therefore should be included in the measurement model, but not necessarily that way as introduced in the proposed model. To overcome this contradiction between individual traits and company norm, I am suggesting the introduction of the latent variable called company traits which could be measured along similar Likert–scale questions as for the financial literacy element. Attitudes are expected to influence behaviours and as well both are –following the OECD (2015) definition– are determinants of financial literacy, thus as a synthesis of the above introduced models, the following model could be drawn up as seen on Figure 5.

The above model merges the OECD (2015) definition with elements of the previously introduced SEM models (Romano–Tanewski–Smyrnios 2000, Wise 2013, Koropp et al. 2014, Ye–Kulathunga 2019) and is modified so that financial literacy factors influence financial decisions, whose outcome can be measured directly. Attitude, behaviour and knowledge and skills form together financial literacy of the company which is accompanied in the model by further two latent variables, organizational characteristics, such as norms or rules the company follows (the notions organizational culture or organizational behaviour is avoided intentionally, their assessment is way beyond the scope of my research) and as well company demographics and such measures as profitability or growth rate.

Figure 5 Model for measuring the effect of financial literacy on financial decisions



Source: own editing

4. Conclusion

Assessing financial literacy has accelerated in the past few years, dozens of new papers presented more and more complex analyses on either individual or financial literacy of companies. In this paper, I gave an overview of studies (mostly) of the past decade and found that –fortunately and unfortunately– today we face an immense selection of definitions and measurement models. Scholars described financial literacy in dozens of ways, and even though some elements (e. g. knowledge, behaviour, attitude, savings, inflation, investment, mathematical skills) appear in almost all studies, with the papers focusing on different subsets of financial literacy (e. g. credit literacy or debt literacy), harmonizing measurement models and comparing results is rather problematic.

This wide variety of measurement methods led me to the formulation of a proposed measurement model, which tackles some of the weaknesses of the reviewed methods. The proposed PLS SEM measurement model takes into account not only perceived and actual knowledge, attitudes and behaviour of agents, but introduces company traits in the model, considering that the way financial decisions at company level are made differently depending on the characteristics of the companies.

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References

Abebe, G. – Tekle, B – Mano, Y. (2018): Changing Saving and Investment Behaviour: The Impact of Financial Literacy Training and Reminders on Micro–businesses. *Journal of African Economies*, 2018, 27, 5, 587–611.

Agyei, S. K. (2018): Culture, financial literacy, and SME performance in Ghana. *Cogent Economics & Finance* (2018), 6: 1463813.

Alexander, G. J. – Jones, J. D. – Nigro, P. J. (1997): Investor self- selection: evidence from a mutual fund survey. *Managerial and Decision Economics*, 18, 7–8, 719–729.

Ali, H. – Omar, E. N. – Nasir, H. A. – Osman, M. R. (2018): Financial literacy of entrepreneurs in the Small and Medium Enterprises. In Noordin, F. – Othman, A. K – Kassim, E. S. (eds.): *Proceedings of the 2nd Advances in Business Research International Conference,* 31–38.

Atkinson, A. – Messy, F. (2012): Measuring Financial Literacy: Results of the OECD / International Network on Financial Education (INFE) Pilot Study. OECD Working Papers on Insurance and Private Pensions No. 15. OECD Publishing.

Bannier, C. E. – Schwarz, M. (2018): Gender- and education-related effects of financial literacy and confidence on financial wealth. *Journal of Economic Psychology,* 67, 66–86.

Bianchi, M. (2018): Financial Literacy and Portfolio Dynamics. *The Journal of Finance*, 73, 2, 831–859.

Brent, D. A. – Ward, M. B. (2018): Energy efficiency and financial literacy. *Journal of Environmental Economics and Management,* 90 (2018), 181–216.

Brown, M. – Henchoz, C. – Spycher, T. (2018): Culture and financial literacy: Evidence from a within–country language border. *Journal of Economic Behavior and Organization,* 150 (2018), 62–85.

Brown, R. B. – Saunders, M. N. K. – Beresford, R. (2006): You owe it to yourselves: the financially literate manager. *Accounting Forum*, 30.2, 179–191.

Buchanan, L. – O'Connell, A. (2006): A Brief History of Decision Making. *Harvard Business Review*, 2006 Jan., 84, 1, 32–41.

Carraher, S. – Van Auken, H. (2013): The use of financial statements for decision making by small firms. *Journal of Small Business & Entrepreneurship*, 26, 3, 323–336.

Dahmen, P. – Rodríguez, E. (2014): Financial Literacy and the Success of Small Businesses: An Observation from a Small Business Development Center. *Numeracy*, 7, 1 Article 3. 1–12.

Drexler, A. – Fischer, G. – SCHOAR, A. (2014): Keeping it Simple: Financial Literacy and Rules of Thumb. *American Economic Journal: Applied Economics,* 6, 2, 1–31.

Eresia-Eke, C. E. – Raath, C. (2013): SMME Owner's Financial Literacy and Business Growth. *Mediterranean Journal of Social Sciences*, 4, 13, 397–406.

Fatoki, O. (2014): The financial literacy of micro entrepreneurs in South Africa. *Journal of Social Sciences*, 40, 2, 151–158.

Hakim, M. S. – Oktavianti, V. – Gunarta, I. K. (2018): Determining factors that contribute to financial literacy for small and medium enterprises. In *IOP Conference Series: Materials Science and Engineering*, 337, 1, p. 012064, IOP Publishing.

Henager, R. – Cude, B. J. (2016): Financial literacy and long–and short–term financial behavior in different age groups. *Journal of Financial Counseling and Planning*, 27, 1, 3–19.

Hsiao, Y. J. – Tsai, W. C. (2018): Financial literacy and participation in the derivatives markets. *Journal of Banking & Finance*, 88, 15–29.

Huzdik, K. – Béres, D. – Németh, E. (2014): Pénzügyi kultúra versus kockázatvállalás empirikus vizsgálata a felsőoktatásban tanulóknál. *Pénzügyi Szemle*, 2014/4, 476–488.

Karakurum-Ozdemir, K. – Kokkizil, M. – Uysal, G. (2018): Financial Literacy in Developing Countries. *Social Indicators Research*, 1–29.

Klapper, L. – Lusardi, A. – Oudheusden, P. (2015): *Financial Literacy Around the World: Insights from the Standard & Poor's Ratings Services Global Financial Literacy Survey*. S&P Global Inc. Washington.

Koropp, C. – Kellermanns, F. W. – Grichnik, D. – Stanley, L. (2014): Financial decision making in family firms: An adaptation of the theory of planned behavior. *Family Business Review*, 27, 4, 307–327.

Limpek, Á. – Kosztopulosz, A. – Balogh, P. (2016): Késedelmes fizetés, tartozási láncok – A Dél–Alföld régió kis– és középvállalkozásainak pénzügyi kultúrája. *Statisztikai Szemle*, 94, 4, 365–387.

Luksander, A. – Béres, D. – Huzdik, K. – Németh, E. (2014): Analysis of the Factors that Influence the Financial Literacy of Young People Studying in Higher Education. *Public Finance Quarterly*, 2014/2, 220–241.

Lusardi, A. – Mitchell, O. S. (2011): Financial literacy and planning: Implications for retirement wellbeing. In Lusardi, A. – Mitchell, O. S. (eds.): *Financial Literacy: Implications for Retirement Security and the Financial Marketplace*. Oxford University Press, 17–39.

Lusardi, A. – Tufano, P. (2015): Debt literacy, financial experiences, and overindebtedness. *Journal of Pension Economics & Finance*, 14, 4, 332–368.

Lyons, A. C. – Rachlis, M. – Scherpf, E. (2007): What's in a score? Differences in consumers' credit knowledge using OLS and quantile regressions. *Journal of Consumer Affairs*, 41, 2, 223–249.

McFall, J. P. (2015): Rational, normative, descriptive, prescriptive, or choice behavior? The search for integrative metatheory of decision making. *Behavioral Development Bulletin*, 20, 1, 45–59.

OECD (2015): *Measure and Strengthen SME Financial Literacy in the Agribusiness Sector in Ukraine*. OECD Publishing, Paris.

Ország, G. – Kosztopulosz, A. – Kovács, P. (2015): Dél–alföldi kis– és középvállalkozások pénzügyi kultúrája. *Gazdaság és Pénzügy*, 2015/2, 168–185.

Remund, D. L. (2010): Financial Literacy Explicated: The Case for a Clearer Definition in an Increasingly Complex Economy. *The Journal of Consumer Affairs*, 44, 2, 276–294.

Romano, C. A. – Tanewski, G. A. – Smyrnios, K. X. (2000): Capital structure decision making: A model for family business. *Journal of Business Venturing*, 16, 3, 285–310.

Sarpong-Danquah, B. – Gyimah, P. – Poku, K. – Osei-Poku, B. (2018): Financial Literacy Assessment on Tertiary Students in Sub–Saharan Africa: A Ghanaian Perspective. *International Journal of Accounting and Financial Reporting*, 8, 2, 76–91.

Servon, L. J. – Kaestner, R. (2008): Consumer financial literacy and the impact of online banking on the financial behavior of lower- income bank customers. *Journal of Consumer Affairs*, 42, 2, 271–305.

Stolper, O. (2018): It takes two to Tango: Households' response to financial advice and the role of financial literacy. *Journal of Banking & Finance*, 92, 295–310.

Sucuahi, W. T. (2013): Determinants of financial literacy of micro entrepreneurs in Davao City. *International Journal of Accounting Research*, 1, 1, 44–51.

Swami, S. (2013): Executive functions and decision making: A managerial review. *IIMB Management Review*, 25, 203-212.

Szántó R. (2011): Ésszerűtlen döntések ésszerű magyarázatai – bevezetés a viselkedéstudományi döntéselméletbe. In Szántó, R. – Wimmer, Á – Zoltayné, P. Z (eds.): *Döntéseink csapdájában: Viselkedéstudományi megközelítés a döntéselméletben.* Alinea Kiadó, Budapest, 11–38.

Szántó, R. – Zoltayné, P. Z. (2019): Research decisions making in Hungary in the last decades. *Budapest Management Review*, 2019 (12), 50–61.

Ward, A. F. – Lynch, J. G. (2018): On a Need–to–Know Basis: How the Distribution of Responsibility Between Couples Shapes Financial Literacy and Financial Outcomes. *Journal of Consumer Research*, 45, 5, 1013–1036.

Wise, S. (2013): The impact of financial literacy on new venture survival. *International Journal of Business and Management*, 8, 23, 30–39.

Ye, J. – Kulathunga, K. (2019): How Does Financial Literacy Promote Sustainability in SMEs? A Developing Country Perspective. *Sustainability* 2019, 11, 2990; doi:10.3390/su11102990, 1–2.