EUROPEAN UNION
European Structural and Investment Funds
Operational Programme Research,
Development and Education

MINISTRY OF EDUCATION, YOUTH AND SPORTS

Proceedings
of 13th International Scientific Conference

KARVINÁ PH.D. CONFERENCE ON BUSINESS AND ECONOMICS

Organized by Department of Science and Research
Silesian University in Opava, School of Business Administration in Karviná

The conference was financially supported by the Development of R&D capacities of the Silesian University in Opava
CZ.02.2.69/0.0/0.0/18_054/0014696

November 2 - 3, 2022

Horní Lomná, Czech Republic

SILESIAN UNIVERSITY
SCHOOL OF BUSINESS ADMINISTRATION IN KARVINA

KPCBE
Karvina Ph.D. conference on business and economics

Silesian University in Opava
School of Business Administration in Karviná

ISBN 978-80-7510-529-5

Year of publishing: 2022

Editor: Iveta Palečková

All papers passed a blind review process.

Suggested citation:

Author, A., 2022. "Title of the paper". In: Palečková, I. (ed.). Proceedings of 13th International Scientific Conference "Karviná Ph.D. Conference on Business and Economics". Karviná: Silesian University, pp. XX-XX. ISBN 978-80-7510-529-5.

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13th International Scientific Conference
"Karviná Ph.D. Conference on Business and Economics"
November 2-3, 2022, Horní Lomná, Czech Republic

Conference Proceedings
Silesian University in Opava, School of
Business Administration in Karvina, 2022

DETERMINANTS AFFECTING DEMAND FOR ONLINE INSURANCE IN SLOVAKIA

Erik Gogola[1]

[1]*University of Economics in Bratislava, Faculty of National Economy,*
Dolnozemská cesta 1, 852 35 Bratislava, Slovak Republic
email: erik.gogola@euba.sk

Abstract
The study examines the socio-demographic determinants associated with the different types of online insurance products purchased through online distribution channels on a sample of mid-size Slovak insurance company customers. Social and demographic variables are examined by logistic regression analysis. We identified the following variables as statistically significant determinants influencing online travel and motor third-party liability (MTPL) insurance demand: gender, age, year and online direct distribution channel. Females are less likely to purchase precisely online MTPL insurance than males, while females are more likely to purchase precisely online travel insurance than males from all the offered online insurance products. Concerning age categories, each additional age category increases the probability of purchasing precisely online travel insurance from all the offered insurance products. However, within online MTPL insurance, each additional year decreases the probability of purchasing precisely online MTPL insurance from all the offered insurance products. Our results can help insurers better understand their current and potential customers willing to buy insurance through the internet and thus improve their acquisition and segmentation techniques.

Keywords
Insurance demand, Online insurance, Digitalization, Non-life insurance, Distribution channels.

JEL classification
G22, G52

1 Introduction

Digitalisation, modern technologies and new data sources are fundamentally changing our economy and society and promise to transform several financial and non-financial sectors, including the insurance industry. However, the essential prerequisite to providing digital products and services was the expansion of internet availability and the continuous development of new technologies. This development has created a space for new consumption, purchasing and acquisition possibilities (Vanderlinde, 2020). With the surge in Internet use, e-commerce has been proliferating in Slovakia. In 2021 according to Eurostat, approximately 90% of households (83% in 2017) had internet access at home. Moreover, in 2021 about 69% of individuals used the internet for online purchases within the last three months, while in 2017, it was only 46% of individuals.[1] Based on the long-term research project "Digital Literacy in Slovakia" conducted by the Institute of Public Affairs, the latest publicly available survey data from 2022 shows that an increasing share of the adult population (83%) considered themselves digitally literate.

For the financial industry, where the insurance sector logically belongs is even more important, the number of individuals who use the internet for internet banking. In Slovakia in 2021, it was 58% of individuals; in 2017, this figure was 51%. Also, the empirical results confirm the positive effect of internet use on non-life insurance demand (Belagha & Hemrit, 2020). Even from the received data, we may observe an increasing share of online distribution channels within the examined Insurance company* between 2012 and 2017. According to the number of concluded insurance policies, the percentage share of online distribution channels increased from 28% in 2012 to 43% in 2017. The highest share of online purchases is observed within travel insurance.

In the examined insurance company, non-life insurance products dominated online insurance products; therefore, this paper will focus on the demand for non-life online insurance products. To better understand the general performance and specifics of the non-life insurance market in Slovakia,

[1] Eurostat. Available on: https://ec.europa.eu/eurostat/databrowser/view/isoc_ec_ib20/default/table?lang=en

* The insurer wished to remain anonymous.

we analysed two indicators: (1) insurance penetration ratio (total premiums to GDP) and (2) insurance density ratio (total premiums per inhabitant). According to Insurance Europe in Slovakia, the non-life insurance penetration ratio in 2020 was 1.2%, and the density ratio was 203€. In Europe, the average non-life insurance penetration ratio in 2020 was 2.6%, and the density ratio was 694€. These figures indicate that the Slovakian insurance market is still maturing compared to the more developed European countries with a more advanced insurance market.

However, digitalisation is reshaping the business model of the insurance industry. It influences what insurers cover and how they design and distribute insurance products, underwrite risk and manage claims. The SwissRe Sigma 2020 report "*Data-driven insurance: ready for the next frontier?*" find that many use the internet as a research tool to find information regarding insurance products. In 2017, in China (59%), in Sweden (68%) and in Spain (52%) used the internet as a medium to search for information about life and health insurance products, but penetration of online purchases remained low. In Sweden and China, around 10% of property and casualty gross written premiums were distributed online in 2016. In the short-term, digital insurance consumers will likely be young, between 20 to 36 years old, with higher educated and income levels. However, the study predicts that when innovative digital insurance policies become increasingly available over time, income and education will play less relevant factors in purchasing decisions (SwissRe, 2020). The most significant source of value creation through digital transformation and constantly developing modern information and communication technologies (ICT) that enables insurance companies to develop new and more customer-oriented products and solutions while simultaneously reducing costs. This development will eventually lead to lower premiums, boosting the affordability of different coverages.

The following development may positively influence the demand for online insurance; therefore, examining the determinants influencing the demand for online insurance is necessary. Studies examining determinants influencing the insurance demand of individuals are primarily focused on life insurance (Beck & Webb, 2003; Campbell, 1980). It is, however, necessary to examine determinants influencing demand for non-life insurance given by the increasing volume of assets owned by individuals and emerging risks that may threaten these assets. Only a limited number of studies examined the determinants affecting demand for non-life insurance (Beenstock et al. 1988; Browne et al., 2000; Esho et al., 2004; Millo & Carmeci, 2011, Onruška et al., 2018). The previous studies examining determinants affecting online insurance were mainly focused on determinants such as trust, perceived risk and ease of use (Lim et al. 2015; Gebert-Persson et al., 2018; Yu & Chen, 2018; Huang et al., 2019)

To our knowledge, neither empirical work has tried to identify social, demographic or other determinants influencing individual demand for non-life online insurance products. The main objective of this study is to identify and examine key social-demographic and other determinants influencing individuals' demand for non-life online insurance. Our research will utilise the insurance company customer-level dataset regarding online insurance purchases between 2012 and 2017. We will limit our analysis to online travel and motor third-party liability insurance (MTPL) as they contain the highest share of online purchases. Our results could help insurers in Slovakia to better understand their potential consumers and their needs.

2 Literature Review

One of the fundamental purposes of insurance is to enable risk-taking to individuals and entrepreneurs by transferring risk from policyholder to insurer for an agreed premium in the insurance contract, which supports economic growth, furthermore encourages innovation and eventually enhances the resilience of society and the whole economy (Ondruška et al., 2022). Moreover, insurance also helps us cope with the negative consequences of random, unexpected adverse natural events or events caused by human activities in the form of financial compensation, which eventually mitigates the occurred damages (Mesršmíd, 2015).

Factors influencing insurance purchasing decisions have been the focus of insurance research for many years. From a classical economics perspective, individuals purchase insurance to insure themselves against the risk of incurring a loss (Kunreuther et al., 2013). The benchmark model underlying such decision-making under risk is the expected utility theory. The theory assumes that individuals are rational and forward-looking with a reasonable risk aversion. Therefore the expected utility theory tells us that risk-averse individuals are willing to purchase insurance at a premium that exceeds their expected but uncertain, more significant future losses (Prat, 1964; Arrow, 1971).

Most studies analyse the determinants of individuals' decisions to purchase life insurance. Zietz (2003) published research contained a literature review of specific demographic and economic factors that might be significant in explaining the demand for life insurance. Many determinants have already been studied at the individual and household levels. Two main categories have been identified: socio-demographic determinants (age, gender, education, dependent children, religion and employment) and economic determinants (income, savings and employment). However, significantly lower studies examining factors influencing demand for non-life insurance at the individual level. The reason for the lower interest in the research of determinants affecting demand for non-life insurance is the nature of non-life insurance products. Within non-life insurance products, the obligation to buy certain non-life insurance products is present, e.g. motor third liability insurance (MTPL).

The following studies examined the determinant influencing demand for non-life insurance. Beenstock et al. (1988) analysed 12 industrialised countries and discovered a positive relationship between national income and non-life insurance spending (property and liability insurance). Browne et. al. (2000) examined motor (vehicle) and general liability insurance across OECD countries and found that economic conditions (income, wealth) positively affect the demand for motor and general liability insurance. Esho et al. (2004) analysed data from developed and developing countries from 1984 to 1998 and found a positive relationship between national income and property-liability insurance. The study also confirms that risk aversion significantly impacts property and liability insurance demand. The study by Millo & Carmeci (2011) focused on determinants influencing demand for non-mandatory non-life insurance in Italy and found a significant and positive influence of income and wealth on insurance consumption. Ondruška et al. (2018) examined the determinants influencing demand for non-life insurance based on survey data. They found a statistically significant relationship between the non-life insurance demand and gender, age, marital status, savings and income. The majority of mentioned studies have focused mainly on examining the influence of aggregated economic determinants on non-life demand. Different research results regarding socio-demographic determinants influencing life insurance demand can help us as a proxy for non-life insurance demand. From the various identified socio-demographic and economic determinants, our attention will focus on age and gender.

The research does not clearly prove the impact of age as a determinant influencing the demand for insurance. Showers & Shotick (1994), Truet & Truet (1990) and Ondruška et al. (2018) found a significant and positive impact of age on insurance demand. This behaviour is in line with the traditional life-cycle hypothesis of savings. The purpose of saving the nature of life insurance in the form of an endowment, annuity or death assurance is to protect dependents against financial hardship in the case of premature death of wage earners. This characteristic of life insurance can be applied to non-life insurance as well. Non-life insurance ensures the protection of households' wealth; the bequest motive can also play a significant role in non-life insurance purchasing decisions. Higher wealth generates a higher need for insurance coverage. The opposite negative impact of age on insurance demand was demonstrated by Feber & Lee (1980), Bernheim (1991) and Chen et al. (2001).

The impact of gender as a determinant of insurance demand has been widely researched without cleared results. Most studies analysing individual investment decisions confirm that females have a higher risk aversion rate than males (Halek & Eisenhauer, 2001; Powel & Ansic, 1997; Gandolfi & Miner, 1996, Pastoráková et al., 2013). A study by Luciano et al. (2015) examined various microeconomic determinants influencing insurance purchase decisions based on Italian household

survey data collected by the Bank of Italy in 2012. They found that higher income positively influences the demand for life insurance for both males and females. However, men with higher income levels had a much higher probability of owning life insurance than females. Other determinants influencing the demand for insurance are cultural characteristics. The study by Hofstede (1983) provides four cultural dimensions across different countries: Individualism, Power Distance, Masculinity/Feminity and Uncertainty Avoidance. The study by Chui & Kwok (2008) finds that a feminine society purchases more life insurance, suggesting that feminine are more sensitive to the risk of premature death of family members and the following financial consequences. Masculine societies may buy more non-life insurance as they are more oriented toward tangible goods and want to control their future. However, the effect of masculinity or feminity on non-life insurance purchases is ambiguous (Chui & Kwok, 2008; Park & Lemaire, 2012).

Currently, there is a wide variety of insurance products distributed through various distribution channels. Insurance itself is an abstract financial product; therefore, insurance brokers and agents serve as intermediaries between the insurance provider and the customer, adding the so-called "human touch" to the products. However, increasing digital transformation and modern technologies offer more opportunities for insurers and customers to interact with each other. Therefore it is necessary to understand what factors affect the adoption of online insurance among customers when insurance products are complex (SwissRE, 2020). Online insurance is not applicable to all insurance products; only products with simple and easy-to-understand policies, mostly non-life insurance products (travel and MTPL) insurance, are more acceptable and suitable for online insurance. There is a limited number of previous research examining different socio-demographic and economic determinants influencing online insurance purchasing decisions.

The study by Belagha & Hemrit (2020) examined internet use's effect on insurance demand using a sample of OECD countries between 2007 and 2017. The study empirically proved a positive impact of internet use on non-life insurance demand. On the other hand, the empirical investigation shows no systematic impact of internet use on life insurance demand. These results can be related to perceived risks and consumer knowledge of insurance products. Since life insurance products are generally more complex than non-life insurance products and require a higher degree of involvement from both sides (insurer, policyholder). The study by Yu & Chen (2018) confirmed the importance of trust as customers with higher online experience might affect consumer perception of product uncertainty and their purchase intention. The authors discovered that consumers who perceive less product uncertainty and have more online user experience are more likely to purchase online travel insurance. The positive and significant impact of perceived usefulness, perceived ease of use and trust on online travel insurance demand (Huang et al., 2019).

Overall a significant part of the reviewed empirical studies concerning life or non-life insurance demand used aggregated macro or survey data sources for their research. In our research, we use individual-level data from a mid-size Slovakian insurance company to examine the determinants influencing the demand for online Travel and MTPL insurance products. Based on the reviewed literature regarding life and non-life insurance demand, we selected age and gender as determinants to examine the impact on non-life online insurance demand. The selected determinants lead us to our research question: How do age and gender influence the demand for online Travel and MTPL insurance?

This paper's novel contribution to empirical literature extends insurance demand literature by examining individuals' socio-demographic determinants affecting non-life online insurance demand based on real customers' online purchasing decisions in a mid-size Slovakian insurance company.

3 Data and methodology

We utilised the data from a mid-size Slovak insurance company that offers life and non-life insurance products. The insurance company has a strong focus and presence on the internet, mainly concerning travel insurance. The insurance company provided us with aggregated internal data regarding the

share of online distribution channels between 2012 to 2017 according to the number of concluded policies and gross written premiums. Furthermore, they also provided aggregated internal data regarding different types of non-life online insurance products between 2012 to 2017 according to the various distribution channels, a number of concluded policies, and also according to gross written premiums. From the following data, we can obtain a comprehensive overview of online insurance development within the insurance company and derive the development of the overall online insurance market in Slovakia. For data analysis, we used basic descriptive statistic methods.

3.1 Data analysis

We have closely examined the development of online insurance policies within the insurance company. **Fig. 1** presents the percentage share of distribution channels within the insurance company according to the number of concluded insurance policies between 2012 and 2017. We may observe a continuous increase in the number of insurance policies concluded through the internet, from 28% in 2012 to 43% in 2017. However, even in 2017, over half of the insurance policies were concluded through offline distribution channels. **Fig. 2** presents a different view of distribution channels, as it contains information regarding the gross written premium by insurance policies. From a gross written premium point of view, the different offline distribution channels play an essential role, while the online distribution channel plays a minority role in this case. These two charts show the positive tendency of online insurance adoption regarding the number of concluded insurance policies. However, the online distribution channel plays a minor role in terms of gross written premium. This development can be related to the constant increase of household access to the internet, increasing digital literacy and technological development, which may increase the household's willingness to buy insurance policies online. However, insurance products' perceived risk and complexity limit households from concluding insurance policies with high premiums.

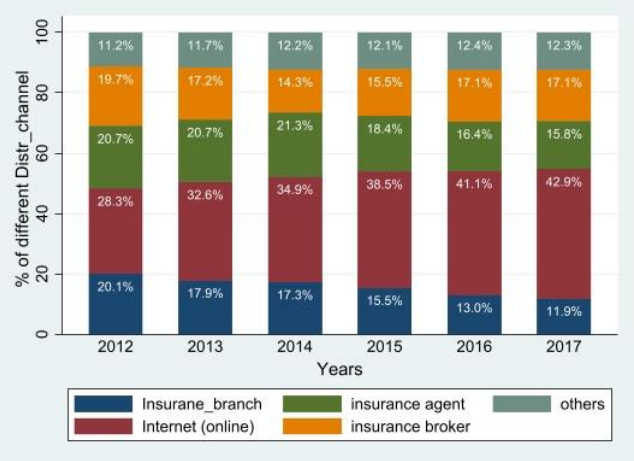

Fig. 1. Distribution channels according to the number of concluded non-life insurance policies (Source: Own calculation)

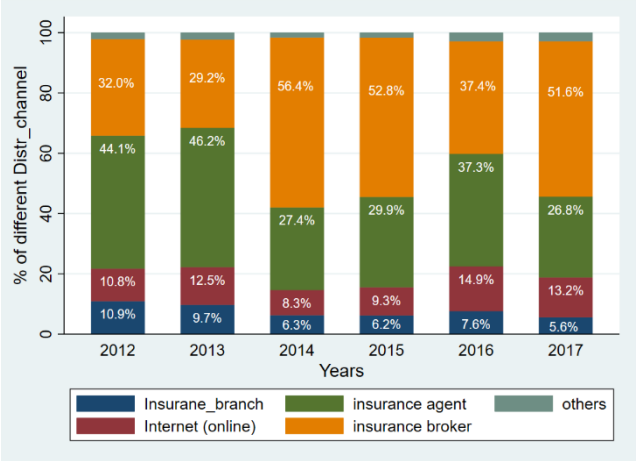

Fig. 2. Distribution channels according to the gross-written premium of non-life insurance policies (Source: Own calculation)

Further, we took a closer look at different non-life insurance products to see the proportion of online insurance. From all the non-life insurance products, we can observe the highest share of online purchased insurance policies within travel insurance according to the number of concluded policies and gross written premiums between 2012 to 2017. Moreover, in 2017 almost the fall of travel insurance policies was concluded through the internet. However, even within travel insurance (with the most online concluded insurance policies), the gross written premium received through offline channels was higher than online ones. The second non-life insurance product with the highest share

of online purchased insurance policies according to the number of concluded policies, and gross written premium was MTPL, followed by the Accident insurance product. However, in both insurance products, the online insurance policies played a lower share of policies even according to the number of concluded policies and the gross written premium. From **Fig. 3** and **Fig. 4**, we may observe a slow adoption of online insurance within selected non-life insurance products. We observed the fastest adoption of online insurance within non-life insurance products that are less complex, mainly travel insurance and MTPL. Within these insurance products, generally public feels lower risk, mainly because these products are easy to understand, short-term with lower premiums. Even if the individuals find out afterwards that the product is not ideal, it will not cause profound affection in their attitudes.

Fig. 3. Non-life insurance product according to the number of concluded insurance policies (Source: Own calculation)

Fig. 4. Non-life insurance product according to the gross written premium (Source: Own calculation)

Furthermore, we examined the influence of selected determinants (age, gender, year and online distribution channels) on demand for specific non-life online insurance products, namely online travel insurance (travel) and online motor third-party liability insurance (MTLP). We used a logistic regression model to quantify the influence of selected determinants on customer demand for non-life online insurance products (travel, MTPL) within the examined insurance company.

3.2 Logistic regression model

We used an internal customer-level dataset from the insurance company to empirically analyse the impact of selected determinants on demand for online travel and MTPL insurance. The dataset contains information about the individuals' social-demographic characteristics who purchased online insurance products directly from the insurance company website or through partner websites between 2012 and 2017. The sample size has 208 179 observations from 2012 to 2017.

We used binary logistic regression to examine the impact of selected determinants on customer demand for online travel and MTPL insurance. We used this type of regression due to the categorical nature of our variables. Further, we have chosen to examine these two online insurance products based on the higher share of online purchases within these two insurance products.

We created a dichotomous dependent variable to predict the influence of selected determinants on online travel and MTLP insurance. In the case of online travel insurance, our dependent binary variable reaches the value 1 (only online travel insurance policies) and 0 otherwise (all other offered online insurance policies). The same binary coding is applied to the online MTPL insurance policies. In the proposed two logistic regression models, we used firstly online travel insurance policies (1) and all other offered online insurance policies (0) and secondly online MTPL insurance policies (1)

and all other offered insurance policies (0) as a dependent binary variable. At the same time, we applied four categorical variables (Gender, Age categories, Year and Online distribution channel) as independent variables. The baseline model in this study is given as follows:

$$P(Y) = \frac{1}{1+e^{-(\beta_0+\beta_1 Gen_i+\beta_2 Age+\beta_3 Year+\beta_4 Onl.Dist.chanel_{34}+\varepsilon_1)}} \quad (1)$$

Our explanatory variables are as follows: gender (Gen), age (Age), year (Year) and online direct distribution channel (Onl.Dist.channel). We test the interdependencies between selected determinants in the first step to exclude multi-collinearity. No significant correlation between the selected independent variables was found. We used average marginal effects to interpret parameter estimates after logistic regression. Marginal effects refer to the impact of independent variables on a dependent variable as a discrete change from the baseline level.

4 Results

Subsequently, we examined the influence of selected determinants on demand for online travel and MTLP insurance. For the empirical analyses, we used a logistic regression model; **Table 1** and **Table 2** contain the results from the regression analysis. Concerning online travel insurance, we found a statistically significant and positive relationship between the demand for online travel insurance products and gender. Females are, on average, 7% points more likely to purchase precisely online travel insurance from all the offered online insurance products compared to males. This finding confirms the literature, which suggests that females are more risk-averse and show a higher interest in life insurance (Halek & Eisenhauer, 2001; Gandolfi & Miners, 1996).

Further, we found a statistically significant and positive relationship between online travel insurance and age. In terms of age, on average, each additional age category (older individuals) is associated with a 3% points increase in the probability of purchasing precisely online travel insurance from all the offered insurance products. The following may suggest that even customers in middle or older age are open to purchasing exactly travel insurance through the internet from all the offered online insurance products. This development can be attributed to two determinants. First is the character of the travel insurance products, which are simple, and easy to understand with a low premium and perceived risk. Even if the individuals make a purchase mistake and find out afterwards that the product is not ideal, it will not cause serious financial consequences for them. The second is that older customers may dispose of higher tangible wealth, and non-life insurance ensures the protection of households' wealth; the bequest motive can also play a significant role in non-life insurance purchasing decisions.

Regarding the years, we found a statistically significant negative relationship between online travel insurance and years. On average, each additional year is associated with a 3% points decrease in the probability of purchasing precisely online travel insurance from all the offered insurance products. This finding suggests that customers with each additional year from 2012 to 2017 are more willing to purchase other offered online insurance products. Furthermore, we found a statistically significant negative relationship between the demand for online travel insurance products and direct online distribution channels. Customers are, on average, 4% points less likely to purchase precisely online travel insurance from all the offered insurance products directly through the insurance company web page. This development may suggest that more and more customers are comparing and purchasing travel insurance products through providers of comparator web pages, which enables them to compare different types of travel insurance products from different insurers in one place.

Concerning online MTPL insurance, we found a statistically significant and negative relationship between the demand for online MTPL insurance and gender. Females are, on average, 7% points less likely to purchase precisely online MTPL insurance from all the offered online insurance products

than males. This finding suggests that women are less likely to purchase online motor insurance. This finding may suggest the masculine character of this insurance product which we can relate to cultural determinants affecting particular insurance product demand (Chui & Kwok, 2008; Park & Lemaire, 2012).

Further, we found a statistically significant and negative relationship between online MTPL insurance and age. In terms of age, on average, each additional age category (older individuals) is associated with a 2% points decrease in the probability of purchasing precisely online MTPL insurance from all the offered insurance products. The following may suggest that mostly younger or middle age customers prefer to purchase MTPL insurance through the internet. In contrast, the older the individual is, the less probably will drive or own a car. Thus the need for MTPL insurance naturally decreases.

Regarding the years, we found a statistically significant positive relationship between online MTPL insurance and years. Each additional year is, on average, associated with a 2% points increase in the probability of purchasing precisely online MTPL insurance from all the offered insurance products. This finding suggests that customers with each additional year from 2012 to 2017 are more willing to purchase car insurance policies from the internet, as this product is considered to be simple, easy to understand and compare. Furthermore, we also found a statistically significant negative relationship between the demand for online MTPL insurance products and direct online distribution channels. Customers are, on average, 2% points less likely to purchase precisely online MTPL insurance from all the offered insurance products directly through the insurance company web page. This finding suggests the same development as observed within online travel insurance.

Table 1. Logistic regression (travel online)

VARIABLES	(1) Odds ratio	(2) Marginal effects
travel		
female	1.795***	0.07***
	(0.0228)	(0.002)
age_categories	1.276***	0.03***
	(0.00635)	(0.001)
year	0.883***	-0.02***
	(0.00329)	(0.000)
online_direct	0.724***	-0.04***
	(0.00928)	(0.002)
Constant	1.589e+109***	
	(1.191e+110)	
Observations	204,206	204,206

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own calculation

Table 2. Logistic regression (MTPL online)

VARIABLES	(1) Odds ratio	(2) Marginal effects
mtpl		
female	0.512***	-0.07***
	(0.00737)	(0.001)
age_categories	0.810***	-0.02***
	(0.00449)	(0.001)
year	1.218***	0.02***
	(0.00521)	(0.000)
online_direct	0.816***	-0.02***
	(0.0113)	(0.001)
Constant	0***	
	(0)	
Observations	204,206	204,206

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: own calculation

5 Conclusion

The main objective of this study was to identify and examine key social-demographic and other determinants influencing demand for non-life online insurance products. Overall, most empirical studies concerning life or non-life insurance demand used aggregated macro or survey data sources. We utilise the insurance company's internal customer-level dataset. Using logistic regression, we have identified determinants influencing customers' demand for online travel and MTPL insurance. This paper contributes to a better understanding of consumer behaviour in purchasing online travel and MTPL insurance from the microeconomic perspective. As there is no empirical research

examining the influence of socio-demographic determinants on demand for any online insurance, our contribution enriches the existing empirical literature concerning insurance demand research.

From the data, we can confirm the increasing share of online distribution channels in the examined insurance company according to the number of concluded insurance policies. However, according to the gross written premium, online distribution channels are among the minor distribution channels. We can attribute this to customers being more open to purchasing non-life insurance policies through online distribution channels as these products are less complex and short-term at a lower price. Therefore, this paper suggests that insurance products with higher complexity, higher policy value and longer maturity should still be provided with in-person professional services by the insurance representatives.

We found that gender and age have a statistically significant impact on demand for online travel and MTPL insurance products. Females are 7% points less likely to purchase precisely online MTPL insurance than males, while females are 7% points more likely to purchase precisely online travel insurance from all the offered insurance products than males. Concerning age categories, each additional age category increases the probability of purchasing precisely online travel insurance from all the offered insurance products by 3% points. However, within online MTPL insurance, each additional year decreases the probability of purchasing precisely online MTPL insurance from all the offered insurance products by 2% points. Other independent variables, year and online direct distribution channels, also show a statistically significant impact on demand for online travel and MTPL insurance. While for both online insurance products, the direct distribution channels had a statistically negative impact, the year had a different impact on online travel and online MTPL insurance.

Our results may help the insurance company to increase the sales of its online products by incorporating our results into different e-commerce and marketing methods and strategies. Our results can help the insurance company to increase customer demand by targeting specific gender and age categories within different online insurance products. Further, cooperation with partners providing insurance comparison web pages may be a good strategy for future online insurance demand.

The limitation of our research is that it focuses only on the binary ownership of certain online insurance products and our database did not capture the influence of Covid-19 on the demand for online insurance. For further research, we would consider using the amount of premium paid for different online insurance products as the dependent variable.

6 Acknowledgement

This work was supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic under Grant VEGA No. 1/0466/19 entitled "The causes and consequences of suboptimal financial decisions of individuals with an emphasis on insurance decisions". This paper was also supported by the University of Economics in Bratislava under the research project called Projekt mladých učiteľov, vedeckých pracovníkov a doktorandov No. I-22-112-00 entitled „*Rast podpory populistických radikálnych pravicových strán: Vplyv efektu susedstva na volebné preferencie jednotlivca*".

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13th International Scientific Conference
"Karviná Ph.D. Conference on Business and Economics"
November 2-3, 2022, Horní Lomná, Czech Republic

Conference Proceedings
Silesian University in Opava, School of
Business Administration in Karvina, 2022

IMPACT EVALUATION OF ENVIRONMENTAL MANAGEMENT SUPPORT ON A SELECTED SAMPLE OF MUNICIPALITIES

Anna Kalafutová[1]

[1] *University of Economics in Bratislava, Faculty of National Economy,*
Dolnozemská cesta 1, 852 35 Bratislava, Slovak Republic
email: anna.kalafutova@euba.sk

Abstract
Waste management and recycling resonate locally, nationally and internationally. In the Slovak Republic, municipalities are responsible for mixed waste. One of the possibilities to increase the rate of recycling and reduce the cost of mixed waste is to invest in projects to increase recycling in the municipality. In this work, we deal with the analysis of the operational project Quality of the environment in a selected sample of municipalities in the Slovak Republic. In the first part, we deal with legislative changes in the field of waste management in Slovakia, the investigated operational program and the need to increase the recycling rate. In the research, we focused on financial indicators and the rate of recycling in supported municipalities and cities from the one challenge of the program, which we compared with a selected sample of non-supported entities. Through the use of the Differences-in-Differences method, we compared the impact of support on the revenues and expenses of municipalities in the area of waste management and the rate of recycling. The results of the research can help in monitoring the impact of structural and investment funds in the field of environmental policy on the rate of recycling, as well as the income and expenditure of local governments.

Keywords
Environmental management, municipalities, difference-in-differences, support program.

JEL classification
Q58, R11, H23

1 Introduction

The importance of effective use of entrusted funds in a relevant, efficient and transparent manner is part of the requirements for the implementation of political measures. In-depth analyses of the various spectrum of political instruments at the national and transnational level serve to fulfil the key evaluation tools. The aim of the publication is to bring a discussion about the functionality of political measures based on the evaluation of environmental policy in a selected sample of municipalities in the Slovak Republic.

Part of the environmental policy is participation in the creation and protection of the environment, solving the problem of climate change and preserving natural values. This is a complex issue, from the creation and implementation of program/strategic documents to the reflection in relevant legislative measures to targeted economic/financial support through funds.

The global problem of increasing waste production creates incentives to increase recycling and reduce overall waste production. According to Eurostat, the Slovak Republic is among the countries with the highest increase in waste production in the EU. In 2005, Slovak resident produced an average of 237 kg of waste per year, in 2020 up to 433 kg (Eurostat, 2022a). In 2017, landfills accounted for up to 61% of waste from total production. The highest share of landfilled waste from European Union countries was recorded in Malta (93%). The lowest amount of landfilled waste from the countries of the European Union is in Denmark (1%), Germany (1%). Finland (1%), the Netherlands (1%), Sweden (1%) and Belgium (1%) (News European Parliament, 2017, Eurostat 2022b). Reducing the gap between countries is possible by using support financial programs. Municipalities can apply for grants from the European Union to address the increase in recycling and effectively meet requirements. What impact do the obtained funds have on the environmental policy of municipalities in the Slovak Republic in the area of waste management? We set this research question in this research paper. In the contribution, we will focus on monitoring the 11th call for financial assistance of the OP Environmental Quality of the Slovak Republic with a specific focus on municipalities.

2 Literature

Environmental policy is an important part of the state at all levels of management. The policy should respond to the changing quality of the environment, waste management and the changing political and socio-economic conditions in societies. Linking the assessment of environmental and economic aspects in environmental policy is increasingly coming to the fore, as many studies indicate (Medina-Mijangos et al., 2020). Various aspects of measures in waste management are analysed, a large part of which consists of methodological approaches to the evaluation of measures (Peng et al, 2020; Fredriksson et al., 2019). Individual published studies in the field of environmental policy differ by examining the selected evaluation criterion, such as the effectiveness of implemented measures (He et al., 2018; Mazzanti et al., 2009; Mazzanti et al., 2011; Peng et al., 2020) or their effectiveness (Wu et al. 2014). A special group is research focused on the evaluation of support that comes from the structural and investment funds of the European Union. Financial resources help in development projects in countries at the European level, in various areas of a citizen's life.

A subsidized fund for the construction of environmental infrastructure was created for the countries of Eastern Europe already at the time of preparation for joining the European Union. The aim of the structural funds was to achieve environmental cohesion. The new member states were required to adopt programmatic program documents and legislative measures aimed at environmental protection. One of the results is the adoption of the Environmental Policy Strategy until 2030, based on the document Zelené Slovensko (2018), which includes circular economy (Ministerstvo životného prostredia, 2015a). In 2015, the European Commission proposed new goals for the share of waste recycling by 2025 of 60% recycling and reuse and 65% by 2030 (Melece et al. 2018). Financial resources from the European Union were intensively used to achieve the set goal. One of the subjects was the municipalities, which are responsible for managing mixed municipal waste. Since 2009, a number of legislative changes in the field of municipal waste and small construction waste have been implemented in the Slovak Republic. In 2008, Directive 2008/98/EC of the European Parliament and the Council on waste was issued on December 19, 2008, as one of the EU directives on waste management (Directive 2008/98/EC). At the national level of the Slovak Republic, the laws on waste have been changed. Subsequently, Act No. 79/2015 Coll. on waste and on the amendment of certain laws (zákon 79/2015 Z.z.) With the change in the law in 2015, the obligations with municipal waste were transferred to municipalities, but the responsibility for sorted municipal waste was taken over by producers (Pavlovič, 2018). Municipalities are responsible for municipal mixed and separated waste collected from households, or construction waste and others. Municipalities and cities must also ensure the sorting of biological waste, namely biodegradable kitchen waste, waste of edible fats and oils, and biological waste from gardens, parks and cemeteries (zákon 79/2015 Z.z).

3 Methodology and data description

Operational program the Environmental Quality was created in cooperation with the European Union and the Ministry of the Environment of the Slovak Republic. The duration of the operational program was determined between 2014 - 2020. Part of the program document for drawing funds was the area of development needs and disparities with the support of municipal waste management in accordance with the hierarchy of waste management. Through operational program Quality of the Environment, several projects were created in municipalities aimed at reducing waste landfilling. On March 23, 2016, the operational program Environmental Quality announced the 11th call for applications for non-refundable financial assistance focused on the sorted collection of municipal waste, the recovery of biodegradable waste and the mechanical-biological treatment of municipal waste. The goal of the challenge was to increase the amount of recycled waste and its possible reuse. The content of the goal resulted in conditions and measurable indicators for the applicants in tons per year after the implementation of the project: increasing the capacity for sorting municipal waste,

monitoring the amount of sorted municipal waste, increasing the capacity for waste recovery and the amount of evaluated non-hazardous waste. The amount of funds from the sources of the European Union was allocated in the amount of 57 011 064 euros. The total level of financial resources from the sources of the European Union represented 85% of the total authorized expenses with a level of co-financing from the sources of the state budget in the amount of 15%. So, the applicants (both public and private entities) did not have to have the means for co-financing and this project can be characterized as a financial subsidy for successful applicants. The call was closed on 16.9. 2016. Of the total volume, local governments were also recipients and received funds in the amount of 35 257 712,98 eur, which is 52,57% (Ministerstvo životného prostredia Slovenskej republiky, 2002; Ministerstvo životného prostredia Slovenskej republiky, 2015a, Ministerstvo životného prostredia Slovenskej republiky, 2015b)

3.1 Data

In the analytical part of the research, we obtained data from publicly available documents of municipalities. All financial data were adjusted by the amount of CPI inflation on the basis of data obtained from Data-Cube (Statistical Office of the Slovak Republic). For the calculation, we used the formula (100 minus total annual inflation in individual years)/100. We used the resulting numerical value in the given investigated years and multiplied it by the original values of the above-mentioned indicators (Statistical office of the Slovak Republic, 2022).

Of the total number of 98 municipalities examined, half (49 municipalities) are supported from OP Environmental Quality in 2016 from the 11th call. The remaining half (49 municipalities) were randomly selected and subject to a size criterion (population) so that the group of supported and non-supported municipalities was the same. The selection of unsupported municipalities was carried out by self-selection due to the lack of necessary data for some municipalities. We have divided the investigated municipalities into categories according to the size category based on the number of inhabitants available to the Statistical Office of the Slovak Republic (Public data database Statdata, 2022). In Table 1, we can observe selected indicators and data that we implemented in the Differences-in-differences method. The table contains the indicators with which we worked in the methodology, the floor of the investigation and the source of sampling. The table contains all the necessary indicators in abbreviated words, which we used in the following tables.

Table 1. Data description

abbr.	term and description	coverage	source
te	total expenditures of municipalities	2013-2020	final account of the surveyed municipalities
mewm	municipal expenditure on waste management	2013-2020	final account of the surveyed municipalities
imw	income from the fee for municipal waste and small construction waste	2013-2020	final account of the surveyed municipalities
mwr	the amount of annual municipal waste fee rate for person	2013-2020	general binding regulations on local fees for municipal waste and small construction waste
wete	percentage share of waste management expenditures in total expenditures in selected municipalities	2013-2020	final accounts of the surveyed municipalities, total expenditures delate municipal expenditure
wmperc	waste management per capital	2013-2020	final accounts of the surveyed municipalities, demographic data from websites of selected municipalities

sw	percentage of sorted waste in selected municipalities	2013-2020	internal document of selected local governments – waste management programs, publicly available documents from Act. No 329/2018 Coll.
inf	inflation	2013-2020	subtraction of price level change
op sup	OP Quality of the Enviroment 11th appeal		operation program quality of the environment
dbp	difference between period		2013 – 2016 and 2017-2020
dbg	difference between groups		
numinh	the number of inhabitants in the municipality	2013-2020	websites of municipalities, economic and social development program in municipalities
sm	49 supported municipalities	49 mun.	list of supported municipalities in 2016 from the website of the Ministry of the Environment
um	49 unsupported municipalities in the same size category	49 mun.	random selection of municipalities base on the same size category of supported municipalities

Source: Own processing

We compared analytical data in the studied years 2013-2016 and 2017-2020 using the Differences in Differences (DiD) research method. The reason for the division into two periods is based on the date of obtaining support and the actual use of financial resources by municipalities in 2017. We adjusted the data in individual municipalities and years for inflation and calculated the percentage change between individual years as follows:

$$(X_1/X_0)*100$$

We averaged the resulting data within the examined periods and types of groups. In this way, we monitored the following indicators: expenditure on waste management, revenue from the fee for municipal waste and small construction waste, the rate of the fee for municipal waste, the percentage of waste management expenditure on total expenditure, the share of waste management expenditure per inhabitant and the percentage rate of recycling municipal waste.

By analysing the data of the average values of the percentage changes for supported and non-supported municipalities in the area of waste management costs, revenues from the municipal waste fee and the recycling rate, we monitor the changes in the examined period across individual years.

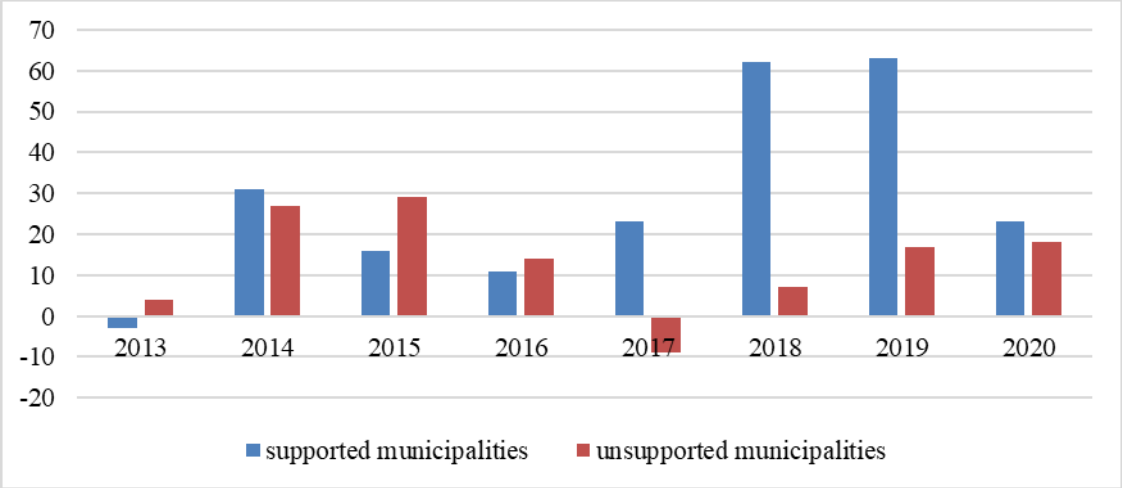

Fig. 1. Development of average expenses for waste management in percentage points (Source: own processing)

The development of expenses for waste management is a natural result of financial support for supported municipalities in the years 2017 to 2020. Unsupported municipalities spent more funds before 2017, but with a lower percentage change than supported municipalities in the period after support. We assume that non-supported municipalities invested in waste management before 2017, but this did not show up in spending as significantly as for supported municipalities.

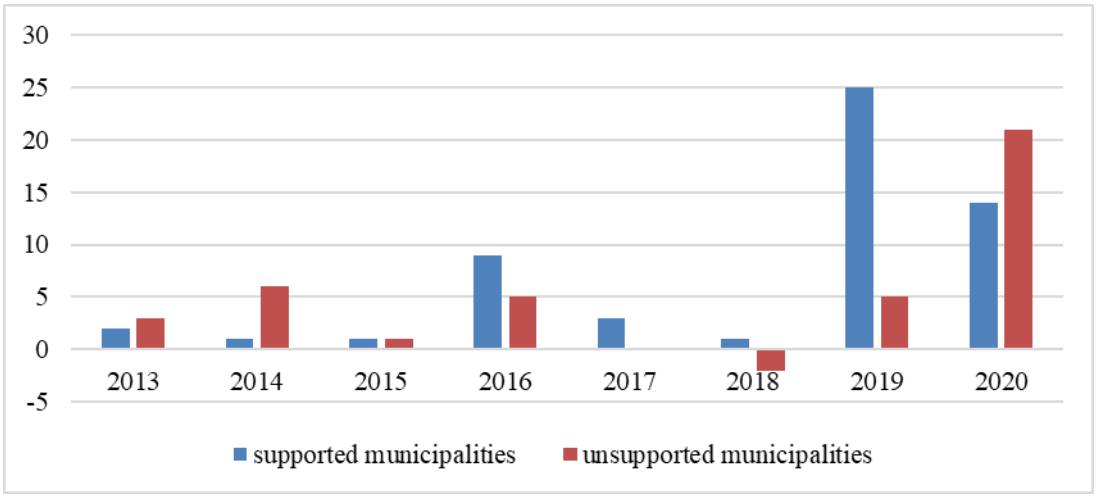

Fig. 2. Development of average income from the fee for municipal waste in percentage points (Source: own processing)

The reason for examining this quantity is to monitor the impact of investment in waste management on municipalities, entrepreneurs and residents. In the second examined year, we can observe a high increase in percentage change for both groups of municipalities. The assumed reason is a change in the financing of local governments from income taxes on natural and legal persons. What is interesting is the faster reaction to the change in 2019 in the case of supported municipalities, whose total percentage change was higher than for non-supported ones in 2019 and 2020.

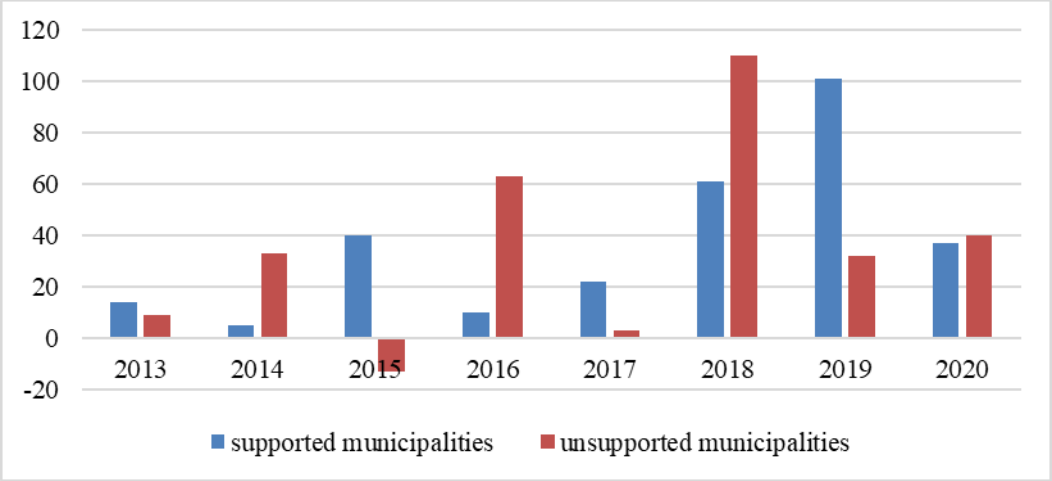

Fig. 3. Development of average amount of recyclable municipal waste in percentage points (Source: own processing)

At the end of the first year under review, changes in the area of recycling are more pronounced in unsupported municipalities. In 2018, we noticed an increase in recycling, mainly in unsupported municipalities. In this case, supported municipalities react more slowly but with a gradual trend. In 2019, the highest percentage change in the area of waste recycling was in the supported municipalities with the expected impact of the implementation of the investigated challenge in the operational program Quality of the environment.

4 Results

By comparing groups of municipalities in the period before and after financial support, we monitor the differences between groups and periods with the possibility of comparing results.

Table 2. Change in total waste management expenditures in percentage points

DiD	2013-2016	2017-2020	dbp
sm	13,54	41,18	-27,64
um	58,42	8,27	50,15
dbg	-44,88	32,91	-77,79

Source: own processing

In the period after the implementation of the project, we recorded a high percentage change for the supported entities, with the opposite trend for non-supported municipalities. Based on the data, we conclude that there have been significant financial changes in waste management costs for selected non-supported municipalities. One of the reasons may be the increase in capital expenditures associated with investment projects. In the group of supported municipalities, we can observe a similar trend in the second examined period after financial support, but with a lower percentage change.

Table 3. Change in revenue from waste charge in percentage points

DiD	2013-2016	2017-2020	dbp
sm	6,45	10,92	-4,47
um	3,68	5,94	-2,26
dbg	2,77	4,98	-2,20

Source: own processing

In the first examined period, there was a smaller change than in the following period. In the group of supported municipalities, we recorded higher changes in percentage points in both investigated periods. At the same time, we can observe an increase in the percentage change between periods in the amount of 4,47 percentage points in this group. The increase in the percentage change of the income from the fee for municipal waste and small construction waste in the second examined period may be due to the increase in the rates of the fee for municipal waste and small construction waste in recent years.

Table 4. Change in the rate of the municipal waste fee for one person in percentage points

DiD	2013-2016	2017-2020	dbp
sm	3,02	6,79	-3,77
um	5,19	3,97	1,23
dbg	-2,17	2,82	-5,00

Source: own processing

We observe a percentage increase between the periods 2013-2016 and 2017-2020 for supported municipalities. We noticed the opposite trend in the selected sample of unsupported municipalities. We can observe a higher percentage point increase in supported municipalities in the second year under review. The reason may be a more frequent change in the amount of fee rates for natural persons and a more frequent reaction to legislative changes than unsupported municipalities.

Table 5. Change in the share of waste management expenditures in total expenditures in percentage points

DiD	2013-2016	2017-2020	dbp
sm	27,50	26,78	0,72
um	32,70	0,39	32,31
dbg	-5,19	26,39	-31,59

Source: own processing

The difference in percentage points is visible within the studied periods as well as groups. We can see the most significant difference in unsupported municipalities across the difference between periods. It is interesting to observe the difference between the first and the second examined period for supported municipalities with a slight increase at the level of 0,72 percentage points. For comparison, we did not detect a high percentage increase in the second examined period for non-supported municipalities. In this case, we see the impact of financial support in the selected supported group compared to the non-supported group.

Table 6. Percentage change in the share of waste management expenditure per capital

DiD	2013-2016	2017-2020	dbp
sm	14,25	44,25	-30,00
um	67,53	5,89	61,63
dbg	-53,28	38,36	-91,63

Source: own processing

The largest percentage changes were observed in the selected group of unsupported local governments. Based on the high value of the percentage change, we assume that during this period a selected group of unsupported municipalities spent funds on capital investments in waste management. In the second examined period, we recorded a higher percentage increase in supported municipalities, but with a lower percentage point than in the case of non-supported municipalities in the previous year.

Table 7. Change on the proportion of sorted waste in percentage points

DiD	2013-2016	2017-2020	dbp
sm	17,77	74,96	-57,19
um	19,80	44,40	-24,60
dbg	-2,03	30,56	-32,59

Source: own processing

The percentage changes in the share of recycled waste are significantly different between the investigated periods. The reason may be the fact that in the last 3 years biodegradable waste has also been included among the recycled waste. The highest change between periods was recorded in supported municipalities. We recorded the highest increase in the supported municipalities, in the amount of 74,96 percentage points in the second examined period. We can also notice an increase in the selected sample of unsupported municipalities, but with a lower percentage point.

5 Conclusion

The increase in funds spent on waste management combined with the increase in the competences of municipalities shows us the importance of examining environmental policy also from the point of view of financing municipalities. With supported financial programs, state and local governments are trying to eliminate the amount of mixed municipal waste produced, which often ends up in landfills. One of the supported programs was OP Quality of the environment, the 11th challenge focused on the sorted collection of municipal waste, recovery of biodegradable municipal waste and mechanical-biological treatment of municipal waste is being investigated as part of it. Most of the supported entities used the financial support for the implementation of the collection yard project or the purchase of mechanical machines for the processing of biological waste.

By examining the impact of supported municipalities through publicly available financial indicators and comparing with a selected sample of non-supported municipalities, we found the effectiveness of the funds spent. The percentage changes in the funds spent on the waste management program, the share of waste management expenses per inhabitant and the recycling rate were higher in the second investigated comparative period (2018-2020) in the supported municipalities. We conclude from this that the funds from the operational program were used by the municipalities that needed these funds and later applied them. The selected non-supported municipalities had higher indicators in the first examined period (2013-2016). The assumed reason is high changes in finances due to capital investments in the waste management program.

The results confirmed the impact of funds from European funds on the monitored indicators of supported local governments and helped to solve their waste management, which, however, remains a complex and neuralgic point in the activities and responsibilities of local governments. The importance of environmental policy is recognized by national and European policy, which in this programming period 2022-2027 focuses on legislative measures and economic/grant policy. Its influence and impact on municipal waste management therefore remains a challenge for further/our research. Solving waste as part of the circular economy is and will be a complex and long journey that can only be achieved through the cooperation of transnational, national and local levels of governance. However, it must become more and more pronounced and with a higher accent a strong motivation for citizens as "producers" of municipal waste through set processes, used technologies, environmental education, participatory tools and economic favouring of those who, with their approach and attitude, participate in increasing and achieving the quality of life in his village.

Research can be an incentive for supplementing the evaluation of the state of implementation of the environmental quality operational program at the Ministry of the Environment of the Slovakia from the point of view of financial comparison of supported municipalities and non-supported municipalities. The results of the research show us the effects of the use of support for the financing

of local governments, which can motivate other local governments to use European funds in the field of environmental policy in the future. At the same time, the research indirectly monitors the effectiveness of the use of funds from the EU from the Environmental Quality OP, which can help to create effective conditions for support recipients in the Slovak Republic in the next program period.

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13th International Scientific Conference
"Karviná Ph.D. Conference on Business and Economics"
November 2-3, 2022, Horní Lomná, Czech Republic

Conference Proceedings
Silesian University in Opava, School of
Business Administration in Karvina, 2022

A COMPARISON OF LIMITED LIABILITY COMPANIES BASED ON THEORIES OF STEWARDSHIP AND AGENCY

Radek Kowala[1]

[1]*Silesian University in Opava, School of Business Administration in Karvina,*
Univerzitní nám. 1934/3, 733 40 Karvina, Czech Republic
email: kowala@opf.slu.cz

Abstract
The topic of handover of governance is currently important with regard to the life cycle of companies. The researchers focused on this issue in the context of the current change of ownership and CEO. This study aims to conduct a literature search in relation to the future research objectives and to formulate a framework for targeting primary research. In seeking answers to the above questions, the use of stewardship and agency theories appears to be the correct approach. Based on a literature search, appropriate tools will be found to compare companies that have experienced a handover of governance with the industry in order to objectively assess their economic success. The theoretical section discusses the theories of stewardship and agency applied to the evaluation of corporate governance style. The empirical part presents a proposal for targeting primary research with respect to the Czech environment.

Keywords
Corporate governance, enterprise management, agency theory, stewardship theory, ratios.

JEL classification
M14, G34

1 Introduction

The thesis will deal with the elaboration of the basic theoretical framework of the investigated issue of transfer of administration and management of limited liability companies in the Czech environment with regard to situations when the managing director is not the owner and the owner is not the managing director of the company at the same time. In the literature, it is common to encounter the issue of transferring a family business to family members, especially the topic of succession. However, the need to hand over the business to professionals outside the family ranks is rarely examined. There are many reasons why it is important to highlight this issue, one of which is the increasing percentage of family and non-family businesses in the Czech Republic whose owners are no longer able to fully perform the management and administration function. The urgency of a precise handover of governance and management in cases where there is no more suitable alternative is increasing in view of the increasing age of the founding fathers.

The issue of ageing businesses is currently very topical, even though little attention is paid to this specific topic in the Czech Republic. Part of this lack of interest can be attributed to the fact that entrepreneurship as such is a relatively young and new sector in the Czech Republic's modern history. The reason for the lack of development of entrepreneurship was the era of the totalitarian regime, where any kind of private entrepreneurship was suppressed. The situation changed for Czechs and Slovaks in 1989 after the so-called Velvet Revolution (Koráb, Hanzelková and Mihalisko, 2008).

The issue of ageing enterprises and its solution can be viewed through the enterprises that have already implemented the handover of management in the Czech environment in the past.

The aim of this paper is to conduct a literature search in relation to the research objectives and to formulate the basic framework for targeting primary research.

Main research objective: to assess the impact of corporate governance handovers based on selected ratios compared to the industry.

Secondary research aim: Identify executive behaviour based on ratio indicators using stewardship and agency theory.

2 Corporate governance Theory

The issue of corporate governance, or in other words, according to the literature, corporate governance, is defined by the OECD (2015) as including "the set of relationships between a company's management, its governing bodies, its shareholders and other stakeholders. It also provides the structure through which the objectives of the company are set, the means to achieve those objectives are determined and the success of the company is monitored".

In essence, corporate governance can be described as a structure whose mission is to ensure that the right questions are asked in the organization along with the establishment of control mechanisms to ensure that the answers reflect the need to create long-term, sustainable, and renewable value (Monks & Minow, 2011).

According to Frank (2011, p. 173), organizational innovation can be defined as changes and innovations in organizational strategy, corporate structure and culture, socio-psychological atmosphere, and organizational management systems.

Organizational innovations can be defined as anything that significantly changes the way in which management performance is implemented or significantly modifies the usual organizational forms in terms of shifting the goals of the organization. Changing the way managers perform their work in the sense of enhancing organizational performance can lead to significant improvement in competitive position and can be termed as organizational innovation (Veber et al., 2016

A consequence of the separation of ownership from corporate governance may be a situation where managers do not only promote the objectives of the owners but seek to achieve their own objectives, such as obtaining high pay, a company car, insurance contribution, housing allowance, social status, or social prestige. From the perspective of the theory of the firm, information asymmetry arises when ownership is separated from governance. The problem of promoting owners' interests can be addressed by positive incentives to managers such as incentive pay programs or negative incentives, which is the threat of dismissal. A model that is appropriate for the information asymmetry situation is the tenant-proxy theory or agency theory. One of the models of agency theory is the so-called moral hazard, which is based on the hidden behaviour of the manager compared to the owner (Hořejší, Soukupová, Macáková and Soukup, 2018).

2.1 Definition of Agency Theory

The origins of agency theory go back to 1932, when Berle and Means assumed that managers (called agents) seek to increase their economic benefit at the expense of the benefit of the owners of the organization (principals) who hire the managers. As a result, a conflict (principal-agent problem) arises as the managers' behaviour harms the interests of the organisation, and hence the owners. The separation of ownership from management allows for the emergence of information asymmetry and, to some extent, bounded rationality of the persons involved. The negative consequences of separating ownership from management can be eliminated if control mechanisms are in place in the organisation, even though they are associated with additional agency costs.

Information asymmetries and other externalities are widespread in many economic cooperation situations. Many examples include significant relationships such as employer-employee, shareholder-manager, or patient-physician. In terms of methodology, the principal-agent relationship is closely related to risk sharing, hidden effort, monitoring, hidden characteristics, screening, and self-selection (Bamberg and Spremann, 1989). Managers have their own interests, which are often different from those of the organization. In this case, it is common for their behavior to be opportunistic, but since opportunism does not always stem from a conflict of interest, the use of stewardship theory is more appropriate to overcome the limitations of agency theory (Davis et al., 1997).

2.2 Defintion of Stewardship Theory

The contradiction between owners (principals) and managers, who are here referred to as stewards, can be overlooked because of the very similar motivations of both actors (Donaldson, 1990a, 1990b, Barney 1990).

The behaviour and actions of the manager or steward here are influenced by long-term self-interest maximisation, such as obtaining a stable job, insurance or pension scheme. For this reason, he or she will act in accordance with the interests of the owners and the organization as a whole, without any ownership stake in the organization, as the long-term welfare of the organization coincides with the long-term utility maximization of the manager (Eddleston and Kellermanns, 2007).

Stewardship theory assumes, when it comes to the governance of an organisation, that top management acts in the best interests of the organisation (Hilb, 2021), despite the fact that, financial incentives and control systems have not been implemented to ensure such behaviour. The role of governance in an organization has a strategic focus and a performance function, focusing on proper management leadership with the intention of achieving the mission and goals.

Stewardship Theory is summarized by J. J. Chrisman (2019) in his article Stewardship Theory: Realism, Relevance, and Family Firm Governance, where among other things, he presents the view of the need to modify and expand the assumptions of stewardship theory to increase its relevance and improve its ability to describe reality. The author of the article cites several weaknesses of the theory, such as the person model, ignoring some basic truths about individuals, and only partially accounting for the bounded rationality of the individual. With respect to the topic of applying stewardship theory to family businesses, the author promotes the view of the need to modify assumptions, as family businesses have many characteristics associated with stewardship theory, but do not always mindlessly behave according to it.

In spite of all the criticisms of these theories, the author of this thesis believes that agency and stewardship theories are the right direction to take with regard to the need to describe the possible positive and negative phenomena of handing over corporate governance.

3 Research methodology and data

Based on previous research, identification of the research gap and objectives, the research purpose of this paper is to (1) summarize the acquired theoretical knowledge in the area of corporate governance transfer and (2) propose a primary research design applicable for further research.

Research phases and data description

Over time, there has been and continues to be a separation of management positions in the company from the owners. This gives the company's activities a somewhat different dimension. The objective of a rational owner is to realise profit and increase the value of the company. However, the manager treats the company as if it were a living entity. This gives him a somewhat different view of its objectives. He is fundamentally concerned with the survival of the enterprise, with gaining and increasing market share, in order to provide the enterprise with a degree of stability for its existence and further development. The manager should pursue as his basic objective the efficiency of resource use and at the same time the market potential. Ideally, he should construct a top-level indicator reflecting both aspects. Thus, the manager should manage the performance of the enterprise as a whole and not turn his eyes only to the structure of a part of the resources and to the mere assessment of the financial health of the enterprise (Váchal, Vochozka et al., 2013).

For the purposes of enterprise evaluation, the author of the thesis finds it appropriate to use ratio indicators, which according to Růčková (2011) are the most numerous and at the same time the most used group of indicators, while facilitating the comparison of the analysed enterprise with other enterprises in the same industry.

The basic ratios suitable for assessing the health of a firm include profitability, liquidity, activity and debt ratios (Janišová and Křivánek, 2013).

PROFITABILITY INDICATORS

Profitability indicators are generally referred to as profitability indicators. In the English literature they are referred to as profitability ratios. In the earlier Czech literature, the term return still appears. Probably the most apt term is profitability. The basic profitability indicators include:

Return on Assets (ROA) is calculated as the ratio of earnings before interest and taxes to assets:

$$Return\ on\ assets = \frac{EBIT}{assets}$$

ROA, or return on assets, expresses the return on capital, without taking into account the sources from which the business activities were financed. This indicator can be used to comprehensively measure the efficiency and return on total capital employed. The indicator can also be used to evaluate the performance of past management. In this case, the financial structure of the firm is irrelevant because we are only assessing the ability to reproduce capital.

Return on Equity (ROE) refers to how much net equity there is per one crown of invested capital:

$$Return\ on\ equity = \frac{EAT}{equity}$$

The return on equity ratio is abbreviated as ROE. It is an indicator with the help of which a company can determine whether its capital is sufficiently appreciated, given a given level of risk. If the ratio shows an increasing trend, it may indicate an improvement in the operating result, a decrease in the equity ratio or a decrease in the return on equity. In the case of the items that make up the ratios, equity is a completely unambiguous item and we apply the same rules of application and evaluation to profit as we do to the ROE ratio (Růčková, 2011).

Return on Sales (ROS) indicator speaks about the proportion of profit before interest and taxes contained in one crown of sales:

$$Return\ on\ sales = \frac{EBIT}{sales}$$

The profitability of sales indicator expresses the profit margin, which is one of the basic indicators of business success. Profit in this case is measured by sales, as one of the most important items of revenue for non-financial companies. The profit margin values are then good to compare with similar companies in the industry (Knápková, Pavelková and Šteker, 2013).

LIQUIDITY INDICATORS

By liquidity, we mean the ability of an enterprise to pay its liabilities. Liquidity ratios measure the items that a firm can pay with the items that must be paid. It is up to the firm to decide what level of certainty it chooses to measure. It then substitutes assets with different liquidity or convertibility into cash into the numerator. Current assets and current foreign resources are some of the most important items in this measurement, and are used by the leading indicators. We consider current foreign resources to be current liabilities, bank loans and financial assistance.

Current liquidity (liquidity tier III)

$$Current\ liquidity = \frac{Current\ assets}{Short\ term\ external\ resources}$$

Current liquidity can be described as the ratio of current assets to short-term foreign resources. The recommended value of this ratio is between 1.5 and 2.5. In a situation where there is an equality of current assets and current foreign resources, with the turnover of current foreign assets being higher than the turnover of current assets, we can speak of a significant riskiness.

Quick liquidity (liquidity tier II)

$$Quick\ liquidity = \frac{Current\ assets - stocks}{Short\ term\ external\ resources}$$

It is one of the most important liquidity indicators. First of all, because it does not contain questionable items, which are mainly inventories. The indicator shows the extent to which a firm is able to pay its short-term liabilities without having to sell inventories. In general, a ratio of 1:1 is optimal, with the understanding that the firm does not have to sell its inventories (Mallya, 2007).

Immediate liquidity (liquidity tier I)

$$Immediate\ liquidity = \frac{Current\ financial\ assets}{Short\ term\ external\ resources}$$

A more stringent liquidity indicator is instant liquidity, which is the ratio of current financial assets to current liabilities. When we talk about current financial assets, we mean cash on hand, bank accounts and other short-term marketable securities. The recommended value of this ratio ranges from 0.2 to 0.5 (Scholle, 2012).

ACTIVITY INDICATORS

The results of the activity ratio analysis indicate whether the firm's assets are adequate to finance current and future activities. Liquidity ratios also measure a firm's ability to use invested funds efficiently. Activity ratios, inform about the firm's asset utilization, a high asset turnover rate may indicate an insufficient amount of assets, and conversely, a low turnover rate will most likely represent an inefficient use of the firm's assets.

Turnover of assets

$$Turnover\ of\ assets = \frac{Turnover}{Assets}$$

Asset turnover indicator comprehensively assesses the efficiency of the use of total assets. The indicator expresses the number of turnovers of total assets in 1 year. The literature recommends an indicator value of at least 1. In the case of a lower result than 1, we can talk about the overcapacity of the company's assets and inefficient use of assets (Kislingerová, Pavelková and Šteker, 2010).

Receivables turnaround time

$$Receivables\ turnaround\ time = \frac{Average\ receivables}{Turnover} \text{ x } 360$$

Accounts receivable turnaround time is a calculation that evaluates the ratio of average accounts receivable to average daily sales. Thus, the indicator expresses the period from the beginning of the receivable to the payment of invoices by customers. In general, as the time to collect receivables increases, the costs associated with the need for credit also increase (Knápková, Pavelková and Šteker, 2013).

Commitment turnaround time

$$Commitment\ turnaround\ time = \frac{Current\ liabilities}{Turnover} \text{ x } 360$$

An indicator of the turnaround time of liabilities, indicating the time interval from the time the liability is incurred to the time it is repaid to the supplier. Firms perceive the maturity of a liability in the opposite way to the maturity of receivables. We observe here a tendency to try to keep the receivables turnaround time as short as possible and the payables turnaround time as long as possible. This is because trade credit is not interest-bearing and is therefore profitable for the firm. As for the turnover period of liabilities, to ensure the liquidity of the firm, this period should not be shorter than the turnover period of receivables (Mace, 2006).

INDEBTEDNESS INDICATORS

Debt ratios indicate the level of risk. The amount of risk is directly proportional to the capital structure of the firm, i.e. the structure of equity and debt. One of the basic rules of business is that a firm must be able to pay its debts whether it is prosperous or not. Therefore, the more indebted a firm is, the higher the risk that it will be unable to repay its obligations and will approach bankruptcy.

Despite the risk of using foreign capital described above, a certain amount of debt is beneficial to the firm. In general, foreign capital is a cheaper source than equity capital. This phenomenon can be explained by the fact that the interest resulting from the borrowing of foreign capital reduces the amount of tax, and since interest is part of the cost, it reduces the amount of profit that is subsequently taxed. This effect can be referred to as a tax shield.

If we consider the different types of capital in terms of the cost of financing corporate activities, equity is the most expensive instrument and its counterpart is short-term foreign capital, such as trade credit or short-term bank credit.

In terms of risk, however, it follows that equity is the most expensive instrument, but also the safest. Equity financing is mainly chosen by conservative forms of company management.

According to the above, it can be said that the most optimal ownership structure of a firm is a combination of equity and foreign capital, acquired as cheaply as possible. The exact ratio then depends on the business activities of the firm.

Debt ratio

$$Debt\ ratio = \frac{External\ sources}{Total\ assets}$$

Another basic indicator is the total debt. The literature recommends values ranging from 0.3 to 0.6. However, when assessing indebtedness, we should take into account the firm's industry affiliation and, no less, the firm's ability to repay interest on debts (Knápková, Pavelková and Šteker, 2013).

Debt to equity ratio

$$Debt\ to\ equity\ ratio = \frac{Total\ debts}{Total\ assets}$$

The indicator measures the extent to which equity is leveraged. A high value of the indicator speaks of a dangerous debt to assets ratio of the company. Otherwise, a low value of the indicator may indicate a very conservative way of managing the company or an inability to use debt instruments. In many professional articles and recommendations, it is possible to read about the recommended value, which ranges from 0.6 to 1.

Equity ratio

$$Equity\ ratio = \frac{Equity}{Total\ assets}$$

The self-financing ratio should be used as a complementary indicator to the total debt ratio, and it is advisable that their sum is approximately 1. The ratio shows the proportion of the company's assets that are financed with owners' money. Just like the previous indicator, it is very important for the

evaluation of the overall financial situation of the company, and comparison with other profitability indicators is necessary (Růčková, 2011).

4 Primary focus of research

Secondary sources from official statistics and registers will be used for data analysis. These include profit and loss statements, balance sheets and ratio-based assessments of selected industries.

The quantitative analysis will be carried out on companies in the Czech Republic from 2010 to 2020. Taking into account the needs of the objectives of the thesis, the following basic criteria were chosen:

1. CZ ID NUMBER

2. The registration number was active between 2010 inclusive and 2020 inclusive (i.e. companies established before 2010 and dissolved after 2020).

3. Only Ltd.

4. Turnover category was 1 million between 2010 and 2020. CZK or more in at least 9 of these 11 years.

5. The owner in each of the years 2010 inclusive - 2020 inclusive is only a natural person or several natural persons.

6. Managing director ≠ owner (completely different, none of the owners is also managing director).

- We track in each year always as of 31.12.
- The condition managing director ≠ owner is met in at least 7 of the 11 years.

7. They have submitted a balance sheet and income statement for at least 5 years between 2010 and 2020.

5 Conclusion

The transfer of corporate governance is still a relatively new area of interest in the Czech Republic. This is due to historical events affecting the business environment. On the basis of the literature, it is now possible to analyse companies in the Czech Republic according to established criteria that have undergone a handover process in the past. Their comparison with the industry can visualize the trend of economic success in comparison with the industry. Subsequent application of stewardship and agency theories could approximate the long-term behaviour of the executive in relation to the economic performance of the enterprise.

The aim of this paper was to conduct a literature search in relation to the research objectives and to formulate a framework for targeting the primary research. In view of the literature search, the author of the thesis finds it appropriate to examine the selected companies based on the ratio indicators and theories of stewardship and agency.

6 Acknowledgement

This research was financially supported from the project IP/3/2022 Project of institutional support of Silesian University.

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13th International Scientific Conference
"Karviná Ph.D. Conference on Business and Economics"
November 2-3, 2022, Horní Lomná, Czech Republic

Conference Proceedings
Silesian University in Opava, School of
Business Administration in Karvina, 2022

DO ATHLETES TAKE MORE RISKS IN FINANCIAL DECISIONS?

Daniel Krcho[1]

[1]*University of Economics in Bratislava, Faculty of National Economy,*
Dolnozemská cesta 1, 825 35 Bratislava, Slovak Republic
email: daniel.krcho@euba.sk

Abstract
Different authors proposed numerous determinants of propensity to risk. In our research, we investigate whether there is a relationship between practicing sports and accepting financial risk. For this purpose, we analyse 35 subjects whose risk profile was evaluated through their provider of financial services. Our results indicate that subjects who practice sports have riskier investment profile compared to those who do not engage in sports at all. These findings may bring new insight into the understanding of the relationship between personality and propensity to take risks in financial decisions.

Keywords
Propensity to risk, personality traits, sport, financial risk.

JEL classification
G11, G41

1 Introduction

Is decision making in financial matters influenced by whether the subject practice a sport? Although risk in general has been studied in detail, insufficient attention has been paid to some links between personality traits and propensity to risk.

This paper investigates the hypothesis, whether athletes are riskier in their financial decisions than non-athletes. The main idea why this might be so lies in personality. We assume that there are particular personality traits linked to both propensity to risk and tendency to practice sport. This question is interesting not just from the point of view of psychology, but is also compelling for economists. It is not always feasible to conduct psychological tests or questionnaires in order to find out someone's personality traits. It is, on the other hand, easy and casual to ask, whether they practice sport of any kind. If our hypothesis holds, we might get a very fast (albeit very rough as well) estimate of their propensity to financial risk.

Our paper begins with literature review. Here we are looking for correlation between particular personality traits affecting propensity to risk and sport. In the next part, we describe our data and specify, why we have chosen ordered logistic regression model. Results section focuses on descriptive statistics, demography and our estimation of ordered logistic regression model with calculated logistic distribution. This is followed by discussion, where we address shortcomings of our data. Then follows conclusion, references and appendix.

2 Literature Review

Are athletes taking more risks? It is true that health insurance companies ask potential clients if they play any sports, and an athlete may actually represent a riskier client due to the higher risk of injury. However, this is not the risk we want to investigate. In this paper, we deal with the question of whether a sportsman or sportswoman takes a higher risk in their financial decisions. Is there any relationship between practicing sport and taking risk? Are the financial decisions of athletes riskier than those made by non-athletes?

The theoretical background of this question is not quite straightforward. We take a closer look on the personality, as a link between propensity to risk and practicing sport. Many authors claim that it is the individual's personality that influences his or her propensity to risk, including the financial one. Other authors study how one's personality influences the tendency to engage in sports. For this reason, we need to focus on the intersection of particular personality traits and see if there is a

correlation between traits that cause a higher propensity to risk and those that are associated with willingness to engage in sports.

2.1 Personality and risk

One of the best-known personality trait taxonomies is the big five personality traits, sometimes referred to as five factor model (FFM) or just the Big Five. As its name suggests, it lists five personality traits, namely openness to experience (often just openness), conscientiousness, extraversion, agreeableness and neuroticism.

According to Nicholson et al. (2005), risk propensity is strongly rooted in personality and there is a clear big five pattern for overall risk propensity. In their results, high openness to experience increases tolerance of uncertainty, therefore increases propensity to risk. High extraversion is associated with sensation-seeking, thus increasing propensity to risk. Sensation-seeking is a key subcomponent of propensity to risk. Low neuroticism and agreeableness lower the anxiety about negative consequences, therefore increase propensity to risk. And lastly, low conscientiousness allows to bypass the cognitive barriers of need for control and consideration, thus increasing propensity to risk.

Soane et al. (2010) obtain similar results, as the overall willingness to take risk is associated with low scores in agreeableness, neuroticism, and conscientiousness and high scores in both openness and extraversion. Lauriola and Weller (2018) also analyse five factor model and associated high extraversion and openness to experience with higher propensity to taking risks. On the other hand, high agreeableness and conscientiousness are linked to risk aversion. Their results for neuroticism are mixed.

Also, Jochemczyk et al. found out that extraversion and openness to experience are positively related to propensity to risk. However, this effect is domain specific. Effect of extraversion is limited to recreational risk, social risk and risk in health and safety. Openness has strong links for recreational and social risk together with relatively weak effect for investment risk. Moreover, authors found conscientiousness to have weak (but statistically significant) negative relation to almost all risks except investment risk.

Finally, meta-analysis of Highhouse et al. (2018) indicates just weak to modest relations between big five personality traits and propensity to risk and concluded, that propensity to risk comes from a different personality trait that might be independent of the five-factor model.

2.2 Personality and sport

Tok (2011) investigated personality differences between athletes and non-athletes using big five personality traits. His results show significantly higher levels of openness and extraversion and lower levels of neuroticism and conscientiousness in case of athletes.

Similarly, Steca et al. (2018) compared personality traits of athletes and non-athletes using big five factor model. According to them, there are personality differences between athletes and non-athletes, as well as between high- and low-level athletes. Successful athletes scored higher in conscientiousness, extraversion, agreeableness and neuroticism but not openness in comparison to non-athletes. Less successful athletes scored higher than non-athletes only in agreeableness and extraversion.

Engels et al. (2022) focused on the enjoyment of physical activity. Their results suggest that there is relationship between big five personality traits and practicing sport. Results of Eysenck et al. (1982) shows that athletes on all levels of proficiency possess extraverted temperament. Moreover, athletes score low on neuroticism.

According to meta-analysis done by Rhodes and Smith (2006), high extraversion and conscientiousness is positively correlated to physical activity, as well as low neuroticism. On the other hand, openness to experience and agreeableness were not linked with physical activity.

Another meta-analysis done by Wilson and Dishman (2015) conclude that physical activity is positively affected by high level of conscientiousness and extraversion and low level of neuroticism. There is a rather small but statistically significant relationship between physical activity and openness. Agreeableness, however, is not significant.

2.3 Synthesis and shortcomings of literature

What athletes and risk-takers have in common? According to our findings from the works of other authors, both groups possess high level extraversion with low level of neuroticism. Remaining three personality traits – openness, conscientiousness and agreeable – seem to be mixed. Therefore, we propose that athletes have higher propensity to risk, due to their personality traits of high extraversion and low neuroticism, which are characteristic for risk-seeking person.

However, it is necessary to add that general propensity to risk and domain specific propensity to risk might differentiate significantly (Lauriola – Weller, 2018; Soane – Chmiel, 2005; Soane et al., 2010). For example, particular trait may influence propensity to risk in general, but not specifically in finance or heath and vice versa.

Another potential shortcoming lies in the relationship between personality and sport. Most studies focus on professional sportsmen and sportswomen. Our study concerns ordinary people who either play some kind of sport in their leisure time or not. However, ordinary people who practice sport just as a past time activity without competition or membership in any sport club are rarely studied. Because of this, personality of athletes mentioned in studies above might differentiate from personalities of common people practicing sport just for recreation.

3 Data and Methodology

We gathered information about 35 clients of a financial advisor in Slovak Republic. Complete data can be found in Table 1 in appendix. As a part of their personal analysis these clients were asked whether they practice sport of any kind. The reason for such question is to determine potential injury risk for the purpose of underwriting insurance.

The information is collected by advisor. This is why also subjects with negative answer might engage in some sport, but its level is no sufficient enough for the advisor (or client) to consider it significant. For example, for the question "Do you do any sport?", the client might answer "Yes, I sometimes go cycling". The advisor, however, consider it unimportant, thus do not include it into the analysis of the client and does not mark it into client's record.

The way the data is collected makes it highly subjective. It depends both on the client's answer and consultant's way of view. However, the question about sport is asked for the purposes of life insurance, so we might expect it to be fairly accurate. Moreover, our data is from a single workplace, so the choice is likely to be consistent.

Second important indicator is propensity to risk. This is measured with results of the investment questionnaire. The questionnaire is created by the company providing financial advisory in order to measure investment profile of their clients. The most risk-averse clients are considered conservative. Most risk-seeking are dynamic and between the two are balanced clients.

We use ordered logistic regression (ologit). Our dependent variable is risk expressed using investment strategy and sport as explanatory variable. In the original data, investment strategy is described just verbally, as in Table 1. For the purpose of our research, we quantify the strategies as following. Value of conservative strategy is 0, value of balance balanced strategy is 1 and dynamic strategy has value of 2.

That does not necessarily mean that propensity to risk of a subject with dynamic strategy is double in comparison to subject with balanced strategy, nor that conservative strategy is riskless. It is only for the purpose of ordering from the most risk-seeking to the most risk averse group. This is the reason why we employ ordered logistic regression (ologit), as only the order, not the values matter.

4 Results

Out of 35 subjects, 18 are females and 17 males. There are 20 athletes and 15 non-athletes in the pool. Division between athletes and non-athletes is described in detail in the previous section. Complete data can be found in Table 1 in appendix.

16 subjects have conservative investment strategy according to investment questionnaire. From the rest, 5 have balanced strategy and remaining 14 have dynamic investment strategy. We identify the last group as the most risk-seeking, while the first group is considered risk averse. Balanced strategy assembles those whose propensity to risk is somewhere between.

Table 2 shows us that majority of conservative clients are non-athletes. On the other hand, majority of dynamic clients do engage in sports.

Table 2. Distribution of strategies

Strategy	Athlete		Total
	no	yes	
Conservative	12	4	16
Balanced	3	2	5
Dynamic	5	9	14
Total	20	15	35

Source: own processing

Pearson $\chi 2$ of 4,725 is statistically significant, therefore we could claim that there is a relationship between practicing sport and investment strategy.

In Table 3 is demographic description of data set.

Table 3. Demographic description

	males	females	total	age average	age median	risk average	risk median
non-athletes	9	11	20	30.95	28.5	0.65	0
athletes	8	7	15	31.73	28	1.33	2

Source: own processing

As we can see, athletes are considerable riskier according to investment strategy questionnaire. While "average" non-athlete shows risk of 0,65 i.e., something between conservative and balanced investment strategy, "average" athlete risk propensity is somewhere between balanced and dynamic strategy.

There might be a suspicion that our results are distorted, because young supposedly tend to practice sport more often than the older. Therefore, higher risk among athletes is caused by lower average age. However, as we can see in Table 3, average age of athletes and non-athletes are 31,73 and 30,95. Their medians are similar as well at 28 and 28,5 respectively. Age difference between the two groups is negligible.

Another possible objection is about sex. It is widely established that men are, in general, more risk-seeking than women. Our sample consist 18 females and 17 males, but they are not distributed proportionally. Group of athletes consists of one more man than women, but non-athletes' group has two more woman than men. This could signify that athletes are more prone to financial risk only because the group consist of larger percentage of men.

However, both age and sex proved to be statistically insignificant in our model. Yet, our estimated ordered logistic regression showed that practicing sport has statistically significant positive effect on riskiness of investment strategy. Results of ologit model with strategy (risk) as dependent variable and practicing sport as independent variable is bellow in Table 4.

Table 4. Ologit model estimation

Strategy	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Sport	1.462447	0.6861342	2.13	0.033	0.117649	2.807245
/cut1	0.4166188	0.4498616			-0.46509	1.298331
/cut2	1.072049	0.4830224			0.125343	2.018756

Source: own processing

Positive Sport coefficient means that practicing sport is linked to choosing investment strategy with higher risk. In order to interpret the coefficient and cut-points, we calculate logistic distribution in Table 5.

Table 5. Logistic distribution

	Athlete	Non-athlete
Conservative	0.260027005	0.397326124
Balanced	0.403621494	0.255013616
Dynamic	0.336351501	0.34766026

Source: own processing

Probability of an athlete being conservative investor i.e., to have the lowest propensity to risk is about 26%. Probability of a non-athlete being conservative is about 39,7% and so on. As we can see, the model estimate matches the expectation for conservative and balanced strategy. However, in case of dynamic strategy i.e., high risk, there seems to be no significant difference between athlete and non-athlete. Non-athletes are predicted to be even slightly more prone to dynamic investment strategy.

4.1 Discussion

Looking at the descriptive statistics in our sample, we can see a hint of a relationship between investment strategy and practicing sports. This relationship is theoretically based on the fact that not only propensity to risk, but also the willingness to play sports are rooted in one's personality.

Our model using ordered logistic regression estimated, that being an athlete is indeed statistically significant in choosing investment strategy, and therefore propensity to financial risk. However, while it holds for conservative and balanced clients, predicted probabilities for dynamic clients are somehow confusing, as both athletes and non-athletes report virtually the same values.

We see two main shortcomings in our analysis. First potential problem is the sample size. Our dataset consists of only 35 subjects, which we consider too small to be relevant, regardless of our results. Secondly, as we mentioned in the methodology, athlete status is quite subjective.

Nevertheless, we do not consider our research entirely barren. We show that there might be substantial relationship between propensity to risk and practicing sport. Three quarters of conservative clients are non-athletes and 60% of athletes have dynamic investment strategy (in comparison to 25% in the non-athlete group).

Estimating one's propensity to financial risk through their relation to sports is a novel approach. This idea may be particularly interesting for providers of financial services. However, more research needs to be done in order to prove or reject the hypothesis. For the future research, more data is necessary. Therefore, we need more subjects and preferably, more objective definition of an athlete.

5 Conclusion

In this paper, we investigate whether there is any relationship between practicing sport and taking risks in finance. Main idea is that both the tendency to play sports and propensity to take risks are rooted in one's personality.

For this research, we used sample of 35 subjects, each having one of three investment strategies, representing their propensity to risk in finance. Group of athletes possesses riskier strategies than non-athletes. Most of conservative i.e., low-risk clients are non-athletes (12 out of 16). Most of clients with dynamic strategy i.e., high-risk clients are athletes (9 out of 14). We estimated ordered logistic regression model. Sport coefficient is positive and statistically significant, which means that practicing sport is indeed related to investment strategy. Logistic distribution, however, provided mixed results.

Relationship between sport and propensity to financial risks is interesting, yet only seldom studied phenomenon. In order to further expand our understanding of this issue, it is necessary to gather more data.

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Appendix

Table 1. Complete data

subject	sex	age	sport	strategy
1	female	29	no	dynamic
2	female	53	no	balanced
3	female	50	yes	conservative
4	male	50	yes	conservative
5	male	28	yes	dynamic
6	female	28	no	conservative
7	female	28	no	conservative
8	male	28	yes	dynamic
9	female	28	yes	conservative
10	male	21	no	conservative
11	male	21	yes	dynamic
12	male	21	no	dynamic
13	female	21	yes	conservative
14	female	21	no	conservative
15	female	29	no	conservative
16	female	34	yes	balanced
17	female	27	no	dynamic
18	female	21	yes	dynamic
19	male	21	yes	dynamic
20	female	30	no	dynamic
21	male	32	yes	dynamic
22	male	23	no	balanced
23	female	31	yes	dynamic
24	male	24	yes	dynamic
25	male	21	no	conservative
26	male	30	no	conservative
27	female	22	no	balanced
28	male	25	yes	balanced
29	male	24	no	conservative
30	female	52	no	conservative
31	female	62	yes	dynamic
32	male	33	no	conservative
33	male	30	no	dynamic
34	female	48	no	conservative
35	male	49	no	conservative

Source: own processing

13th International Scientific Conference
"Karviná Ph.D. Conference on Business and Economics"
November 2-3, 2022, Horní Lomná, Czech Republic

Conference Proceedings
Silesian University in Opava, School of
Business Administration in Karvina, 2022

IS ADVERTISING VOLUME THE KEY TO SUCCESS IN E-COMMERCE?

Daniel Kvíčala[1]

[1]*Silesian University in Opava, School of Business Administration in Karvina,*
Univerzitní nám. 1934/3, 733 40 Karvina, Czech Republic
email: kvicala@opf.slu.cz

Abstract
The internet is full of advertising, we can see it on almost every website, social network or online application. Advertising is annoying for a large number of people, but it is also a powerful tool for attracting new customers. E-shops use all kinds of advertising and pay huge amounts for it. So the question is what is the real impact of advertising on users' buying behaviour and companies' business results. There are still not enough scientific studies to answer this question reliably, despite the fact that every e-shop has this data. Therefore, the aim of this paper will be to investigate the relationship between sales and the volume of ad impressions on Google, Sklik, Facebook, YouTube and Instagram. The research will involve data from 6 B2C e-shops offering different products.

Keywords
E-commerce, advertising, impressions, e-shop, online marketing.

JEL classification
M37

1 Introduction

Nowadays, there is no need to describe at length the nature of the e-commerce market, as this issue is one of the most topical topics in both the scientific and business environment. The main characteristics of this market include its dynamism and wide reach, where e-commerce has long been growing every year and gaining more and more importance in the retail sector (Yu et al., 2016). At the same time, it also provides companies with the opportunity to reach customers almost worldwide. Customers, in turn, have the opportunity to browse and compare offers from a very wide portfolio of retailers from the comfort of their homes, where they can move between retailers with just a click. Business is conducted through e-shops, where companies present their products and use various tools to try to get customers to buy. In addition to e-shops as such, companies also use online marketing channels such as social networks, PPC platforms or product comparison sites. These tools provide companies with the possibility of direct and quite sophisticatedly targeted communication through various types of content such as photos, videos, texts, etc.

One of the important elements of the e-commerce environment is the collection and use of customer data, which e-shops can use to streamline online marketing communications and marketing activities in general (Mazzarol, 2015). It is also important to mention that online marketing channels as well as the data that is generated in e-commerce is standardized almost all over the world. This fact implies that strategies, tactics, analytics and other activities can be applied across the entire e-commerce environment, which significantly increases the range of application of the acquired knowledge and experience. Academics and managers alike have almost endless possibilities when working with data and interpreting it for further use. However, despite these facts, there is still a significant knowledge gap as there are not enough empirical studies based on business data to provide the desired insights into customer buying behaviour, online advertising and e-commerce as a whole.

The ease of setting up and launching online sales to a high degree lowers the barriers to entry in the e-commerce market, which has caused a rapid increase in the number of e-shops. And it is the high number of e-shops combined with low barriers to customer movement and the aforementioned comparison of offers and service between e-shops that increases the intensity of competition. E-shops must therefore constantly work on increasing the value offered by analysing both customers and their needs and behaviour and their competitors (Muangpan, 2022). This also increases the emphasis on the effectiveness of online marketing communication, which includes, for example, advertising.

There are many ways of advertising in the online environment and with it many ways to spend with the company's resources. Each e-commerce store has a different volume and level of resources, but for all of them it is true that these are limited to a certain extent and therefore need to be handled with the highest possible efficiency (Priansa and Suryawardani, 2020). With this in mind, it is essential for e-shops to plan their advertising activities well, ideally based on empirical data that they can gather from external and internal sources. As part of the analysis, they should process both historical and current data through continuous collection and evaluation. For this purpose, there are a wide range of readily available tools that often collect and evaluate data automatically in the basic setup. As an example, both e-commerce and advertising platforms provide an easy way to get an overview of customer behaviour on the e-shop or the results of advertising activities using tools such as Google Analytics, Google Ads, Facebook or Sklik. The use of data from these platforms for analysis and recommendation generation are the subject of this article. Specifically, it will be about the relationship between the volume of ad impressions through these tools and the business results of the selected e-shops expressed in terms of sales and simplified profit (the difference between sales and advertising costs). Sourly, the aim of this paper will be to investigate the relationship between sales and the volume of ad impressions on Google, Sklik, Facebook, YouTube and Instagram.

2 Literature review

In the literature review, the author focuses on online marketing area, customer behaviour in e-commerce and the use of online marketing channels, along with an overview of the metrics that are tracked in online marketing activities. It will also present how e-shops can approach data collection, analysis and interpretation.

2.1 Customers and businesses in e-commerce

Kotler and Armstrong (2012) described online marketing as marketing using various online electronic channels like e-shops or communication platforms. E-shops are now strong window to showcase and educate the consumers about products and services offered by the organizations (Sohaib et al., 2019). Also, they serve as a powerful tool to build a strong market position by combining the informative, relational, and transactional elements (Roy and Sharma, 2021). Literature divide them, among others, as B2C (business to customer) and B2B (business to business) by the type of customer they deal with. In this article, the main focus are B2C e-shops. Li and Wang (2011) provided an ICTRT framework which explains that e-shop should have five basic attributes: information dimension, communication dimension, transaction dimension, relationship dimension, and technical merit dimension. The e-shop's success depends on its ability to generate and delivery value for customers based on understanding their needs (Chen et al., 2018).

Customer behaviour in e-commerce have specifics that need to be taken into account during planning of online marketing activities. One of the main specifics of shopping in an e-commerce environment is convenience and time saving (Andrews and Currim, 2004). Some authors also state that consumers in the online environment have the opportunity to easily, quickly and clearly obtain information about retailers and products, compare them with each other and find out which ones best match their preferences (Degeratu et al, 2000; Alba et al, 1997). At the same time, customers are able to choose from a range of retailers around the world (Brynjolfsson et al., 2011) and have much lower barriers to switching from one retailer to another (Yen, 2011; Burnham et al, 2003). Simply put, a customer only needs one click to visit and possibly purchase from another retailer (Gommans, Krishnan, Scheffold, 2001). There is also a specific in trust towards the seller. In the online environment, transactions are carried out remotely and customers cannot, for example, touch or test the goods, which increases uncertainty and also brings certain risks associated with the purchase, such as the provision of personal data. This increases the importance of the trust that the online retailer

must inspire in the customer, otherwise the customer will buy elsewhere (Reichheld and Schefter, 2000).

2.2 Advertising and communication channels

Online advertising is a way of online communication that is fast evolving and its posibilities are constantly developing in tactics and forms of content that affect customers shopping decisions (Gburova and Fedorko, 2019). The focus has currently turned to the customer and his individual needs and characteristics. In online advertising, the focus is on speed, flexibility, creativity and differentiation from the competition (Xie et al., 2022). Priorities in online advertising are speed, flexibility, personalisation, creativity and ingenuity, which is how e-shops try to differentiate themselves from the competition (Priansa and Suryawardani, 2020). Zhang et al. (2021) claims that e-shops can generate profit consistently only by continuously optimising their online advertising activities and dividing their investments into an effective combination of different channels, which in practice can be an extremely complex task that a significant number of e-shops may never be able to cope with. In addition, online advertising enables activities related to targeting (Goldfarb, 2014), which means that, for example, when selling pet supplies, it is possible to target readers of pet magazines or even those interested in a specific goods associated with a particular animal (Blake, Nosko and Tadelis, 2015). Second, advertisers can immediately gain and analyse data and measure the performance of their ads to optimize its effectiveness, and at the same time they can adjust their ads' content to generate better results (Suciu et al., 2019).

Online advertising on search engines, pay-per-click ads (eg. Google or Sklik) and social media platforms (eg. Facebook) are one of the fastest growing online advertising marketplaces. The space available for paid ads, or positions, is sold using auctions and payment is calculated considering the number of clicks each position receives (Santos et al. 2022). Google is the most popular search engine and, with more than 3.5 billion searches processed every day, it is also the most visited website in the world (Huesch et al., 2022). Facebook is a social media platform and social networking service with more than 2.8 billion monthly active users. Users can post text, photos and multimedia and interact directly with other users (Schintler and McNealy, 2022). Instagram is a photo and video-sharing social networking service acquired by Facebook in 2021. It has more than one billion users and more than 500 million daily active users (Omnicore, 2021). Google Analytics is a standard tool used for website usage tracking (Nelson, 2016). Using Google Analytics is relatively easy and does not necessarily mean additional financial costs for e-shop (Porsche et al., 2022). The aforementioned tools provide the opportunity to implement online marketing activities, collect and gather data on advertising effectiveness and customer behaviour. Thus, they serve as valuable online marketing communication tools and their use can help the e-shop to achieve its business goals.

2.3 Performance measurement in e-commerce

The importance of measuring the performance of e-stores is one of the essential activities in running an e-commerce business, as it is the data obtained from measurement that should be the cornerstone in planning future not only marketing activities of e-stores (Welling and White, 2006). Despite the data being nearly identical across the e-commerce marketplace, there are many ways to measure, interpret, and apply it to improve e-commerce results. Thus, there is no clear-cut interpretation of how e-shops should measure performance, both in academic and practical terms (Ghandour, 2010). One of the reasons why this is the case is that e-commerce performance varies according to the perspective of individual stakeholders, whether they are e-commerce owners, customers or investors (Welling and White, 2006).

However, in the context of the topic of the article, it can be stated that the basic element for measuring the performance of an e-shop are statistics from the area of sales such as sales, costs and profit, which are undoubtedly among the important indicators (Ghandour, 2015). Thus, in this article will author focus mainly on financial indicators connected to sales and advertising. Specific metrics describing

customer behaviour, e-commerce performance and online marketing activities are for example number of ad impressions, CPM (cost per thousand impressions), link clicks, CPC (cost per click), website visits, time spend on the website, revenues, cost of advertising, number of transactions, etc. (Benwell and Deans; 2011, Hojdik, 2017).

3 Methods and data

The aim of the paper is to analyze the relationship between the volume of online advertising on several communication platforms and the business results of an e-shop. The volume of advertising will be expressed using the sum of advertising impressions (IMP) on the selected platforms. Those platforms were Google Ads, Facebook, Instagram and YouTube. The ads for each e-shop were in different formats, specifically text ads in search, banner ads, photos, videos and sponsored social media posts. Business results mean the total revenue (REV) of the e-shop and also the profit (PROF), which is expressed in a simplified form by the difference between revenue and advertising costs (COS).

For the research, data of six B2C e-shops offering different product categories were analysed. The data was obtained directly from the selected e-shops and comes from the Google Analytics platform, which collects all data on customer behaviour on the e-shop, sales and performance of individual communication platforms. As the performance data of the mentioned communication platforms was aggregated during the export, the results of all platforms are expressed as their sum. The data collection period is 30 months (January 2020 to June 2022) and the dataset is divided into days, so 912 observations are analysed, with values of selected variables assigned to each day. The total sum of individual e-shop values is 440,399,852 impressions, 428,711,422.00 CZK in sales and 38,310,118.64 CZK in advertising costs. It should also be noted that the sales do not come only from the mentioned channels, as their source is also other activities of e-shops. An overview of summary data on individual e-shops is available in Table 1. Due to the anonymisation of the e-shops, which was one of the conditions of their participation in the research, their names will not be mentioned. Each e-shop will therefore be identified only by a letter from A to F and the only identifying data will be the product category offered by the e-shop. The product categories are as follows: gifts (A), sports equipment (B), clothing (C), food supplements (D), fitness equipment (E) and bicycles (F).

Table 1. Summary of e-shops

E-shop	IMP	REV (CZK)	COS (CZK)	PROF (CZK)
A	52490,941	28496182	4516978	23979204
B	220157840	175119151	22806992	152312159
C	108391081	134961310	7200634	127760676
D	19036759	19266784	2108192	17158591
E	26501105	9220231	1202131	8018100
F	13822126	61647764	475191	61172572

Source: own

The relationship between impressions and revenues / profit will be examined using correlation and regression analysis. Pearson correlation coefficient is the most commonly used correlation method for measuring bivariate linear correlation (Wubetie, 2019). The study of correlations between characters has applications in practically all fields of research. Simple correlation only allows assessing the magnitude and direction of the association between two characters, without providing necessary information regarding the direct and indirect effects of a group of characters in relation to a dependent character of greater importance (Lucio et al., 2013). The relationship (or the correlation) between the two variables is denoted by the letter r and quantified with a number, which varies between −1 and +1. Zero means there is no correlation, where 1 means a complete or perfect correlation. A strong correlation is considered to be from 0.7 upwards and a weak correlation is

considered to be from 0.3 downwards, whether positive or negative. (Akoglu 2018, Her and Wong, 2020).

The aim of simple regression analysis is to assess the relative influence of a predictor variable on a given outcome. This differs from correlation analysis, which aims to (a) test the strength and direction of the relationship for forecast and estimation and (b) assess whether the data meet these criteria before applying the equation for forecast and estimation. The main purpose of linear regression is to fit a line to the data that predicts Y based on X. R-squared (R2) or coefficient of determination. It is a measure (ranging from 0-1) of the proportion of variability in Y that can be explained by the variability in X through their linear relationship, or vice versa (Zou et al., 2003).

4 Results

A summary of the results is available in Table 2 and Table 3. Before discussing and interpreting the results of the analysis in more detail, it should be noted that the highest value of both analyses was 0.52, in the case of the correlation between IMP and REV for the MS e-shop. Thus, it is already clear from this fact that in none of the cases studied was there a strong relationship or influence of IMP on REV or PROF. In the case of regression analysis, the highest value was 0.26 for the same e-shop.

Table 2. Summary of results (Correlation)

Relationship	A	B	C	D	E	F
IMP /REV	0,42	0,51	0,23	0,23	0,11	0,04
IMO/PROF	0,37	0,49	0,22	0,19	0,09	0,03

Source: own

In terms of the correlation analysis of the relationship between IMP and REV variables, a moderate correlation was found in two cases (MS, DS), while in the other cases the values were less than 0.3 and therefore a weak relationship. The lowest value was 0.04 for e-shop BL. Thus, in this case there is almost no linear relationship between IMP and REV. In all cases of analysis of the relationship between IMP and PROF, the values were lower compared to IMP and REV. Thus, it means that the relationship of IMPs with sales and profit of e-stores is weak except for two values where the relationship is moderately strong.

Table 3. Summary of results (Regression)

Relationship	A	B	C	D	E	F
IMP /REV	0,17	0,26	0,05	0,05	0,11	0,002
IMO/PROF	0,14	0,24	0,05	0,04	0,01	0,002

Source: own

As far as the regression analysis is concerned, it is already quite clear in advance that, in view of the results of the correlation analysis, no strong influence of impressions on sales or profit of e-shops is likely to be found here either. The highest value was measured again for the MS e-shop, namely 0.26 (IMPxREV). Thus, the impressions explain a maximum of 26% of the value of the dependent variable, i.e. sales. Except for the e-shop DS, where the coefficient took the value of 0.17 (IMPxREV), the values for all other e-shops were lower than 0.055 (MZ) and the lowest 0.0016 (IMPxPROF for BL). Considering the literature and the results of the research, it can be concluded that the volume of advertising impressions has a rather weak relationship with business results and also a weak influence on their development in the case of the selected e-shops. Thus, at least when applying correlation and regression analysis.

5 Conclusion

The results show that the volume of ad impressions alone is not sufficient to reliably increase the effectiveness of advertising, as the ad may not be sufficiently attractive to the selected target group. To maximize ad effectiveness, a company needs to monitor sub-metrics such as CPC or CPM to help determine how attractive a given ad is to potential customer (Grigas et al., 2017). Another possible metric for evaluating ad performance can be click-through-rate, which determines the ratio of users who clicked on an ad to the number of impressions (Ren et al., 2018). Based on these metrics, the e-shop can then decide on how to proceed with the ads, specifically whether to change the ad content or targeting (Ren et al., 2016; Zhang et al., 2017). As none of the e-shops showed a strong correlation between separate advertising volume and revenue and profit, it can be assumed that these recommendations are valid regardless of the product category offered. However, it should be mentioned that further research will be necessary to confirm this statement.

The basic and at first glance perhaps trivial managerial implication can be formulated into a rule that "volume is not enough", and therefore companies must look at the content of advertising rather than its volume. Specifically, companies must know the needs of customers and the resulting benefits of the product offered before launching (not only) online marketing advertising campaigns. These must then be formulated into a clear message embedded in attractive visuals, which must then be distributed through adequate channels. The advertisements on the channels themselves must be properly targeted to make them as relevant as possible to the customer in relation to their stage in the buying process. The See-Think-Do-Care framework, for example, can be used as a tool to help organise the content, channels and objectives of individual advertising campaigns according to these principles.

The theoretical implication is, for example, to approximate the relationship between impression variables and profit and sales. Since no strong relationship between these variables has been demonstrated using the data, other variables must be used to determine sales or profit. The lack of available empirical studies in this area also increases the emphasis on expanding knowledge and thus conducting more similar research to better understand, among other aspects, customer buying behavior in e-commerce and increasing the effectiveness of firms' online marketing activities.

This research also has several limitations. The size of the data sample is not generalizable to the entire e-commerce market, even in the Czech Republic, let alone globally. The sample is also not sufficiently representative for any of the individual product categories, as only one e-shop was included for each category. Another limitation is that the author was not aware of the specific type of ads in each case, whether they were content or text ads, or the format of the ads (photo, banner, video). It is also unknown on which channels the advertisements were distributed and in what proportion. The targeting characteristics of the ads are also unknown, hence we do not know to what extent the ads were shown to relevant audiences, which may have a major impact on its results (Ren et al., 2016; Zhang et al., 2017) hence what was the frequency of the ads or how many times the average customer saw the ad. The methods used examine the relationship of selected variables within a single observation, which, in the context of the research, may affect the predictive value of the results. In fact, advertising impressions may have a lagged effect on revenues or profits. Therefore, to eliminate this limitation, a VAR (vector autoregression) method could be used in the future (Gunter and Önder, 2016; Orzan et al., 2020; Roy and Sharma, 2021).

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13th International Scientific Conference
"Karviná Ph.D. Conference on Business and Economics"
November 2-3, 2022, Horní Lomná, Czech Republic

Conference Proceedings
Silesian University in Opava, School of
Business Administration in Karvina, 2022

EVALUATING CONSUMER E-COMMERCE ACCEPTANCE USING TECHNOLOGY ACCEPTANCE MODEL

Sarath Thulaseedharan Mallika[1]

[1]*Silesian University in Opava, School of Business Administration in Karvina,*
Univerzitní nám. 1934/3, 733 40 Karvina, Czech Republic
email: mallika@opf.slu.cz

Abstract
This paper attempts to identify latent factors that can be used for measuring consumer acceptance of E-commerce. In order to achieve this objective, this study integrates e-shopping quality, enjoyment and trust to technology acceptance model. A survey was conducted among 78 internet users. Website design, customer service, privacy/ security, shopping atmosphere/ shopping experience were the factors evaluated in this study. Exploratory factor analysis revealed that the 17 variables used in this study are correlated to each other and three latent variables can be used to measure consumer e-commerce acceptance.

Keywords
E-commerce acceptance, technology acceptance, trust, privacy, shopping quality.

JEL classification
M21

1 Introduction

The E-commerce industry witnessed tremendous growth during the last decade. This took shopping to an entirely new level. Growth in the number of internet users, smartphone and computer users positively contributed to the growth of e-commerce. The growth however is uneven. There are several factors that contribute to the uneven growth of e-commerce across various countries. It includes Trust, Security, Social Status, Culture, literacy etc.

The open nature of the Internet as a transaction infrastructure and its global nature create uncertainty around on-line transactions, and this makes trust and risk crucial elements of e-commerce. Trust has long been regarded as a catalyst for buyer-seller transactions that can provide consumers with high expectations of satisfying exchange relationships.

Although growth in sales suggests that the number of online consumers is growing, many research failed to explain what factors influence consumer attitude towards online shopping. A few studies attempts to explain consumer acceptance to e- commerce from the perspective of technology acceptance model. It explains ease of use and usefulness of a technology influence consumer's attitude towards acceptance of a technology and hence the use of it.

Several models have been proposed over the years to explain individual's behaviour towards usage of technologies. This study attempts to study consumer acceptance of e-commerce from a technology acceptance perspective with trust and shopping enjoyment as additional influencers on customer attitude. TAM proposes belief-attitude-intention-behavior causal relationship for explaining and predicting technology acceptance among users. According to TAM, perceived usefulness and perceived ease of use determines person's attitude towards using a technology.

The objective of this paper is to identify latent factors which can be used to assess consumer e-commerce acceptance using extended TAM

The results of this study will help e-tailers in identifying those factors which influences consumers with their decision making to go online for a shopping. This will help them to develop their strategies to increase website traffic and hence sales.

2 Literature Review

The acceptance and use of information technologies can bring long term benefits to both organisations and individuals such as convenience, time efficiency, financial efficiency and improved overall performance (Sharda, Barr and McDonnell, 1988).

The technology acceptance model (TAM) provides a conceptual framework for this study. The primary objective of TAM was to describe the processes underpinning the acceptance of technology. This will help in the prediction of behavior and to give a theoretical explanation for the successful implementation of technology. The practical objective of TAM was to inform practitioners about measure that they might take prior to the implementation of systems and technology.

Davis (1989, 1993) commenced with the development of TAM by framing the processes mediating the relationship with external factors and actual system use. This model was based on the Theory of Reasoned Action, which explains a psychological perspective on human behavior.

TAM proposes that perceived usefulness and perceived ease of use determine a person's attitude towards using that technology which in turn determines their intention to use it. Individual's decision to perform a behavior is the result of the analysis of the benefit that they expect to receive from the behavior compared to the effort or costs they put in to perform the behavior (Johnson and Payne, 1985; Payne, 1982). This means that the use of a system or technology is determined by an evaluation of the trade-off between perceived usefulness and perceived ease or difficulty of using it (Davis, 1989)

Perceived usefulness is defined as the individual's perception of the extent to which the use of a given technology improves performance. Perceived ease of use is degree to which a person believes that using a particular technology is free of effort (Davis, 1989). Perceived ease of use also shares a similarity with the complexity factor theorised in the innovation diffusion literature as a barrier to innovation adoption. It was defined as the extent to which individual's find innovation difficult to understand and use.

According to TAM, technology acceptance is a three stage process. External factors (System design) trigger cognitive responses (perceived usefulness and perceive ease of use), which, in turn, form an affective response (attitude towards using technology), influencing user behavior (Davis, 1989; Davis 1993). Therefore, user behavior is the outcome predicted by perceived ease of use, perceived usefulness and behavioural intentions.

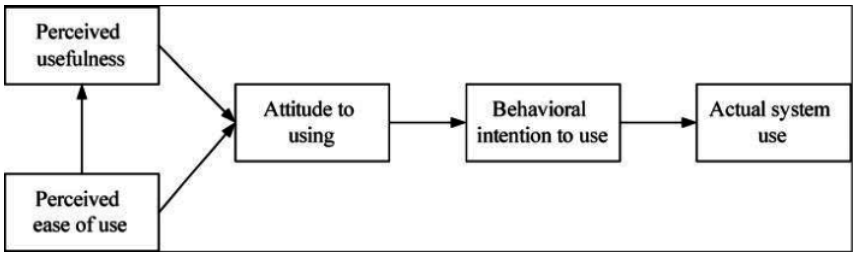

Fig. 1.Technology Acceptance Model (Source: https://www.researchgate.net/figure/Figure-2-The-technology-acceptance-model_fig2_290518613)

Earlier studies have validated TAM as a robust framework for understanding user's acceptance of technology in various contexts including banking technology (Adamson and Shine, 2003), m-commerce (Bruner and Kumar, 2005), telemedicine technology (Chau and Hu, 2001) etc. Despite the robustness of TAM, some research has shown inconsistent findings regarding the effect if ease of use on attitude. Researchers suggested that belief factors such as usefulness, enjoyment, trust and performance may influence individual's attitude towards using a technology than by ease of use (Van der Heijden and Verhagen, 2004)

2.1. Extending TAM

Although the wide application of TAM confirmed the robustness of the theory, the authors of the model aimed to increase its predictive power. The rationale behind extending the model was the limited understanding of the conditions underpinning user's perception of technology utilisation. Vijayasarathy (2004) argues that the variables in TAM are better suited for decisions involving few technology usage choices than to situations involving user's voluntary choices like online shopping. Therefore, the original TAM variable may not adequately capture key factors influencing consumer's attitudes towards e- shopping.

2.2. Trust

Researchers in different disciplines agree on the importance of trust in the conduct of human affairs, but there also exist widespread disagreement regarding a suitable definition of the concept. Social psychologists define trust as an expectation about the behavior of others (Lewicki and Bunker, 1995). Luhmann (1989) defines trust as a mechanism to reduce the complexity of human conduct in situations where people have to cope with uncertainty. In this perspective trust bears important functions for the consumer- it reduces information complexity and lowers the perceived risk of a transaction. McKnight and Chervany (2001) define trust as the extent to which one believes that the new technology usage will be reliable and credible. Pavlou (2003) defines trust in B2C e-commerce as the belief that allows consumers to willingly become vulnerable to web retailers after having taken the retailer's characteristics into consideration. All these definitions depict consumer's beliefs about the safety of shopping online.

Internet usage has been increasing tremendously over these years but the online purchase has not been in par with that. One of the key reasons for it is the concern regarding the safety of conducting business over the internet (Gefen and Straub, 2003). Consumer's trust and e- tailers and internet technology are key factors that influence believes about safety.

Trust is more critical for online shopping than in purchasing from traditional brick-and-mortar stores due to the unique characteristic of virtual shopping. Consumers feel greater uncertainty and elevated risk in their online shopping decisions due to the inability to see and touch a product and due to the absence of face to face interactions. Therefore, trust is one of the most effective tools for reducing uncertainty and risks and generating a sense of safety (Pavlou, 2003). Therefore, trust is believed to play a vital role in consumer's e-shopping behaviours.

Results of previous research supported trust as an antecedent of ease of use (Pavlou, 2003), usefulness (Pavlou, 2003), attitude (Chen and Tan, 2004) and behavioural intention (Gefen and Straub, 2003). A trust- enhanced technology acceptance model was developed by Dahlberg et. al (2003) and it provides a better explanation of consumer technology adoption than the basic TAM.

2.3. Enjoyment

Shopping enjoyment can be defined as the pleasure that a consumer derives from the shopping process or activities (Mihic and Milakovic, 2017). It is the extent to which one believes that the shopping will provide reinforcement in its own right, going beyond performance consequences (Chiders et.al, 2001).

Shopping behavior of people is trigged by several motivations (Utilitarian and hedonic) and by their shopping goals (Chen and Shen, 2005). Primary advantages of e- shopping like convenience, competitive pricing and greater access to information are related to utilitarian perspectives and they are found to have huge influence on one's shopping behavior. However, hedonic aspects of e-shopping such as enjoyment, self- gratification and social experiences also influences one's shopping attitudes (Childers et.al., 2001)

Enjoyment is a major factor that drives users to accept a new technology (Bruner and Kumar, 2005). Davis et.al (1992) extended the original TAM to include perceived enjoyment as an additional motivational determinant of technology acceptance. Research on online consumer behavior has provided evidence that shopping enjoyment plays an important role in influencing shopping behavior/ attitudes (Childers et.al., 2001)

The role of trust and enjoyment in the formation of consumer attitude or intention to use a new technology has been discussed in many studies (Chen and Tan, 2004; Childers et al., 2001). However, the relationship among trust, enjoyment, ease of use, and usefulness are unclear. According to Gefen (2004), perceived usefulness influence trust, while others demonstrated that trust influences usefulness. Pavlou (2003) reports that trust influences both usefulness and ease of use.

2.4. E-Shopping Quality

According to Ahn et.al (2004), e-shopping quality refers to the overall consumer perceptions of the excellence and effectiveness of a product or service offered through their virtual store. Consumers' perception about online shopping is influenced not only by the quality of the product but also by the quality of the web site- their features and performance.

Researches have been too active in developing scales for measuring e-service quality. A number of scales have been presented by researches like SITEQUAL (Yoo and Donthu, 2001), eSQ (Zeithamal et.al, 2000) WebQual (Loiacono et.al., 2007), eTailQ (Wolfinbarger and Gilly, 2003) etc. WebQual, SiteQial, eSQ focus primarily on the website environment and interface, while eTailQ provides a more comprehensive look at the multiple dimensions comprising online retail service quality like Website design, Security/ Privacy, Fulfilment/reliability and Customer service. However, none of these scales evaluates the hedonic aspects of a website.

3 Methodology

Data was collected from people of all age, gender, employment type and level of education. The questionnaire consisted of 17 variables corresponding to factors web design, customer service, privact/security, and atmospheric/experiential. All variables except for demographic information were assessed using 7-point Likert scale (1= strongly disagree, 7= strongly agree). Respondents were initially asked to name the e-commerce site they use quite often and asked them to keep that retailer's name in mind while filling the questionnaire. All the variables used in this study were adopted from previous research (Ha and Stoel, 2009). On average, respondents spend about 7 minutes completing the survey.

A total of 78 responses were collected. 38 respondents were males which make it 50% of the total respondents. 43.6% of the respondents fell under the age group of 26 to 30 years and 32% fell under the group 20 to 25 years. Out of the 78 respondents, only 2 were over the age of 50.

89.7 % of the respondents were graduates where 56.4% had a master's degree and above qualifications. Students accounted for only 9% in this survey and 10.3% respondents were unemployed. 56 respondents were employed full time and 5 were self-employed.

Exploratory Factor analysis (EFA) was performed using principle component analysis and oblique rotation method (oblimin) was utilized as presence of correlations across undelying e- commerce factors was presumed (Matsunaga, 2010). The minimum factor loading (factor-variable correlation) criteria was set to 0.50. The communality of the scale, which indicates the amount of variance in each dimension, was also assessed to ensure acceptable levels of explanation. A minimum eigenvalue of 1.0 were used as criteria for the factor number decision.

4 Results

The overall significance of the correlation matrix was assessed using Bartlett's Test of Sphericity, which provides a measure of the statistical probability that the correlation matrix has significant correlation among some of its components. The result was significant, P <0.001, which indicated its suitability for factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy (MSA), which indicates the appropriateness of the data for factor analysis, was 0.875. Data with MSA above 0.8 are considered appropriate for factor analysis (Kaiser and Rice, 1974)

The factor solution derived from this analysis yielded three factors for the scale, which accounted for 67.13% of variation in the data. Scree plot, another technique to determine the number of underlying factors also shows similar result (Fig.2)

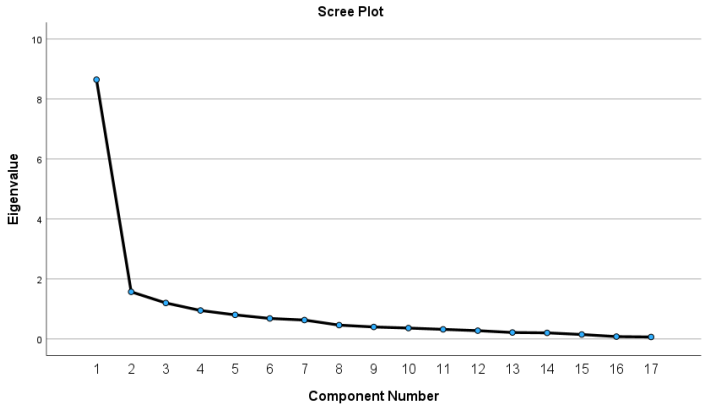

Fig. 2. Scree Plot (Source: own research)

Exploratory factor analysis revealed that three factors can be used for measuring consumer acceptance of e-commerce.

Table 1. Pattern Matrix

Pattern Matrix			
Variable	Factor 1	Factor 2	Factor 3
The site doesn't waste my time			0.537
I can go to exactly what I want quickly			0.78
The organisation and layout of the website faciliates searching for products			0.697
The site gives me enough information so that I can identify the item to the same degree as if I am in the store			0.677
The company is ready and willing to respond to customer needs	0.837		
The website has reasonable shipping and handling costs	0.639		
Customer service personnel are always willing to help you	0.796		
Inquiries are answered promply	0.759		
When you have a problem, the website shows a sincere interest in solving it	0.762		
I feel like my privacy is protected at this site		-0.736	
I feel safe in my transactions with this website		-0.85	
I feel I can trust this website		-0.816	
The website has adequate security features		-0.776	
The company behind the site is reputable	0.664		
It is really fun to shop at this website	0.813		
The site almost says "come in and shop"	0.704		
Buying at this website is exciting for me	0.675		

Source: Own research

The above table shows us whether our items for a particular construct loads well together or not. The first four items representing Web design loads well together and variables 5 to 9 representing customer service also loads together. Variables 10 to 13 load well together to its parent construct which is privacy/ security. However, we can see that the last four variables load together with the variables 5 to 9 to the construct customer service. We expect those variables to represent own construct, experiential/atmospheric.

5 Conclusion

This study explores factors that can be used to measure customer acceptance of online shopping using technology acceptance model (TAM). Three factors were found- Website design, Customer service and Privacy/ Security. The explained variance of the first factor, Website design is 50.84% which is greater than the other two factors.

The items expected to represent experiential/atmospheric failed to load together. These items loaded onto a factor other than its underlying factor.

According to this study, website design is the major factor that can be used for measuring consumer e-commerce acceptance. Markets should thus understand that the consumers aren't just interested in how secure your website is and how safe is to perform transactions on your website. Their decision is very much influenced by the overall design of the website- ease of using the website, easy navigation and availability of major information as consumers are usually sensitive to time.

Limitations in generalizing the results of this study includes, this study surveys consumers from India. The convenient sampling process prevents the generalization of finding to consumers outside India. Another major limitation to this study is the inadequacy of the sample size. Only 78 responses were collected which also impedes the generalisation of the results.

6 Acknowledgement

This paper is supported by the Ministry of Education, Youth and Sports Czech Republic within the Institutional support for Long-term Development of a Research Organization in 2022.

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QUO VADIS METAVERSE?

Ondřej Mikšík[1], Radka Bauerová[2]

[1]Silesian University in Opava, School of Business Administration in Karvina,
Univerzitní nám. 1934/3, 733 40 Karvina, Czech Republic
email: miksik@opf.slu.cz

[2]Silesian University in Opava, School of Business Administration in Karviná,
Univerzitní nám. 1934/3, 733 40 Karviná, Czech Republic
email: bauerova@opf.slu.cz

Abstract
Consumers are constantly influenced by new technologies or by the continuous improvement of established technologies. These accelerating technological changes have an impact on consumer behaviour. As a result of this phenomenon, some of the activities that consumers normally perform in the real world can move into the so-called Metaverse using virtual reality. Therefore, the aim of this paper is to reveal the activities that a particular segment of consumers would like to perform in the metaverse. An online questionnaire distributed by the IPSOS in Slovakia was used to collect primary data. Demographic criteria, frequency of internet usage, and social media usage were used to define the consumer segment. The research revealed that more than half of consumers surveyed would welcome the opportunity to travel in the metaverse or learn new skills. More than 1/3 of them would also welcome the opportunity to visit concerts, museums, and stores with real goods and spend their leisure time in the metaverse. Furthermore, it was found that consumers falling within the selected segmentation criteria examined differed in their perceptions of the different metaverse opportunities. The paper will be of professional benefit but could also be useful for interested non-professionals.

Keywords
Metaverse, Virtual reality, Consumer behaviour, Consumer perception, Questionnaire.

JEL classification
M31, J11

1 Introduction

Even before we started talking about the metaverse, it was possible to encounter virtual reality (VR). Virtual reality has been around since 1968 (Winters, 2021), while we have only been talking about the metaverse since 1992 (Novak, 2022). More recently, with the advent of 5G internet, Facebook's introduction of its Horizon Worlds metaverse and the adoption of the digital world due to the COVID-19 pandemic, a metaverse is emerging that takes into account VR technology in a very simplistic way, the metaverse can be seen as a parallel to reality that in some ways transcends the physical world (Winters, 2021). Through the metaverse it is possible to work (Murray, 2020), open businesses (Winters, 2021), communicate (Hutson, 2022), educate (Zhang et al., 2022) and meet others in virtual destinations (Hyun et al., 2022).

The metaverse is a relatively new thing that allows consumers to explore things from a different perspective. Thanks to the metaverse, there are new ways to meet friends, colleagues, and family, for example. The authors of this article will therefore focus on what activities a particular segment of consumers can perform in the metaverse. The goal of this paper is to reveal the activities that a particular segment of consumers would like to perform in the metaverse. To achieve the goal, an online questionnaire distributed by the research agency IPSOS in Slovakia was used.

The paper is divided into four chapters. The first chapter is devoted to the theoretical definition of the metaverse. The second chapter describes the research methodology which is followed by the primary research results in the third chapter. The last chapter is devoted to a discussion and conclusion of the research results.

2 Metaverse as a new phenomenon

It is undoubtedly wrong to say that the metaverse is something new and not yet fully known. The "metaverse" as the latest buzzword is attracting a lot of attention from industry and academia. The metaverse seamlessly connects the real world with the virtual world and allows avatars to perform rich activities including creation, display, entertainment, social networking, and commerce. It promises to build an exciting digital world and transform a better physical world through exploring the metaverse." (Yang et. al, 2022).

Hainahn et. al. "In recent years, the metaverse has attracted enormous attention from all over the world with the development of related technologies. The metaverse is expected to be a realistic society with more direct and physical interactions, whereby the notions of race, gender, and even physical disability would be weakened, which would be very beneficial to society."

One of the ways in which consumers can realise themselves in the metaverse is, for example, shopping. Digitalisation in grocery shopping has accelerated in recent years, which has of course also been compounded by the impact of covid-19. In the US alone, online and delivery orders have increased by around 50 per cent during the covid-19 pandemic and are expected to grow further in 2022. Globally, online grocery sales in 2026 are then estimated to increase to almost double the 2021 figure, meaning around 7.6 per cent share of online sales in total grocery sales.[1]

Burberry or Louis Vuitton have their eyes on the metaverse as another environment in which they can reach potential customers and sell their products. Bourlakis, Papagiannidis and Li (2009) even consider metaverse retailing as an evolution of e-retailing.

But shopping for food is only one way to use the metaverse. Entrepreneurship, for example, is another interesting option. The concept of the virtual world that the Metaverse offers breaks down the barriers between motherhood and entrepreneurship, creating a conducive environment that encourages entrepreneurial inclinations. This environment is characterised by low barriers to entry, which mainly involve the acquisition of digital products. It is also characterized by a rapidly expanding user base, a certain degree of anonymity, and a vast array of new activities for which products and services could be offered (Papagiannidis, 2008). One opportunity to take advantage of this world is e-commerce. Thus, even during maternity leave, the Metaverse provides mothers with a direct connection to customers through chat and an environment for marketing communication from the comfort of home (Jeong et al., 2022). At the same time, they can use this environment to sell their products themselves. This allows users to view the object of sale better than in an online store using only pictures or product slideshows (Shen et al., 2021). The metaverse therefore brings many opportunities for companies to realise themselves in this environment.

Likewise, the metaverse is becoming a phenomenon for consumers, who can perform many activities in this environment. Moreover, researchers have found that social self-efficacy in the metaverse mediates the positive relationship between the number of supportive interactions in the metaverse and young people's feelings of loneliness (Hyun et al., 2022). Hutson (2022) believes that the metaverse has the potential to continue the social and workplace changes that the pandemic has already accelerated, and to open up new avenues of communication and collaboration for a more inclusive audience and tomorrow. Researchers are now seeking to understand and explore the impact this new environment will have on marketing, education, healthcare, societal effects and issues relating to trust, privacy, bias, disinformation, application of law as well as the psychological aspects associated with addiction and the impact on vulnerable people (Dwivedi, 2022).

Another phenomenon associated with the metaverse is avatars, their possibilities, and displays. With the proliferation of virtual avatars and the recent advent of metaverse technology, the number of users expressing their identity through an avatar has increased. The research community has focused on refining the realistic expressions and non-verbal communication channels of virtual

[1] Statista Food&Beverage [online] [Accessed 27. August 2022] Available from: https://www.statista.com/statistics/1268769/global-edible-grocery-store-based-and-e-commerce-sales/

characters to create an experience more tailored to the user's needs. Results from this area showed that participants felt that an avatar that embodied their usual expressions was more similar to them than an avatar that did not. In addition, an avatar that embodied their appearance was closer to them than an avatar that did not embody it (Park, Kim and Whang, 2021).

3 Methods

This study focuses on identifying the activities that a particular segment of consumers would like to perform in the metaverse. Therefore, this exploratory research explored the possibilities of the metaverse from the perspective of ordinary consumers. As a research method, the survey method was chosen to obtain a sufficient number of respondents that correspond to the distribution in terms of demographic factors of the Slovak population. To find out the preferred activities, the respondents were asked to tick the selected activities they would like to perform in the metaverse. As a semi-open response type was used, respondents were also given the opportunity to write their own individual responses. Before completing the questionnaire itself, the concept of metaverse as such was explained, as this is research in an emerging field with which not all respondents may be familiar. Primary data was collected through the research agency in early 2022 in Slovakia. The survey collected responses from 525 respondents.

The following table presents the characteristics of the respondent sample in terms of selected sociodemographic factors and frequency of internet and social media use.

Table 1. Characteristics of respondents

Factors examined	Variables	N	Percentage
Gender	Female	214	40.8
	Male	311	59.2
Generation	Baby Boomers	37	7.0
	X	245	46.7
	Y	150	28.6
	Z	93	17.7
Size of a place of residence	Up to 1,000	69	13.1
	1,001 to 5,000	149	28.4
	5,001 to 20,000	90	17.1
	20,001 to 100,000	157	29.9
	More than 100,000	60	11.4
Education	Primary school	51	9.7
	Secondary school with apprenticeship	151	28.8
	Secondary school	221	42.1
	College	102	19.4
Frequency of internet use in leisure time in percentage	Never	0	0.0
	Once per month	1	0.2
	1 to 6 times week	11	2.1
	Daily - less than 3 hours	186	35.4
	Daily - 3 to 6 hours	121	23.0
	Daily - more than 6 hours	190	36.2
Frequency of social media use in percentage	Never	22	4.2
	less than a few times a week	29	5.5
	Several times a week	42	8.0
	Once a day	52	9.9
	Several times a day	366	69.7

Source: OECD

IBM SPSS software (version 21) was used for data analysis. Missing values were excluded from the analysis. In total, there were 14 missing values for the frequency of use of social networks. Considering the nominal type of data, the chi-square test was used for testing. If the chi-square test conditions were not met, Fisher's exact independence test was used.

4 Results

Data analysis first focused on the activities that consumers would like to do in the metaverse from an overall perspective. The first figure shows the results in terms of the popularity of each activity, ranked from most popular to least popular. The most popular activity would be traveling in the metaverse. Up to 66% of the respondents said they would travel in the metaverse if they had the opportunity. The second most popular activity (58% of respondents) was learning new skills. The results show that going to school in the metaverse would be welcomed by the least number of respondents. More than 1/3 of the respondents would like to visit virtual concerts and museums in the metaverse. A total of the 1/3 of respondents would like to spend their free time in the metaverse. Respondents also indicated other activities they would like to do in the metaverse, but the popularity of the others (see Fig.1) is very low (less than 1/3 of respondents).

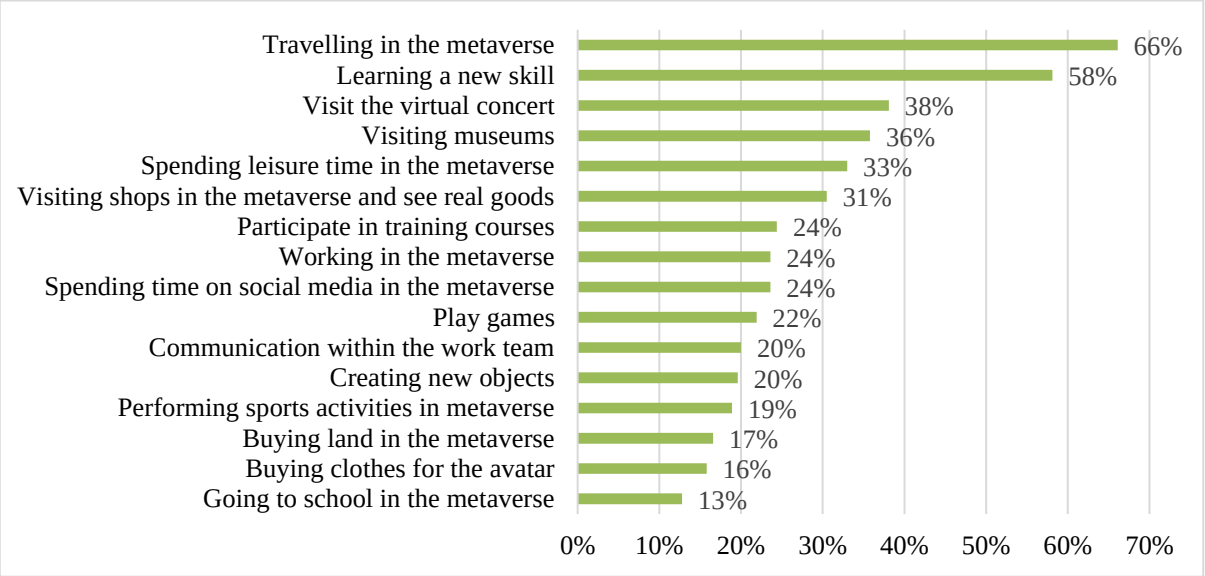

Fig. 1. Preference for selected activities realisable in the metaverse (Source: own processing)

Although only 13% of the respondents would welcome going to school, up to 58% would welcome learning a new skill, so it cannot be said that the respondents perceive learning in the metaverse as an inappropriate activity. Thus, they seem to be rather reserved within the formal educational process but perceive learning as such within the metaverse positively.

Subsequently, attention was paid to whether the respondents responded differently according to which categories they belonged to. Table 2 shows only the results of the tests performed that proved the relationship between the variables under study. The factors that influenced the responses of the respondents include generation assignment, education, gender, frequency of Internet use, and SM.

Table 2. The results of Chi-square Tests and Fisher´s Exact Tests

Activity	Factor	Test	Value	df	Asymp. Sig.	Exact Sig.
Spending time on social media in the metaverse	Generation	Pearson Chi-Square	22.651	3	**0.000**	
		Contingency Coefficient	**0.203**			
	Frequency of SM use	Pearson Chi-Square	13.213	4	**0.010**	
		Contingency Coefficient	**0.159**			
Learning a new skill (a new foreign language, how to make something, or how to use something)	Education	Pearson Chi-Square	14.340	3	**0.002**	
		Contingency Coefficient	**0.163**			
Play games	Generation	Pearson Chi-Square	9.356	3	**0.025**	
		Contingency Coefficient	**0.132**			
	Gender	Pearson Chi-Square	11.623	1	**0.001**	
		Fisher´s Exact Test				0.001
		Contingency Coefficient	**0.147**			
Going to school in the metaverse	Frequency of internet use	Pearson Chi-Square	23.239	8	**0.003**	
		Contingency Coefficient	0.206			
Performing sports activities in metaverse	Generation	Pearson Chi-Square	9.768	3	**0.021**	
		Contingency Coefficient	**0.135**			
Participate in training courses	Education	Pearson Chi-Square	16.514	3	**0.001**	
		Contingency Coefficient	**0.175**			
Visit the museums	Generation	Pearson Chi-Square	10.522	3	**0.015**	
		Contingency Coefficient	**0.140**			
	Education	Pearson Chi-Square	**8.717**	3	0.033	
		Contingency Coefficient	**0.128**			
Spending leisure time in the metaverse	Education	Pearson Chi-Square	**9.068**	3		
		Contingency Coefficient			0.028	
Create new items	Frequency of internet use	Pearson Chi-Square	**17.323**	8	0.027	
		Contingency Coefficient	**0.179**			

Source: own processing.

Those variables where a significant effect was confirmed were subsequently examined in more detail. Figure 2 shows the differences in the responses from the perspective of each generation. It is obvious that spending time on social media would be most welcomed by Generation Z, which is not surprising given the general knowledge of this generation. The generation that differs most from the other generations is the Baby Boomers, who would be least likely to spend time on social media, doing sports activities, or playing games in the metaverse. Yet, the results suggest that this generation also finds a favourite activity in the metaverse, which in this case is visiting museums.

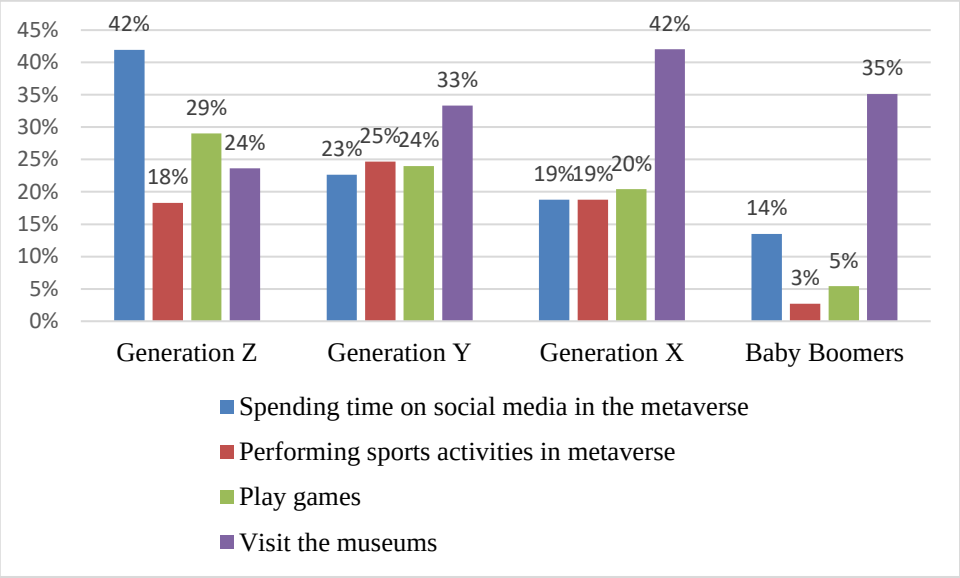

Fig. 2. Differences in preferences by generation (Source: own processing)

The following figure presents the results of an investigation of the effect of education on the popularity of selected activities. The result shows that the higher the education level the respondent has attained, the more they would like to participate in metaverse training. Respondents with a high school education are most interested in learning new skills, spending time in the metaverse, and visiting museums.

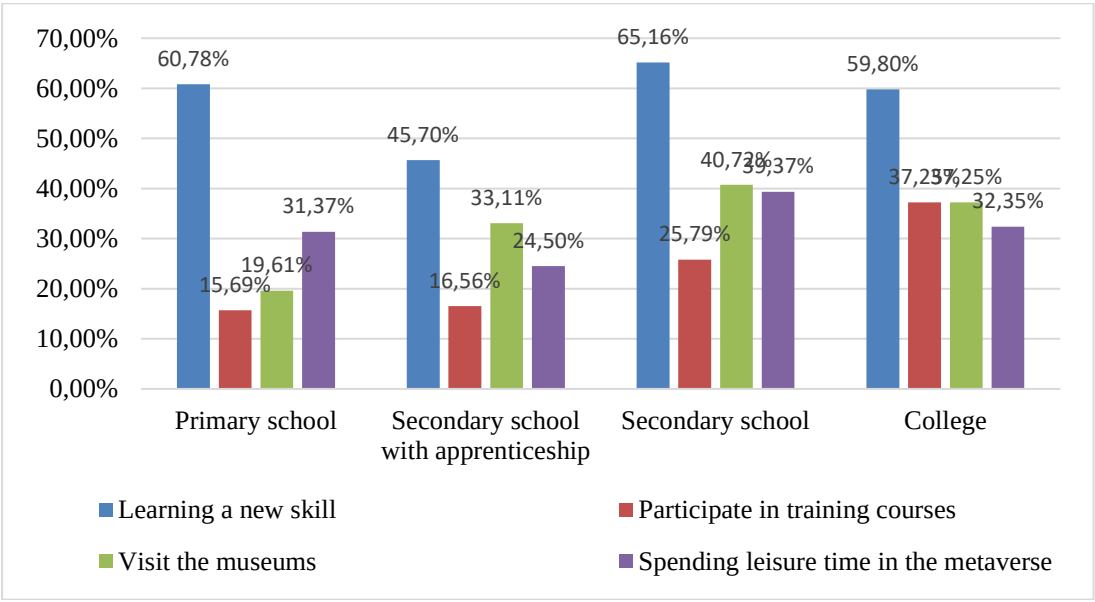

Fig. 3. Differences in preferences by education (Source: own processing)

The results of Fisher's Exact Test (see Table 2) showed that men and women answered differently when it came to the possibility of playing games in the metaverse. When analyzed in more detail, it was found that men (27% of them) were more likely to choose this activity than women (14.5% of them).

The frequency of internet use had an effect on the activity of going to school in the metaverse. Respondents who used the Internet 1-6 times a week showed the highest popularity of this activity (18.2% of them). The second largest group were those who use the Internet more than 6 hours per day. This factor also influenced the creation of new items in the metaverse. Here, the results were slightly balanced between the groups where respondents used the Internet daily and the group that did not use the internet at all, with results ranging from 17% of them to 23% of them. Only the group using the internet less than a few times a week was significantly different, where100% of them would create new items in the metaverse. However, there was only one respondent in this group compared to the other groups and therefore the results here may be somewhat skewed.

In terms of frequency of social media use, the results unsurprisingly suggest that respondents who use social media several times a day would most welcome the opportunity to spend time on social media in the metaverse. In total, up to 28% would like to perform this activity in the metaverse. Interestingly, 13.6% of respondents who have not used social networks at all to date would also like to spend time online.

The respondents also had the opportunity to write down their own activities they would like to do in the metaverse. The activities that appeared in these responses are listed in the following paragraphs:

- being outdoors all over the planet,
- participating in discussion groups with a specific focus (e.g. growing plants, handicrafts, debating books in a favourite genre, debating specialist literature - but in a different way to how it is now on social media),
- going on a date,
- taking a ride in a space machine,
- having sex,
- meeting people who are no longer alive,
- creating a world according to their own imagination,
- taking part in a virtual production process at a well-known brand (automotive for example).

As these were individual responses in this case, it was not investigated whether they were related to sociodemographic factors or frequency of internet use and SM.

5 Conclusion

The metaverse brings new opportunities to meet friends or engage in various activities. From the results of the research, it can be noted that one of the most appealing possibilities would be to use the metaverse for travel. Conversely, the least acceptable option would be to use the metaverse for school-related matters.

In the comparison between generations, it is possible to see a phenomenon in Generation Z, which perceives the metaverse as an opportunity to spend free time on social networks, and on the contrary, this generation has the least metaverse associated with sports activities. The other generations (X, Y and Baby boomers) see the metaverse as an opportunity to visit museums. Thus, there is an intergenerational difference, which is also related to access to new technologies.

Here, then, it is possible to see possible opportunities for linking the metaverse with tourism and targeting generations that seek experiences related to travel and exploring new places, as well as self-development and self-education. In the near future, large and important museums could implement tours of their exhibits (or at least some exhibits) using the metaverse. This could help, for example, those consumers who are limited in their travel for some reason. It could also serve as a sort of enticement for consumers who are unsure whether or not to also visit a site in person.

The limitations of the study are based on the assumption that there are differences between brands related to, for example, cultural backgrounds etc. and that these differences may influence the psychological and behavioural responses of users. Therefore research focusing only on Slovak

consumers can be considered a limitation of this study. Another limitation of the study may be the limits of the respondents' imagination. The questionnaire survey explained to the respondents what the metaverse is. For each activity studied, pictures of the metaverse environment were also added to show what the activity would look like in the metaverse. Despite the researchers' attempts to mitigate this risk with the above information, if respondents had no experience with virtual worlds, they may have found answering more difficult and required a great deal of imagination. Of course, this situation could also have influenced the evaluation of the different activities they would like to do in the metaverse.

Nowadays, metaverse is not common among all consumers. However, authors of this paper believe, it will be soon commonly known term and in this case it would be good opportunity to conduct another research to find out whether consumers do the activities which they now would like to do in metaverse.

6 Acknowledgement

This research was financially supported by the Student grant competition project SGS/18/2022: "The opportunities of using the metaverse in the implementation of product sales and marketing communication". The support is gratefully acknowledged.

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13th International Scientific Conference
"Karviná Ph.D. Conference on Business and Economics"
November 2-3, 2022, Horní Lomná, Czech Republic

Conference Proceedings
Silesian University in Opava, School of
Business Administration in Karvina, 2022

SYSTEMIC RISK PREDICTION USING ENTROPY RULE IN DOUBLE PORTFOLIO SELECTION STRATEGY: EVIDENCE ON US STOCK MARKET

David Neděla[1]

[1]*VSB – Technical University of Ostrava, Faculty of Economics,*
Sokolská třída 33, 702 00 Ostrava, Czech Republic
email: david.nedela@vsb.cz

Abstract
Recently, uncertainty in the financial markets makes the investment environment uncomfortable for investors and analysts. Therefore, we should try to predict the presence of systemic risk in the market. In this paper, we analyze whether applying the defined entropy measure rule employing considered as an alarm allows us to predict a systemic risk and thus outperform the simple portfolio selection strategy. In particular, Shannon and Tsallis entropy measures are used. To determine the optimal weights of a portfolio, we apply a multifactor model with OLS regression and a newly proposed double optimization approach while considering proportional transaction costs. More detailed, we assume a reward-risk maximization model in the first step, and then selected risk indicators (VaR, CoVaR) are minimized while at least the expected return from the first step is achieved. Finally, ex-post results in empirical analysis with US stock data confirm the beneficial properties of this portfolio strategy.

Keywords
Conditional Value at Risk, Entropy, Portfolio selection, Systemic risk.

JEL classification
C38, G11, G32

1 Introduction

Especially in recent years, fluctuations in the global financial system have caused considerable nervousness. High price fluctuations in the world stock markets, together with natural disturbances and political instability, have a significant impact on the world economy. Therefore, the prediction and modelling of stock market behaviour are general problems that are examined by both financial analysts and researchers, respectively.

As is usually well known, a systemic risk does not affect only the individual institution, but each institution located in the market or the whole economic system. In other words, systemic risk and the following systemic crisis are related to a common fluctuation that affects the entire economy, while the interconnectedness of single institutions contributes to an undesirable "domino" effect. For example, Billio et al. (2012) defined systemic risk as any set of circumstances that threatens the stability or public confidence in the financial system. Due to the general definition of systemic risk, its measurement is not clearly and uniformly defined, but financial, macroeconomic, and statistical issues are usually used. After several successive crises, e.g., the global financial crisis (2007-2009), the European credit risk crisis (end of 2011), the COVID-19 pandemic crisis (2019-2021), the war in Ukraine coupled with the energy crisis (2022), the measurement systemic risk often received attention in the literature, see Acharya et al. (2010), Billio et al. (2016), Gradojevic and Caric (2016), Torri et al. (2022), Qureshi et al. (2022), and references therein. In addition, regulators, such as the European Central Bank (ECB), the European Systemic Risk Board (ESRB), or the Federal Reserve System (FED), aim to stabilize the banking and financial system in general. On the contrary, excessive stability does not allow investors to achieve diversification gains.

In this work, we aim to analyse the proposed simple entropy alarm rules included in the portfolio selection strategy using a double optimization approach and multifactor model (e.g., the k-fund separation model of Ross, 1978). Generally, the inclusion of the multifactor model is considered for a precise estimation of the expected returns for optimal decisions. Moreover, simple entropy-based alarm rules are considered for systemic risk prediction. An application of alarm is mainly motivated by the work of Kouaissah and Hocine (2021), in which technical analysis indicators and their rules

are examined for the detection of systemic risk on the market. Contrary to this approach, we replace technical analysis with the entropy technique. In particular, we consider the prediction of systemic risk based on comparing h-day percentage changes of two selected entropy measures, Shannon and Tsallis (Shannon, 1948; Tsallis, 1998).

In recent years, we can observe a significant increase in the popularity of entropy in finance and economics. Bowden (2011) includes directional entropy to find new information on financial risk management. Then, Post and Potì (2017) provided an approach to stochastic efficiency based on relative entropy. Billio et al. (2016) provided an approach based on measuring the cross-sectional entropy of systemic risk. In relation to the topic examined in this paper, Gradojevic and Caric (2016) examined the quantification of the behavioral characteristic of systemic risk with an entropy-based approach around the period of the financial crisis in 2008. Furthermore, the problem of entropy of portfolio weights in the optimization framework is discussed in Pola (2016), Mercurio et al. (2020), and the literature therein. Moreover, Yu et al. (2014) compared more than 20 portfolio models including entropy with respect to their impact on portfolio weights.

In the empirical part, the wealth paths and general statistics of different portfolio strategies are compared to each other, while using either the maximization of traditional reward–risk performance measures (Rachev et al., 2008) or double optimization. The second strategy means employing the minimization risk model with the expected return required from the previous maximization part. In particular, Value-at-Risk (VaR) and Conditional Value-at-Risk (CoVaR) are selected since they are widely used to measure systemic risk. CoVaR calculation is dependent on the financial market (index or benchmark) profitability, see Adrian and Brunnermeier (2011, 2016). The results of each strategy are calculated with and without an entropy alarm. The portfolio is re-calibrated monthly with an upper limit of asset weight. In order to make this analysis more realistic, we consider the payment of proportional transaction costs at each recalibration time.

The rest of this paper is structured in the following way. In this Section, the introduction to this topic is done. In Section 2, the definition and discussion of the selected entropy and the systemic risk measures used are provided. Section 3 consists of an ex-post empirical analysis using the US market data with a discussion of the results. Finally, the paper is concluded and summarized in Section 4.

2 Methodology description and formulation

This section provides a general description of the techniques considered related to entropy measurement, systemic risk prediction, and portfolio optimization tasks.

Despite the financial data, let us assume z risky assets, with a vector of returns $r = [r_1, \dots, r_z]$, where the t-th observation of $r_{i,t+1}$ is calculated as $r_{i,t+1} = \ln \frac{P_{i,t+1}}{P_{i,t}}$, where $P_{i,t}$ is the price of asset i in time $t = 1, 2, \dots, T$ for $i = 1, \dots, z$. Thus, we denote $x'r$ the vector of portfolio returns while $x = [x_i, \dots, x_z]$ denotes vector of weights. If short sales are not considered, portfolio weights x are from the simplex $S = \{x \in \mathbb{R}^z | x_i = 1; x_i \geq 0; \forall i = 1, \dots, z\}$.

2.1 Systemic risk measuring techniques

As mentioned in Section 1, we mainly consider two types of entropy measures in this analysis: Shannon's entropy (Shannon, 1948) and Tsallis's entropy (Tsallis, 1998). In addition, other risk indicators CoVaR and marginal expected shortfall are used for optimization and risk analysis.

Assume a given discrete probability distribution $P = \{p_i, i = 1, \dots, z\}$, Shannon entropy (in some literature denoted as Gibbs–Boltzman–Shannon) is defined as a measure of disorder or randomness (Shannon, 1948). Therefore, the Shannon entropy E_S is mathematically formulated as:

$$E_S = -\sum_{i=1}^{z} p_i \log(p_i)\,. \tag{1}$$

We achieve a maximum of E_S when the underlying probability p_i is equal for each i (uniform probability). In the opposite situation, the minimum value of E_S is reached if only one $p_i = 1$ and the rest is equal to zero.

The second widely used entropy measure is the Tsallis entropy E_T (Billio et al., 2016; Soloviev et al., 2019). This measure differs from Equation (1) with the extension index α, which helps us to better identify the rate of relevance for the crisis prediction of the distribution tails. Thus, E_T can be derived as:

$$E_T = -\sum_{i=1}^{z} p_i^{\alpha} \log_{\alpha}(p_i) = \frac{1}{\alpha - 1}\left(1 - \sum_{i=1}^{z} p_i^{\alpha}\right). \tag{2}$$

Related to the value of α, we take into account more or less tails of the distribution. If the index $\alpha = 1$, Tsallis entropy is identical to E_S. However, when $\alpha > 1$ ($\alpha < 1$) means that the system is more dominated by usual (unusual) situations.

Alternatively, for systemic risk detection, CoVaR presented by Adrian and Brunnermeier (2011) is possible to use. It is calculated as the VaR of the financial market conditional on a company (stock) being in distress (Billio et al., 2016). Firstly, let us define VaR as follows:

$$P\left(r_{i,t} \leq VaR_{it,\kappa}\right) = \kappa \tag{3}$$

where κ is a significant value. $F_X^{-1}(y)$ means the inverse distribution function of the variable X. After that, the CoVaR conditional on the i-th asset return is formulated as:

$$P\left(r_{b,t} \leq CoVaR_{bt,\kappa} \middle| r_{i,t} \leq VaR_{it,\kappa}\right) = \kappa, \tag{4}$$

where κ is a significant value. For example, if $\kappa = 0.5$ then $CoVaR_{bt,0.5}$ is the market VaR at time t when the i-th asset returns are below the mean value.

The last measure of systemic risk is the marginal expected shortfall (MES) presented by Acharya et al. (2010). According to the general definition, $MES_{i,t}$ represents the expected value of $r_{i,t}$ in the case of a decreased market detected when the benchmark return $r_{b,t}$ is lower than a predefined quantile q_{κ}, given by the equation:

$$MES_{i,t} = E\left(r_{i,t} \middle| r_{b,t} < q_{\kappa}\right), \tag{5}$$

where κ is a proportional value from interval $[0,1]$. The benchmark can be a selected reference asset or a market index that copies the entire market.

2.2 Reward-risk measures and portfolio selection frameworks

One of the generally known reward-risk measures is the Sharpe ratio (SR), see Sharpe (1994). According to the original Markowitz work (Markowitz, 1952), Sharpe introduced the ratio involving the portfolio excess return and the standard deviation defined as follows:

$$SR = \frac{E\left(x'r - r_f\right)}{\left(x'Qx\right)^{\frac{1}{2}}}, \tag{6}$$

where r_f is a risk-free rate (or a benchmark return) and Q represents the covariance matrix. The SR value expresses the return for the unit of risk.

Additionally, the Rachev ratio measures the ratio between the Conditional Value-at-Risk (CVaR) of earnings and the mean of losses beyond Value-at-Risk (VaR), see Rachev et al. (2008). The equation is as follows:

$$RR = \frac{CVaR_{\beta}\left(r_f - x'r\right)}{CVaR_{\alpha}\left(x'r - r_f\right)}, \tag{7}$$

where $CVaR_{\alpha}(x'r) = \frac{1}{\alpha}\int_0^{\alpha} VaR_y(x'r)dy$.

The STARR ratio does not work with a volatility indicator but with a risk measure, see Martin et al. (2003). More specifically, compared to the SR, CVaR with a significance value α replaced the standard deviation and it is defined as follows:

$$STARR = \frac{E(x'r - r_f)}{CVaR_\alpha(x'r)}. \tag{8}$$

Using CVaR in the ratio allows us to capture the downside risk of a portfolio compared to the standard deviation as used in SR.

According to Ruttiens (2013), an alternative time-dependent risk measuring technique is calculated based on cumulative returns or wealth path $W = \{W_t\}, t \in \{1,2,\dots,T\}$. The Ruttiens risk indicator is defined as the standard deviation of the spreads between wealth and its linear alternative leading to the same final W. Vector of spreads is computed as $Y_t = W_t - W_0 - (t/T)(W_T - W_0)$. The risk measure is formulated as follows:

$$Ruttiens\ risk = \left(\sum_{t=1}^{T} \frac{1}{T}\left(Y_t - \bar{Y}\right)^2\right)^{1/2}, \tag{9}$$

where $\bar{Y}$ is the mean value of vector Y. As defined by Ortobelli et al. (2017), the dynamic performance ratio RuttR involving Ruttiens risk is mathematically formulated as:

$$RuttR = \frac{W_T - 1}{1 + s \cdot Ruttiens\ risk} \tag{10}$$

where s represents the proportional coefficient. If the initial wealth $W_0 \neq 1$, then the numerator of the fraction contains $W_T - W_0$, which represents the excess return of investment.

In this case, the investor aims to find an optimal portfolio that generates the maximum excess return per unit of expected risk; we can maximize these ratios above in the quadratic optimization framework (Rachev et al., 2008). Generally, the maximization model can be denoted by the following formulation:

$$\begin{gathered} \max_x \rho(x'r) \\ x'e = 1 \\ 0 \leq x_i \leq 1\ ;\ i = 1, \dots, z \end{gathered} \tag{11}$$

where $\rho(x'r)$ represents one of the selected performance measures (Sharpe, Rachev, STARR, or Ruttiens ratio) and e is a z-column unit vector with all values being equal to one.

The second rational option is to minimize the risk of the portfolio, as provided in modern portfolio theory (Markowitz, 1952) built on variance minimization. With respect to this theory, the model can be formulated as follows:

$$\begin{gathered} \min_x \omega(x'r) \\ x'e = 1 \\ E(x'r) = M \\ 0 \leq x_i \leq 1\ ;\ i = 1, \dots, z \end{gathered} \tag{12}$$

where $\omega(x'r)$ means (systemic) risk measure and M is the required value of the expected return (Yu et al., 2014).

3 Ex-post empirical analysis on the US stock market and data description

This section proposes an empirical analysis of the methodologies described above using a stock dataset from the US market.

3.1 Data

In this work, the proposed approaches are implemented using time series of daily closed stock prices for active companies included in the S&P 100 index on date November 4, 2021. The length of the data interval is set from January 2, 2006, to June 30, 2021 (3900 daily observations in total), where two significant crisis periods are observed. Since several price series have incomplete data during the selected period, these stocks are excluded from the dataset. Moreover, the 3-month US Treasury bill is chosen as a risk-free rate needed for a calculation of performance measures and also as an alternative investment while the systemic risk is detected on the market. Data were downloaded from the Bloomberg database and the Investing.com website.

3.2 Ex-post portfolio analysis with results

In practical employing of the entropy measures, the systemic risk alarm rule has to be correctly defined. Usually, when a crisis period or market collapse occurs, the entropy value decreases (Soloviev et al., 2019). Therefore, in the upper part of Fig. 1, we depict the cumulative return paths copying the evolution of the index and Shannon entropy with the length of window 252 days to define the own entropy alarm rule. When analysing these figures, we can observe that the beginning of a market downturn is reflected in the considerable decrease of entropy. In a more detailed view, it can be seen that the rapid decline occurs over at least two days; therefore, $k = 2; 5$ days changes are presented in the bottom of Fig. 1 computed as: $\frac{(E_t - E_{t-k})}{E_{t-k}}$. The results show that the market begins to become unstable if the 2-day negative change of entropy is greater than 0.03. On the contrary, we can use 5-day entropy changes to find the moment to return to the market. Ideally, the investor wants to find the bottom. On the basis of the values obtained, we consider the return moment when the positive change exceeds 0.01. Note that several variants of k-days changes and limits had been considered, but this combination provides the most sufficient results.

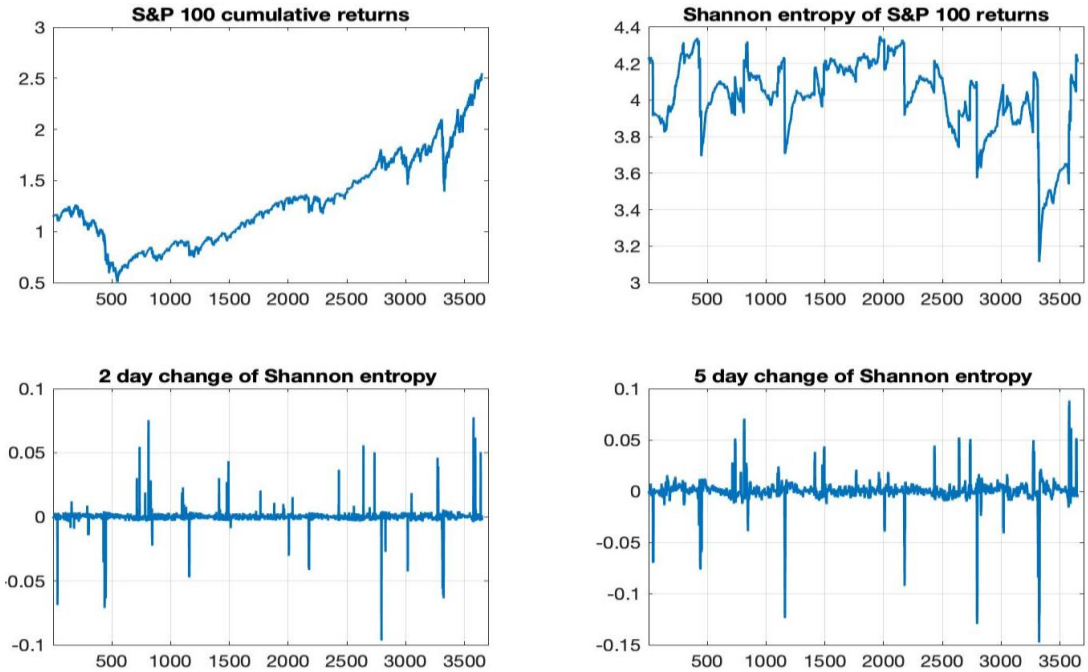

Fig. 1. S&P 100 cumulative path and Shannon entropy with k-day percentage changes computed on a one-year (252 days) rolling window basis (Source: own)

Since it is well known that portfolio strategies are responsive to a re-calibration interval, in this analysis, a monthly (20 days) interval is considered using a one-year (252 trading days) moving window of historical data. In addition to that, short sales are not allowed. To perform the analysis,

the whole computational algorithm, including the portfolio optimization process, can be divided into several individual steps:

Step 1: Compute the market values of the entropy measures based on one-year (252 days) historical return data of the S&P 100 index using Equations (1) and (2). The parameter α for the Tsallis entropy is set as 2. According to these daily values, the k-day differences vectors are computed given by $\frac{(E_t - E_{t-k})}{E_{t-k}}$ for Shannon entropy and Tsallis entropy as well. If the k-day decline is greater than 0.03 (i.e., 3%), the alarm is triggered, indicating a shift of investment to a risk-free asset until the entropy increase more than 0.01 (i.e., 1%). If the alarm rule is not considered, skip to Step 2.

Step 2: Apply the PCA approach to the covariance matrix of the returns to obtain the main $s = 15$ factors (components) explaining approximately 85% of the total portfolio variability. Then, use a common OLS estimator for the approximation of returns assuming that r_i is a linear function of factors f_j formulated as:

$$r_i = a_i + \sum_{j=1}^{s} b_{i,j} f_j + \varepsilon_i, \tag{13}$$

where a_i is constant of the i-th return, $b_{i,j}$ is coefficient for factor f_j and ε_i is error part of the i-th return (Ortobelli and Tichý, 2015; Kouaissah and Hocine, 2021).

Step 3: Apply the double optimization procedure to determine the weight vector. This approach is used to achieve better performance of constructed portfolios. In the first step, the maximization performance ratio model (11) is used, where in some sense, the market potential can be obtained. After that, we proceed with the minimization model formulated in Equation (12) that includes the systemic risk measures (3) or (4), while the expected portfolio return M acquired from the first optimization is higher or at least identical. In both cases, the upper limit of portfolio weight is set at 0.2 due to better diversification of the portfolio, meaning a maximum of 20% of wealth can be invested in a single asset.

Step 4: Compute the final wealth W_T of the re-calibrated portfolio with including transaction costs tc_{t_d} set as 20 basis points given by the following formulation:

$$W_{t_{d+1}} = \begin{cases} (W_{t_d} - tc_{t_d})(1 + r_{b,d+1}) & if\ alarm\ is\ performed \\ (W_{t_d} - tc_{t_d})(x_M)' r_{t_{d+1}}^{ex-post} & otherwise, \end{cases} \tag{14}$$

where $r_{t_{d+1}}^{ex-post}$ is the return between the period t_d and t_{d+1}. The time $t_{d+1} = t_d + \zeta$, where $\zeta = 20$.

The whole algorithm (steps 1, to 4) is applied until daily observations are available. Additionally, to simplify the comparison of portfolio strategies, we consider that the initial investment wealth W_0 is set to 1 currency unit. For computational, optimization, and graphical purposes, Matlab 2021b software is used. All results of this ex-post analysis are presented in Tables 1-4 and Figures 1-2. The comparison of constructed portfolios is based on basic statistics that are captured in Tables: that is, mean (%)[1], standard deviation (%), VaR5% (%), CVaR5% (%), MES (%), SR (%), RR and final wealth.

Table 1 presents the statistics of the strategies when SR is maximized and also the statistics of the S&P 100 index selected as a benchmark strategy (assumed as a buy & hold strategy). First, if simple optimization strategies without alarm implications are compared, we can see the minimal impact on portfolio profitability while including the multifactor model with PCA. However, if we compare individual strategies, double optimization with VaR minimization provides the best performance. The SR-CoVaR strategy has profitability similar to that of simple optimization, but surprisingly higher risk. Considering alarm strategies, the benefit consists of reducing the level of risk undertaken and increasing the mean, final wealth, or performance measures. In particular, MES decreases

[1] (%) means the percentage expression of the result on a daily basis.

significantly, which confirms the success of limiting exposure to systemic risk. It is also evident that the Shannon entropy alarm generates better outcomes.

Table 1. Ex-post portfolio statistics obtained using different strategies while maximizing SR

Strategy	*mean*	*SD*	*VaR5%*	*CVaR5%*	*MES*	*SR*	*RR*	*final W*
SR no PCA	0.0307	1.2734	1.9861	3.1858	2.7112	2.3951	0.8599	3.0613
SR	0.0330	1.2807	2.0270	3.1631	2.7102	2.5644	0.8904	3.3344
SR-VaR	0.0514	1.4288	2.3348	3.5392	2.9834	3.5843	0.8730	6.5171
SR-CoVaR	0.0307	1.4522	2.3663	3.6776	3.0114	2.0996	0.8606	3.0604
Shannon entropy alarm								
A-SR	0.0367	1.0853	1.8196	2.7221	1.8381	3.3637	0.9200	3.8114
A-SR-VaR	0.0530	1.2277	2.0963	3.0578	2.0737	4.3005	0.9104	6.9056
A-SR-CoVaR	0.0469	1.2298	2.0442	3.0489	2.0113	3.7987	0.9219	5.5312
Tsallis entropy alarm								
A-SR	0.0365	1.0878	1.8265	2.7331	1.8668	3.3419	0.9158	3.7902
A-SR-VaR	0.0526	1.2212	2.0943	3.0506	2.1018	4.2911	0.9052	6.8072
A-SR-CoVaR	0.0464	1.2215	2.0486	3.0426	2.0383	3.7761	0.9172	5.4427
S&P 100	0.0299	1.2726	1.9284	3.2268	3.2296	2.3354	0.8836	2.2112

Note: A in the name of strategy means an application of a particular entropy alarm rule. SR-VAR denotes the double optimization approach with maximization of SR and a following minimization of VaR
Source: own

Table 2. Ex-post portfolio statistics obtained using different strategies while maximizing RR

Strategy	*mean*	*SD*	*VaR5%*	*CVaR5%*	*MES*	*SR*	*RR*	*final W*
RR no PCA	0.0242	1.3330	1.9620	3.3272	2.9770	1.8017	0.9102	2.4165
RR	0.0227	1.3729	2.0202	3.4259	2.9769	1.6375	0.8993	2.2850
RR-VaR	0.0439	1.4313	2.3235	3.6350	3.1105	3.0581	0.8547	4.9680
RR-CoVaR	0.0321	1.4055	2.2486	3.5427	2.9055	2.2720	0.8820	3.2257
Shannon entropy alarm								
A-RR	0.0283	1.1052	1.7099	2.7144	1.9759	2.5479	0.9512	2.8108
A-RR-VaR	0.0457	1.2443	2.0804	3.1140	2.1894	3.6601	0.9116	5.2996
A-RR-CoVaR	0.0429	1.2110	1.9715	3.0086	2.0847	3.5247	0.9286	4.7746
Tsallis entropy alarm								
A-RR	0.0286	1.1172	1.7254	2.7639	2.0522	2.5444	0.9404	2.8382
A-RR-VaR	0.0441	1.2478	2.0804	3.1370	2.2514	3.5180	0.9049	4.9909
A-RR-CoVaR	0.0456	1.2080	1.9731	2.9905	2.1057	3.7604	0.9343	5.2770

Source: own

Table 3. Ex-post portfolio statistics obtained using different strategies while maximizing STARR

Strategy	*mean*	*SD*	*VaR5%*	*CVaR5%*	*MES*	*SR*	*RR*	*final W*
STARR no PCA	0.0283	1.2887	2.0613	3.2526	2.7107	2.1814	0.8596	2.8059
STARR	0.0315	1.2671	1.9426	3.1289	2.6760	2.4744	0.8861	3.1581
STARR-VaR	0.0375	1.4493	2.3267	3.6475	2.9770	2.5725	0.8646	3.9208
STARR-CoVaR	0.0334	1.4438	2.3254	3.6545	2.9686	2.2985	0.8613	3.3766
Shannon entropy alarm								
A-STARR	0.0315	1.0584	1.7274	2.6492	1.8066	2.9595	0.9215	3.1548
A-STARR-VaR	0.0462	1.2440	2.1290	3.0894	2.1294	3.6985	0.8985	5.3910
A-STARR-CoVaR	0.0451	1.2188	1.9937	3.0212	2.0038	3.6821	0.9228	5.1729
Tsallis entropy alarm								
A-STARR	0.0295	1.0660	1.7345	2.6828	1.8600	27395	0.9116	2.9199
A-STARR-VaR	0.0473	1.2401	2.1248	3.0780	2.1536	3.7992	0.8971	5.6122
A-STARR-CoVaR	0.0446	1.2169	2.0202	3.0201	2.0343	3.6508	0.9197	5.0881

Source: own

Table 4. Ex-post portfolio statistics obtained using different strategies while maximizing RuttR

Strategy	*mean*	*SD*	*VaR5%*	*CVaR5%*	*MES*	*SR*	*RR*	*final W*
RuttR no PCA	0.0505	1.6161	2.8277	4.0308	3.2272	3.1134	0.8586	6.3074
RuttR	0.0502	1.6641	2.8931	4.1588	3.3235	3.0042	0.8503	6.2338
RuttR-VaR	0.0499	1.6640	2.8866	4.1679	3.3335	2.9909	0.8449	6.1829
RuttR-CoVaR	0.0502	1.6602	2.8665	4.1642	3.3183	3.0119	0.8460	6.2360
Shannon entropy alarm								
A-RuttR	0.0611	1.4051	2.4385	3.4692	2.2018	4.3387	0.8998	9.3018
A-RuttR-VaR	0.0626	1.4060	2.4385	3.4755	2.2011	4.4437	0.8966	9.8297
A-RuttR-CoVaR	0.0608	1.4157	2.4442	3.5170	2.2355	4.2848	0.8935	9.1992
Tsallis entropy alarm								
A-RuttR	0.0603	1.4083	2.4419	3.4815	2.2680	4.2697	0.8970	9.0227
A-RuttR-VaR	0.0617	1.4098	2.4419	3.4901	2.2691	4.3665	0.8936	9.5059
A-RuttR-CoVaR	0.0596	1.4216	2.4442	3.5413	2.3132	4.1824	0.8886	8.8044

Source: own

In addition, the results of the strategies using the rest of the selected performance measures in Tables 2 – 3 confirm the conclusions obtained for the strategies with the Sharpe ratio. Generally, it is obvious that the profitability of portfolio strategies with alarm rule and simple optimization is basically comparable with the simple optimization strategy, but we are able to reduce the risk of portfolios. Otherwise, the effect of double optimization is mainly reflected in the higher mean portfolio return and the corresponding final wealth. Note that we can also slightly reduce the classical risk measures undertaken of these strategies, as well as the systemic risk measure (MES), due to the involvement of the alarm. Obviously, the highest profitability is achieved by maximizing the Rutt ratio in Table 4. Finally, it is evident that all strategies with or without alarm outperform the benchmark index S&P 100 in the case of final wealth.

In order to better capture the evolution of wealth paths for various portfolio strategies, we show Figs. 2 and 3. In particular, we can observe in detail the alarm triggering and its duration during the investment period. We select only the comparison based on two performance measures because of the conservation of space.

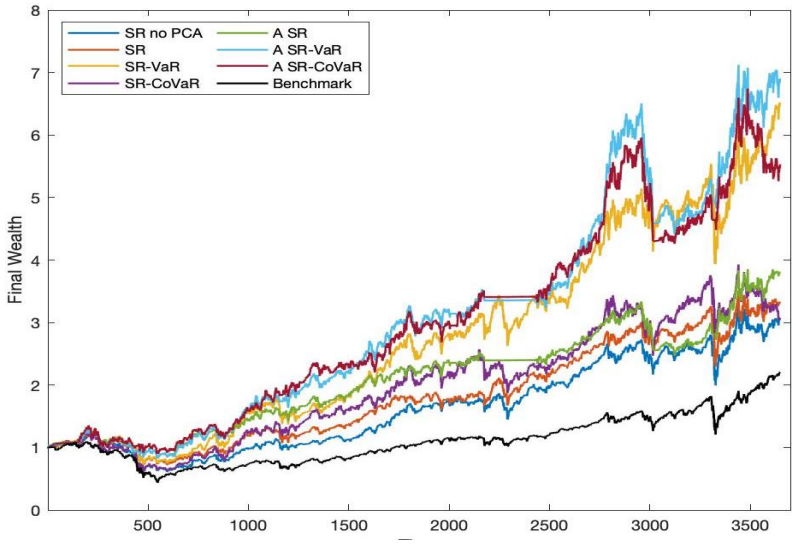

Fig. 2. Ex-post wealth paths for different SR maximization portfolio strategies with and without Shannon entropy alarm or PCA compared to a benchmark S&P 100 (Source: own)

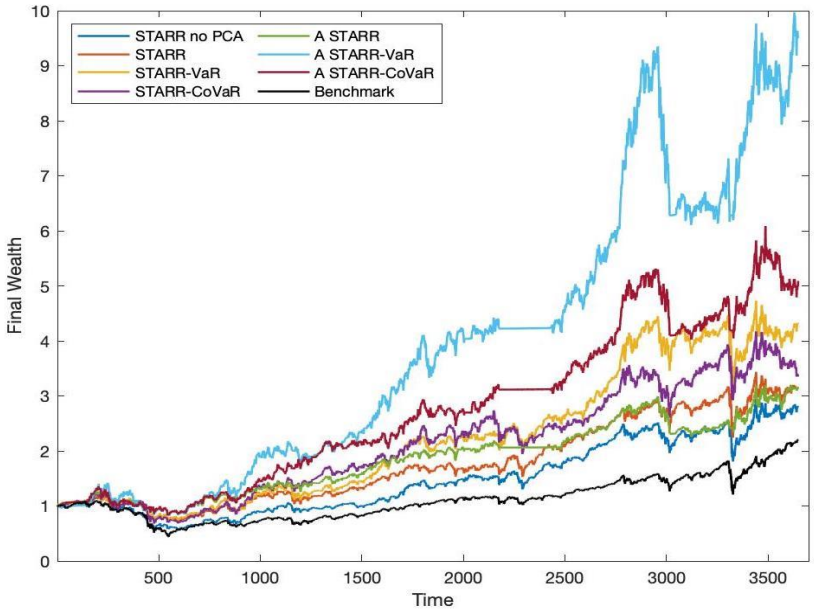

Fig. 3. Ex-post wealth paths for different STARR maximization portfolio strategies with and without the Tsallis entropy alarm or PCA compared to a benchmark S&P 100 (Source: own)

According to the wealth paths in Fig. 2 and 3, we can see the intervals when the alarm was triggered (relatively straight line). The advantage of the alarm approach is already evident during the financial crisis depicted at the beginning of the analyzed period. Moreover, it is also nicely illustrated the portfolio behaviour in times of economic growth, when a partial shock in the market interrupts an investment for a longer period. Before the interruption, an increasing trend is evident, and after moving to risky assets, it is connected to previous growth. Nevertheless, there are still deep dips in the best performing strategies, especially before and during the COVID-19 crisis period, when daily falls in the financial markets were more drastic.

Recall that the proposed approach should still be researched in a wider database to prevent larger portfolio jumps. This analysis serves as an initial step into this application procedure in risk and portfolio management.

4 Conclusion

In this paper, the analysis of the Shannon and Tsallis entropy measures used for the alarm rules included in the various portfolio optimization strategies is presented. In particular, the alarm is applied in order to detect the threat of systemic risk in the market. Furthermore, we consider the parametric return approximation with the OLS estimator and especially the double optimization portfolio selection approach with the maximization of the reward-risk measure in the first phase and the minimization of risk in the second phase under the condition of maintaining the minimum expected returns from the first optimization.

The empirical section analyses the portfolio statistics and wealth paths for different portfolio strategies with and without alarm. By comparing obtained results based on the data of the US market, we confirm the advantage of alarm strategies with double optimization provided even the transaction costs are taken into account in wealth computation. Overall, we can conclude that the double optimization approach leads to significantly higher performance of the portfolio compared to the simple optimization strategy while the impact of the alarm is visible in allowing us the reduction of the risk indicators of generated portfolios.

More sophisticated rules are planned in further research using entropy measures based on market prediction. Moreover, it should be important to consider the sensitivity analysis of the Tsallis entropy parameter. Finally, we can compare the effectiveness of the entropy with the technical analysis.

5 Acknowledgement

The author appreciates the financial support from the Czech Scientific Foundation (Grant NO. 20-16764S), the SGS research project of VSB–TUO number SP2022/04, and the Moravian-Silesian region by the RRC/02/2020 project.

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13th International Scientific Conference
"Karviná Ph.D. Conference on Business and Economics"
November 2-3, 2022, Horní Lomná, Czech Republic

Conference Proceedings
Silesian University in Opava, School of
Business Administration in Karvina, 2022

REINVESTMENT ACTIVITY IN THE COMPANY DURING THE CRISIS

Pavla Pokorná[1]

[1]*Silesian University in Opava, School of Business Administration in Karvina,*
Univerzitní nám. 1934/3, 733 40 Karvina, Czech Republic
email: pokorna@opf.slu.cz

Abstract
The aim of the article is to concrete applications of the results, which show how reinvestment is a common part of corporate finance and where contemporary entrepreneurs reinvest. A reinvestment process is an act in a company when an entrepreneur or other responsible person decides that the profit from the previous (re)investment will return to the company in the form of an identical or different reinvestment. Reinvestment and the reinvestment process cannot be ignored in businesses. This effort comes at a cost, according to Myers and Majluf (1984), companies should first exhaust internal funds when investing in new projects, and only then should companies focus on external sources of financing. The fact that this is a completely common phenomenon is also proven by the fact that out of three questionnaire surveys, the maximum value of the number of companies that reinvest was more than 97 %. Specific ratios to areas that can be reinvested and specific examples are included in this paper.

Keywords
Reinvestment, marketing, business equipment, human resources development, business development in a new direction.

JEL classification
L26, D25, L22

1 Introduction

The aim of the paper is to show corporate reinvestment supported by empirical data by showing the extent of businesses that reinvest, how much and specifically where they do so. I will add an element in the form of a crisis to several years of research. The research began as a general survey of information on reinvestment of companies, the emergence of areas in which reinvestment can be made, and thanks to the Covid-19 pandemic, it became three questionnaire surveys, which subsequently included the already mentioned information and questions related to the crisis. Thanks to the information before and during the crisis, the given research becomes unique. During several years of reinvestment research, the Covid-19 Pandemic arose and subsequently spread throughout the world, causing both a medical and an economic crisis. A greater proportion of firms report significant or severe disruption to sales activities (Meyer et al., 2022). From the beginning, the world faced hardships as great as those of the Spanish flu pandemic and the Great Depression—all at once. This disease is severe acute respiratory syndrome caused by coronavirus 2 (SARS-CoV-2, hereinafter referred to as Covid-19) (Susskind and Vines, 2020). However, deadly pandemics and outbreaks of disease are not new phenomena: throughout recorded history, these aspects have challenged human existence and reduced populations. Some variants have killed significant percentages of humanity, but humans have always sought and often found ways to mitigate their deadly effects. The increasing number of deaths and cases has led to changes in every aspect of our work, school, recreation, travel, economic well-being, and interactions with friends and family, and thus in business (Morens et al. 2020).

During his activity, the entrepreneur must make decisions to support the business according to the set business goals (both main and partial). In general, an entrepreneur should not primarily prefer only short-term financial decisions. As far as long-term financial decisions are concerned, the entrepreneur or responsible manager should create several variants of how, what, and where to go (within financial resources) in his company. The long-term financial activities of an entrepreneur include investments and reinvestments. For many businesses, investments are a basic form of change, incentive or stimulus for business growth or renewal (Okanazu, 2018; Gawali and Gadekar, 2017).

Entrepreneurs face a fundamental dilemma, as there are external and internal sources of financing (internally generated funds) for investment or reinvestment.

From the literature dealing with business practice, the concept of investment (Synek, 2007) is more often known, which are part of successful businesses. Small businesses may require higher one-off investments, but this requires their access to both internal and external finance (Cull and Xu, 2005). These businesses often have to use internal funds to demonstrate their "commitment" and also to reduce costs when applying for bank loans (Brau, 2002). Investment decision-making is an important part of strategic decision-making in any business, because new investment projects fundamentally affect future economic results and prosperity (Scholleová et al., 2010).

2 Research methodology

Depending on the lack of knowledge of the distribution (representation) of the members of the basic set, the sample set can be calculated according to the following formula (Kozel, Mynářová and Svobodová, 2011, p. 199):

$$n \geq \frac{z^2 * p * q}{\Delta^2} \tag{1}$$

Where:
n … is the minimum number of respondents,
z … is the reliability coefficient,
p … is the number of respondents who know the issue in percentage,
q … is the number of respondents who do not know the issue in percent,
Δ … delta is the specified maximum permissible error.

According to Kozel et al. (2011, p. 199) at a value of one (z = 1), a reliability coefficient of 68.3% of the probability of the reliability of the statement is guaranteed, at a value of two, the coefficient corresponds to a value of 95%, and at a value of three, the coefficient is reliable at 99.7% of the probability claim. If the numbers of respondents who know and do not know the issue in percentages are not known exactly, then the researcher must create the product p * q maximum, i.e. the values are set so that both are as high as possible, i.e. 50% and 50%.

When calculating the sample set, a reliability coefficient of 95% was chosen, which corresponds to the value of 2. Since it is not possible to determine the exact percentage of respondents who know and do not know the given issue, the product p * q is determined as maximum (already mentioned 50% and 50%). The last variable, i.e. the maximum permissible error, is set as 5% (100% - 95% = 5%). The calculation of the sample set in this dissertation is determined as follows:

$$n \geq \frac{2^2 * 0{,}5 * 0{,}5}{0{,}05^2} \tag{2}$$

$$n \geq 400 \text{ respondents} \tag{3}$$

Using the calculation above, the minimum number of respondents for questioning in the quantitative research of the dissertation was determined, the sample size is 400 respondents.

Research was created for the purpose of collecting primary data, for this purpose the questionnaire survey method was chosen. A total of three researches were carried out, the first was the already mentioned research from 2018, in an online environment in the fall of 2018. This research was, generally speaking, an assessment of the situation before the crisis (at that time, the research was considered as primary research, which cannot currently be to carry out, because entrepreneurs are not

in the current situation able to objectively evaluate the situation before the crisis, which for many has been going on for a very long time). During this period, relevant data were collected from 576 respondents. The second research on the first wave of the pandemic took place in autumn 2020, again in an online environment and the same group of respondents was interviewed in order to ensure continuity in the observation of change with the extension of questions related to the emerging crisis. During this period, relevant data were collected from 488 respondents. And the third research was conducted a year later with the same questions as the previous research. During this period, relevant data were collected from 447 respondents.

Two pilot tests were conducted, one after the creation of the first questionnaire and the other during the delivery of questions related to the crisis. Both pilots (pre-research) were conducted on 10 respondents, after they were contacted by email and then agreed to a telephone interview. Within these pilots, perhaps the biggest change was made by merging questions related to science and research into the area of a new direction, as the respondents could not effectively separate these areas. According to a simple interpretation of the Oxford Advanced Learner's Dictionary, then, reinvestment is the act of returning profits that have been made from an investment back into the same investment or into a new one. So, it is to some extent a cyclical process. It also follows from this that the reinvestment process can only take place in at least somewhat successful enterprises, as they must successfully pass the first investment cycle and then generate a profit from this process, which the enterprise can then dispose of. And that either outward from the company, for example in the form of payment of rewards, dividends, or investing this money back into the company, for example as a reinvestment in new machines in the area of human resources development, or in *other areas such as* a *new direction of business, marketing or equipment of the company,* on which will be subsequently established.

When going through the mind map (below this text), the procedure is as follows: in the first stage, i.e. after generating a profit, the given responsible person or entrepreneur has to decide whether reinvestment will be carried out, i.e. it is a dilemma between the answer "Yes" - reinvestment will take place or the answer "No". there will be no reinvestment. If the option "No" is selected, the process (cycle) is unsuccessful from the point of view of reinvestment.

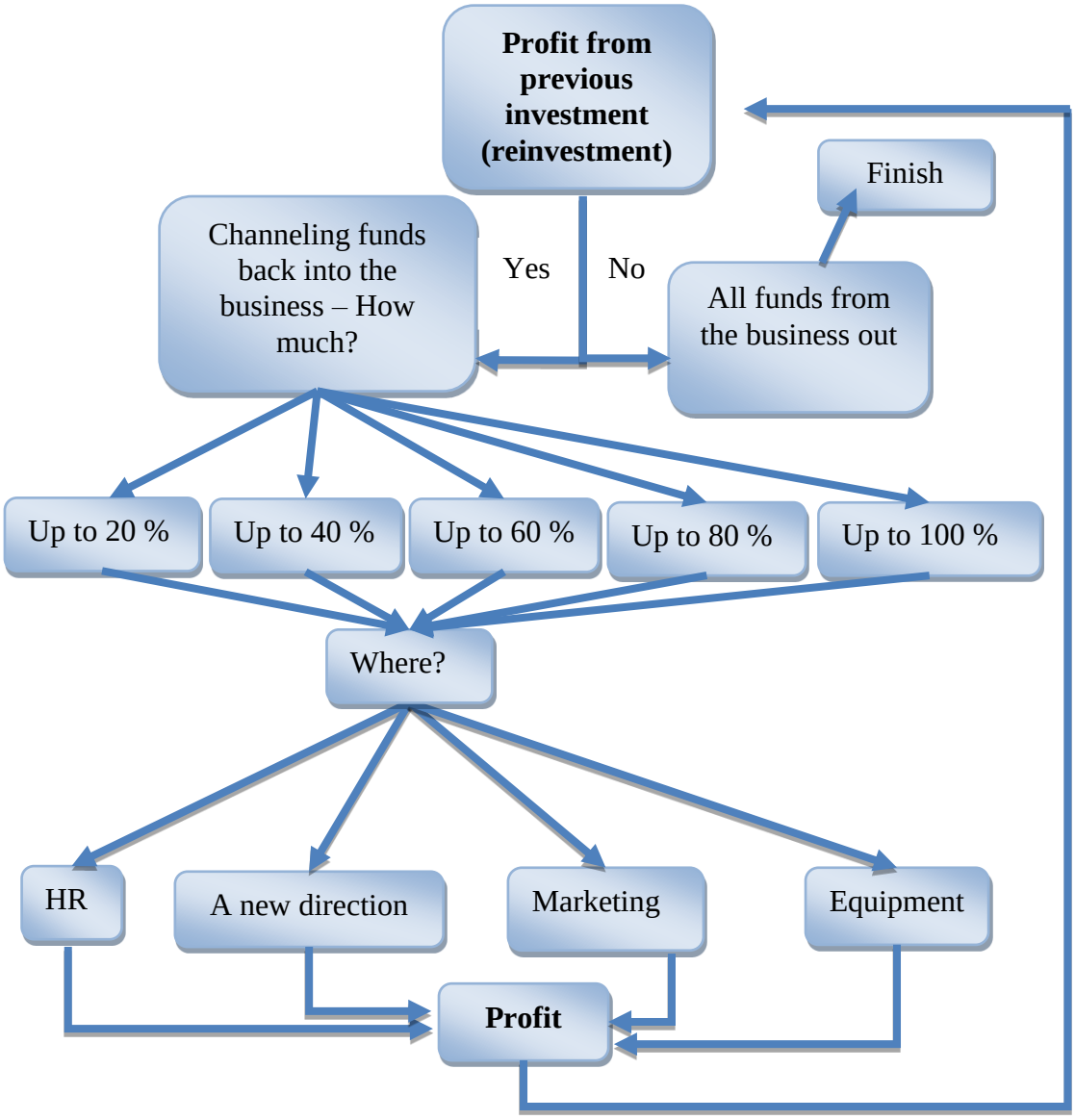

Fig. 1. Mind map of the entrepreneur's reinvestment process (where HR is human resource development) (Source: autor)

On the other hand, if the entrepreneur (manager) chooses the answer "Yes", i.e. the return of profit from the previous investment, or reinvestment back into the company, there is another necessary question in front of him and how much, for simplicity, possible variants with a margin of 20% have been created, see picture above. From the given decision on reinvestment, the given funds can be directed to individual areas (in different proportions), whether it is the development of human resources, science and research together with the expansion of the company in a new direction, to the company's marketing activities or the acquisition of company equipment in, for example, in the form of new production stands. If these ((re)investment) activities are successful and generate further profit, the given funds can be recirculated and the process can be repeated.

3 Results of Reinvestment research in Czech Republic

Since the typical respondent was such that, it is statistically homogeneous in the span of three years examined, with the exception of age, when comparing the two observed crisis years, this difference was already statistically insignificant, it can be assumed that the results are not irrelevant. The distribution of social enterprises is not even, but in none of the three monitored periods has it been proven that there is no relationship between social enterprises and whether the enterprises have reinvested or not, because social enterprises in the Czech Republic are obliged to pay more than half of the profit back to the enterprise, which is must be taken into account when deciding on reinvestment and its amount. In 2018 the null hypothesis was rejected at a p value of 0.097, in 2020 the p value was 0.843 and in 2021 the p value reached 0.574.

The number of those who reinvest grew from 86.46% in 2018 to a percentage of 97.08% in 2021. The fact that the number of such business entities is increasing in such a way that it is a statistically significant change is also proven by the p values at comparing all three monitored years (p value = 2.86-6) and when comparing only two crisis years, the p value was equal to 4.901-6, so this is a statistically significant change. For the amount of reinvestment, data inhomogeneity was noted over the course of three years, but homogeneity was demonstrated within two crisis crisis years. In all three monitored years, the highest percentage of responses was for the size of the reinvested amount from 21 to 40% of the profit obtained from the previous (re)investment. For this answer, the response rate accumulated from 27.31% and rose up to 35.73% of the respondents' response rate.

Other questions were focused on the level of reinvestment in individual created areas. In 2018, i.e., in the time before the crisis, the ratio, if the size of the percentage distribution of the answers is taken into account, was the following marketing (up to 20%), new direction of business (0%), the area of employees (up to 20%) and company equipment (up to 40 %). It can be seen here that before the crisis, companies had no need to expand in a direction other than the one set out so far. But research during the crisis showed different values. Both surveys agree on the most frequent answers, as follows: marketing (up to 20%), new direction of business (up to 20%), the area of employees (up to 20%) and company equipment (up to 40%). During the crisis, reinvestments increased in the area of business development in a new direction, so companies found that they needed another source of income, or to reduce costs, whether for outsourcing or the like.

In order to get closer to the specific objects in which the respondents reinvested in individual areas, the questionnaire survey included open-ended questions, which subsequently created a summary of options, which included all the answers written by the respondents. In the area related to *marketing*, 13 summary sub-areas were created, where the most common was advertising (2020 - 37.95% and 2021 - 33.64%) and this answer included, for example: billboards, banners, leaflets, magazines or in general advertising in the mass media. The second most common answer was social networks (2020 – 20.76% and 2021 – 21.10%) with answers such as Instagram, FB or Linked In. And the third was internet advertising (2020 - 10.98% and 2021 - 18.96%) when the rate of reinvestment in this form of advertising increased significantly the second year when there were covid restrictions. Respondents listed answers that fell into this category: Google advertising, Seznam advertising, PPC or online marketing.

In the area of the *new direction of business*, ten areas of answers were created, where the most answers fell into the area called expanding the offer (2020 - 20.00% and 2021 - 41.89%), in this category you can observe a more than two-fold increase in answers of the type: expanding the offer of services or products, expanding the range to include new trends (vegetarian dishes) or women plus sizes. The second and third areas are different in 2020, the second most frequent answer was the new direction (16.92%) with the answers: food delivery thanks to the pandemic, expansion of the business area, creation of a marketing department, e-shop or sale of own products. The second most frequent area in 2021 was the area of production stands with a percentage of 14.86% of all answers, which sounded, for example, as follows: purchase of stands and equipment, newer technology and equipment, tools or cosmetic devices. This area was the third most numerous response group in 2021

with 14.86%. The third only more numerous areas of answers were expanding the business in the same direction in 2020 with 15.90%, and these percentages included the following answers: new branches, larger warehouses, new branch design or improvements to the exterior and interiors of the shipping area.

The area of *employee development* had only 7 created sub-areas, where the percentage structure of the answers matches, the first in both monitored periods was training in general (2020 – 58.75% and 2021 – 66.17%) with the answers: training, courses, webinars or workshops. As the second most numerous groups of answers, they mentioned specific courses (2020 – 25.41% and 2021 – 17.91%) with answers such as: courses in new technologies, coaching, increasing professional skills, professional competence or DVPP. Third in line the most numerous groups of answers were courses with something at the end (2020 – 10.23% and 2021 – 11.94%) and this included answers such as driver's license, certificates, retraining, MBA or driver's license.

The last area was the *equipment* of the enterprise with five created areas, where the order of frequency of answers was the same, the most answers were counted in the created area of machine and technology (2020 - 58.80% and 2021 - 64.40%) with the following answers: machines, technology, new tools, storage equipment, sheet metal production line for Radegast beer, HW or measuring devices and tools. The second area where the most answers were accumulated was equipment for employees (2020 – 20.99% and 2021 – 16.41%) where the answers were: office equipment, PC, facilities for employees, social room for employees, couches, tables or office furniture. The third most frequent area was the sub-area called vehicle (2020 – 10.42% and 2021 – 12.38%) with answers: car, purchase of serviced vehicles, change of vehicle fleet, utility vehicles, trucks or transport.

To track changes, questions were created to change support areas. In 2020, 52.46% of respondents did not decide to support any of the areas more, which is the most frequent answer, and in 2021, 44.64% of respondents gave the same answer (none). As far as the change is concerned, the biggest change occurred in the area of company equipment, when an increase from 10.04 to 18.55% of respondents was recorded. The respondents are therefore convinced that their current strategy is set correctly, which may be related to the experience and age of the respondents (typical respondent). If they decided to support a cloud more often at the lowest possible rate (2020 - 44.50% and 2021 - 45.69%) within the classic scale of answers. The vast majority of respondents (2020 – 80.96% and 2021 – 81.92%) do not intend to support any segment less, again demonstrating the correct setting of the entrepreneurs' strategy. If they decide to reduce the financial support of any of the areas, it is the lowest possible reduction, i.e. up to 20% (2020 – 58.11 and 2021 – 29.89, where the answers are more scattered (even)).

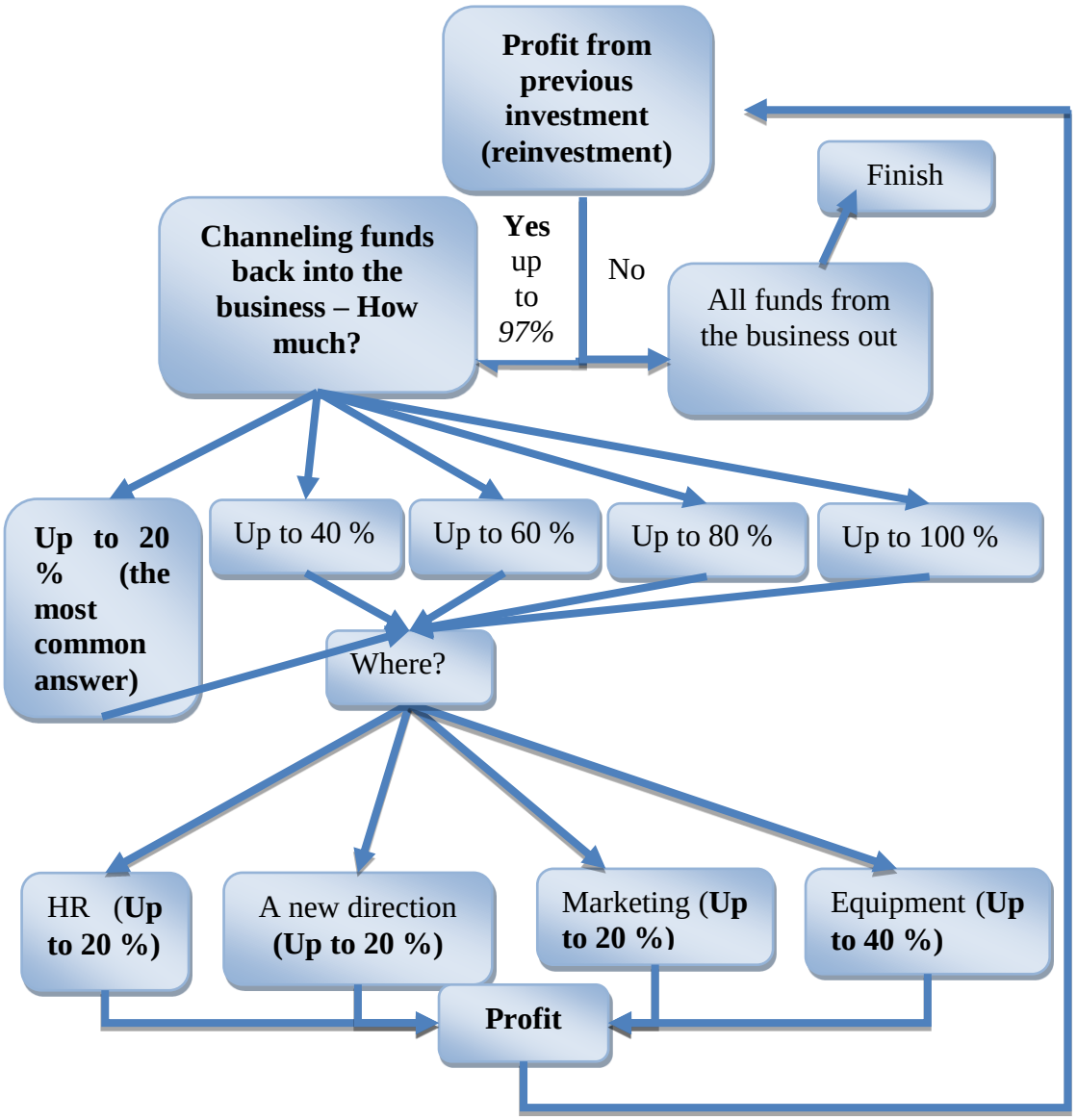

Fig. 2. The resulting mind map of the entrepreneur's reinvestment process (where HR is human resource development) (Source: autor)

The resulting mind map with the most frequent answers or a measure of how many reinvestment points can be seen above.

4 Conclusion

The paper was focused on the area of reinvestments, both on a general level (whether they carry them out, how much percentage of the previous successful (re)investment they put into this one, etc.) and in a deeper sense (where exactly do they reinvest and in what proportion). After presenting the issue in the form of a literature review. The aim of the paper was to spread awareness about the process reinvestment in the enterprise. This was done with the help of the results of three primary researches. In order to see what a practical mind map for carrying out reinvestment should look like in relation to how today's entrepreneurs carry out reinvestments in the company, where and to what extent they apply them, so that entrepreneurs can use it in practice, a general mind map was first presented and then modified according to the results of questionnaire surveys. The first research focused on whether companies reinvest, to what extent and in which segments, including their characteristics, this

research was conducted in the fall of 2018. The next questionnaire survey was already during the crisis (autumn 2020 and fall 2021), when additional questions were added to the original questions for the complexity of the research, also with a focus on reinvestment in a crisis. Thanks to this, the previously mentioned modified mind map was created, and the text contains practical examples of where, in times of crisis, entrepreneurs most often reinvest according to individual areas of the business (marketing, new business direction, business equipment and employee development).

5 Acknowledgement

The conference was financially supported by the Development of R&D capacities of the Silesian University in Opava CZ.02.2.69/0.0/0.0/18_054/0014696.

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BENEFITS OF LINKING LEGAL AND FINANCIAL LITERACY

Katarzyna Zahrajová[1]

[1]*VSB – Technical University of Ostrava, Faculty of Economics,*
17. listopadu 2172/15, 702 00 Ostrava, Czech Republic
email: katarzyna.zahrajova@vsb.cz

Abstract
Financial literacy has been the subject of research for a long time. However, it is quite difficult to define a precise definition. The confirmation is that financial literacy is defined inconsistently by institutions or interest groups. In general, knowledge of financial literacy should provide an individual with guidance on how to effectively manage their own finances to avoid high levels of debt. Legal literacy is an equally important area that, in connection with financial literacy, will provide comprehensive knowledge that will help in making the right decisions not only in the financial sphere. The aim of the article is to define the concepts of financial and legal literacy, focusing on the importance of their connection. Although these may appear to be very different areas, their connection is important as most financial products are provided based on a contract.

Keywords
Financial literacy, legal literacy, dept, education.

JEL classification
K1, K22, O16

1 Introduction

This paper is written to prove that financial and legal literacy have a lot in common and they can barely exist without each other. Nowadays, the global economy is getting slower so more and more people are getting financial problems. There could be a lot of reasons which caused those problems. In these times, there are two main problems which caused the slowing of the global economy Covid - 19 and the war between Ukraine and Russian. For those who do not understand the important of financial and legal literacy these times could be ruining. If people do not have reliably allocated their finances, they could get into the serious troubles and they could have problems with paying the loans because of this situation. Even small knowledge of the financial and legal literacy can make their life easier and calmer, because they could rely on their financial responsibility.

Financial literacy is very important in this modern world. It is a foundation for financial decision making. The financial responsibility is increasing with more and more new products come to the market and people want to buy them. There is also more financial products and individual must decide which one is the best to choose. Credits, loans are more accessible for everyone. People who are financial literate, can recognize the interest rates quantify their amount and count the impact on their budget. With the financial literacy also comes the ability to make decisions about the money. This decision have an effect on the expectation and plans about the future

Most actions we take in financial literacy is supported by contracts. To understand what we are signing, it is necessary that we understand the text of the contract. Contracts are often written incomprehensibly and can contain things that are difficult to understand for the public. Therefore, it is very important to expand legal knowledge along with financial literacy. The importance of legal literacy is confirmed by the article in magazine Trade-off 4/2020 called "Legal literacy is tragic in our country, says the populariser of law" by Dominik Stroukal. Where lawyer Vojtěch Sucharda who believes that an understandable interpretation of the law can improve its understanding mention that legal literacy should be reformed just like financial literacy. (Stroukal, 2020)

The aim of this paper is to prove that there is link in the financial and legal literacy. Contribution of this paper is to make peoples think about their financial and legal literacy as a one whole and help them to understand it better.

2 Financial literacy

With the development of new technology, services, and financial products on the market, people need to know how to use them correctly. If we know how to use financial products and services correctly, they can make our life easier. But they can also bring risk, and we can just as easily get into financial trouble. Finances are part of our everyday life, and it is very important that to know how to manage them. To be good in managing with money and finances we need to have at least some education of financial literacy.

The Financial literacy has been studied by lot authors like Škvára Miroslav in his book "Finanční gramotnost" or Kiyosaki Robert in "Rich dad, poor dad" and there are more of books and studies which can proof their importance. This is also linked to the fact, that form one straight definition of the financial literacy is quite hard. In Czech Republic this definition among other form the Ministry of Labour and Social Affairs and Ministry of Finance. These institutions define financial literacy as: "the set of knowledge, skills and value attitudes of the citizen necessary to financially secure himself and his family in contemporary society and to actively participate in the market of financial products and services." (National Financial Education Strategy 2010, p. 11). OECD define the financial literacy as a „Financial literacy is knowledge and understanding of financial concepts and risks and the skills, motivation, and confidence to apply such knowledge and understanding to make effective decisions across a range of financial contexts to improve the financial well-being of individuals and society and to enable participation in economic life. (Pisa 2012)

In most publications, financial literacy is divided into several logical units, such as money literacy, which generally includes money, banks, payments, and financial products. Another is budget literacy, which defines budgets such as personal or family, which is also associated with income, spending and inflation. A properly prepared budget provides a clear idea of the financial situation of a family or individual (PETÝRKOVÁ, Lenka a Pavlína CHMELAŘOVA, 2011).

For a proper understanding of financial literacy, it is essential that individuals understand how to properly manage money, which defines control on how much they are spending, awareness of investments and savings. Among the necessary aspects of financial literacy is also the effective earning of money. The individual receives some amount of money with which should come out throughout the month. Effective communication with financial institutions such as banks or other money lenders is also important. For an individual to be able to properly deal with money, he needs to know its value. To understand the real value of money, it is essential that the individual knows how inflation, exchange rates develop, and how it affects the price level. It is also essential to understand how different bank products work and how they react to changes in the economy.

Everyone should be able to plan and predict how much money he will need for a given period, it is always advisable to count on a reserve, also to cover at least partially unexpected expenses. The most important knowledge that is necessary in the field of financial literacy is the skill of protection against over-indebtedness. (Pavelková, Jaroslava, Knaifl, Oldřich a Preuss, Karel, 2012)

Financial literacy can be also taken as simple civic responsibility or the ability knowledge and skill to behave responsibly in everyday life in a democratic society. (DVOŘÁKOVÁ, Z., SMRČKA, L. a kol, 2011) The education in financial literacy should be differenced by the age, kids in the kindergarten need to know how to manage their pocket money but the grown-ups need to manage much bigger amount of money to secure themselves or whole families.

Financial illiteracy brings with it the issue of indebtedness of the population. The financial illiteracy can make the people to make wrong decisions about their incomes by which they cannot provide all needed thinks. When the income is not used right there is a high probability that they will have to borrow some money from bank or any other institution. Over-indebtedness of the population is a big problem in the Czech Republic.

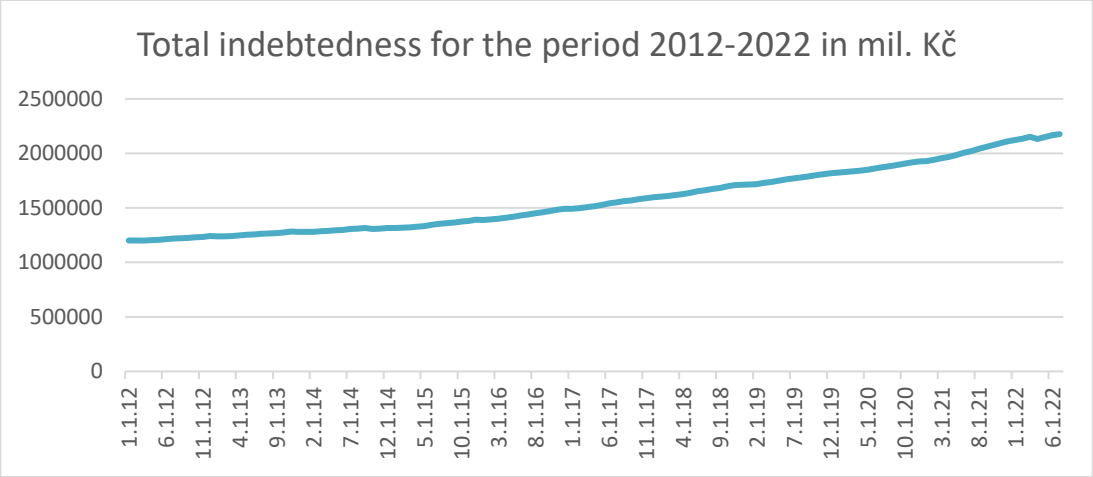

Fig. 1. Total indebtedness for the period 2012-2022 in mil. Kč (Source: own processing from ČNB- ARAD)

Figure 1 shows the development of Indebtedness of the population in Czech Republic in last 10 years. The indebtedness is divided to three categories which shows following figures.

First is dept is intended to the housing, this debt shows figure 2. It also includes mortgages and housing loans. Trend of this dept has a growing tendency. From the data we can detected that in the 2020 there was big upturn in the Housing depts. It is the size of debt from mortgages and building savings loans increased by 160 billion year-on-year in 2020 which is paradox during the ongoing pandemic, it has grown the most in history. (ARAD systém časových řad, 2022)

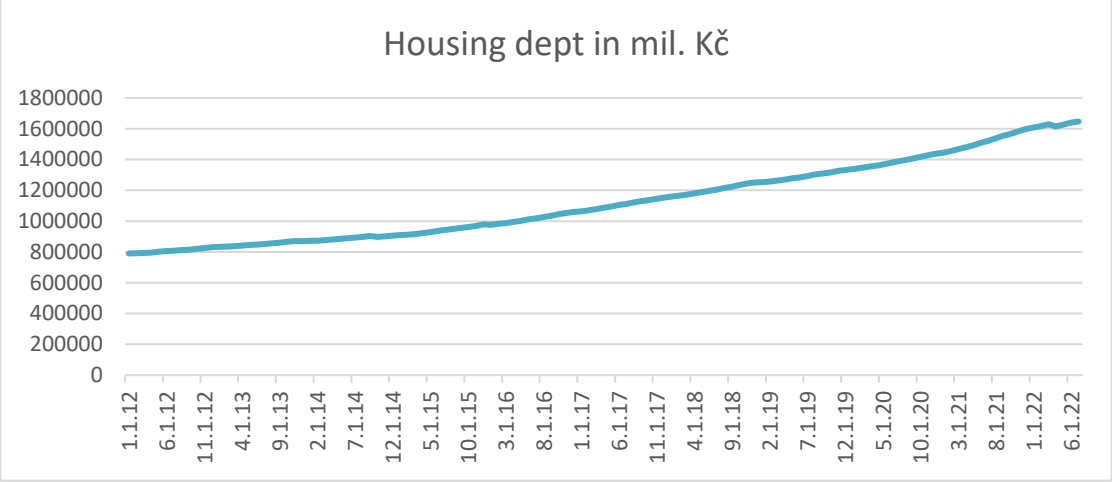

Fig. 2. Housing dept in mil. Kč (Source: own processing from ČNB- ARAD)

The figure 3 shows the consumption depts. These loans could have purpose or not, you can get them in bank or online. They are much more available than the housing ones. But they brink also a higher risk because you can get many of them to cover one expense. The issue here is that every of them have different interest rate and you need to pay more money back than you got from the loan. The longer the maturity period, the more we pay in interest rate, the shorter the maturity, the more we burden the personal or family budget and limit ourselves to the possibility of other financial activities. (VYBÍHAL, V. a kol. 2011) As we can see in the figure 3 at the beginning of the 2022 the consumption dept was 330147,3 mil. Kč, what is 63388,7 mil. Kč more than ten years ago. (ARAD systém časových řad, 2022) The consumption dept, have growing trend.

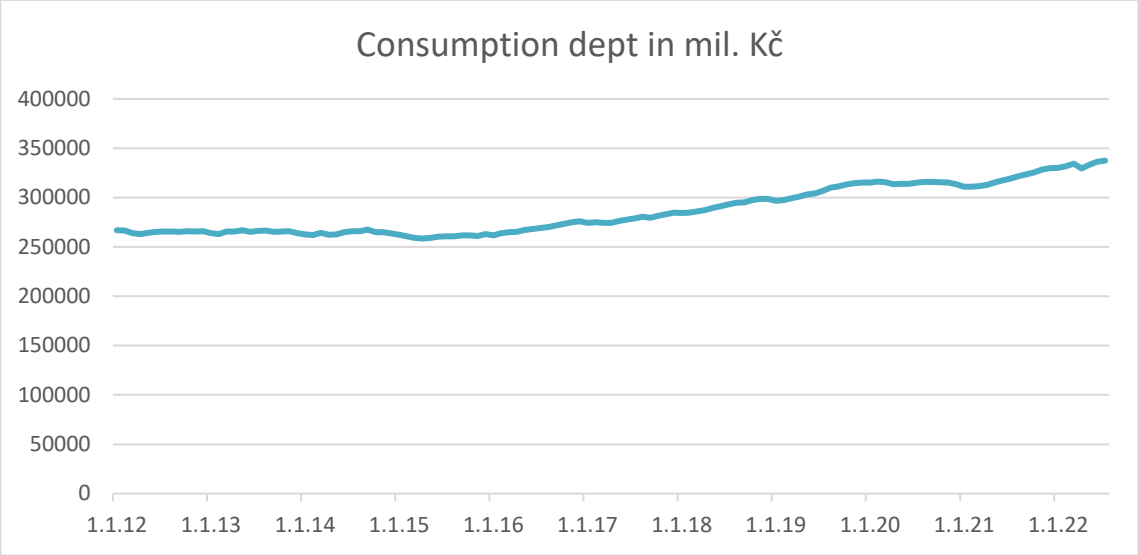

Fig. 3. Consumption dept in mil. Kč (Source: own processing from ČNB- ARAD)

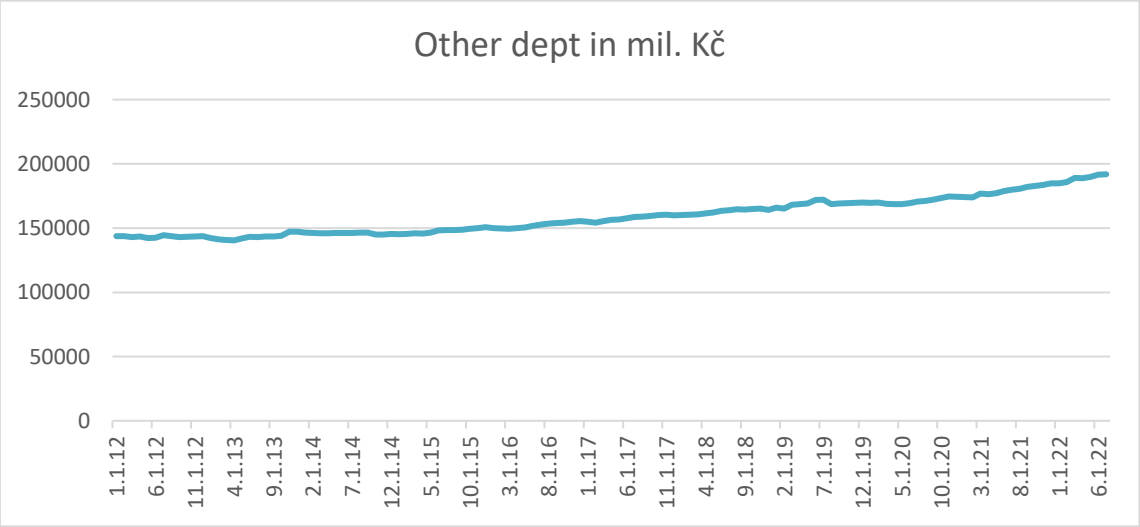

Fig. 4. Other dept in mil. Kč (Source: own processing from ČNB- ARAD)

The third dept in figure 4 contains all the loans which are not determined for housing or consumption. To this category belongs loans for development, investing or leasing and others. Figure 4 also shows a growing trend in the ten years.

All the figures prove that total indebtedness in Czech Republic in the last ten years is growing. To have healthy credit and loans in population is the most important step to improve financial literacy. It is important to keep balanced incomes and outcomes to pay all the loans we have. It is also important to choose right product, to cover the cost we need. If we are going to buy flat or build house, we need to make sure we choose the housing loan. In the whole process we need to answer the most important questions if we can handle the monthly payments of the loan and do we have enough money left to survive whole month. Lot of people do not count the monthly payments into the family budget so they can get into serious financial trouble.

The knowledge of financial literacy can help as in making decisions about the loans and credits. In the market there are a lot of institutions which can provide you loans and credit, but we need to count how much we are going to pay back. Some of the providers have high interest rates so when someone who have no idea about financial literacy take this loan can payback much more than he think.

Financial knowledge can refer to the degree of education which individuals have. The knowledge is the key to understanding and skills to manage their financial affairs. This is considered as an important tool and necessary for individuals to make informed financial decisions, utilize financial ser-vices, and navigate the consumer market effectively (Reich and Berman, 2015)

Synchronise the financial incomes and outcomes is a part of financial skills. The banks provide the electronic banking where you can check your bank account balance, but lot of bank users do not use it and they lost the overview. It is important to have some financial buffer, to overcome some unforeseen event and to have some money left over the end of the month. (Van Raaij, 2016)

3 Legal literacy

There are two different approaches to how we can think about the legal literacy. One is an American approach where law is examined as an independent variable. This kind of thinking based on Pound's distinction between law which is written in books and the law in action. The law is considered as something given and valid. In its opinion, it is an examination of the applicable law in practice (official law in action). There is so-called "gap study", i.e. an examination of the gap between "law in books" and "law in action". (Pound, 1910) The European approach is defined by the Ehrlich's and his living law. The Ehrlich's living law is based not only on the understanding written law, but the subject of investigation are also informal rules, habits that the individual in life situations follow, or tends to follow. (Ehrlich, 1936)

Michael E. Manley-Casimir, Wan- da M. Cassidy, and Suzanne de Castell said that "*Full legal literacy goes beyond the development of a basic legal competence and implies the acquisition of knowledge, understanding and critical judgment about the substance of law, legal process, and legal re- sources, enabling and encouraging the utilization of capacities in practice.* "

Podgorecki (1974) think that „*Knowledge of law enactments or regulations is understood as acquaintance with the tenor of legal texts based on the awareness of their obligatory nature, whereas knowledge of legal principles means cognition of the basic norms of right and wrong in relation to the spheres and conditions, in which a given type of behaviour is permissible."*

According the Škvára (2011) legal literacy is the overview of the knowledge and adaptation of the applicable law.

4 Linking the financial and legal literacy

Although financial literacy is already dealt with by a large spectrum of authors, it is still a very topical topic in which it is necessary to constantly educate. However, legal literacy is still in its infancy and their interconnection is still evolving. Unfortunately, basic knowledge of these areas continues to be lacking in society, and often individuals find themselves in situations where they are no longer able to withstand their financial situation. I believe that simply educating society in the field of financial literacy is not enough, for a proper understanding of financial instruments it is necessary to supplement at least the basics of law. It is also very important that the company is educated so that it understands the contracts it signs, so that they can calculate how much they will overpay on credit or know their rights that arise from the law. Legal literacy defines the foundations of law that an ordinary person needs to be able to manage their personal finances.

In modern world, there is only a few people who have not own their bank account. It is practically a necessity to have it, because all the employers are sending the pay check there. To open the bank account, you need to sign many of the contracts and agreements, which are written by the lawyers and lot of peoples do not even know what they are signing. To know what the contract or agreement means, you need to know at least some special phrases, which are used in most of these contracts. This is the reason why the financial and legal literacy should be linked and lectures together.

5 Conclusion

Although many authors are already dealing with the issue of financial and legal literacy, it is still a topical topic and a focus on this issue is very necessary.

Nowadays, there are many options to manage our money. Unfortunately, many people still have a low awareness of how to handle their money. The factors that influence this ignorance can be many, but a proper understanding of financial and legal literacy is key to people understanding what is happening to their money. Many people do not know how to set a budget correctly and then find themselves in a situation where they do not have enough funds to pay all the bills. As already mentioned in this article, the indebtedness of the population in the Czech Republic has been steadily increasing over the past 10 years. Often people have more loans and then they are not able to pay their repayments and so they continue to borrow. And this is the reason they often get more and more into debt.

Thanks to the link between financial and legal literacy, there is a motion that people will be more careful in making decisions about their finances and will have a greater understanding of the contracts they sign.

6 Acknowledgement

This research was financially supported within the VŠB–Technical University SGS grant project No. SP2022/71 (Analysis of fraud in cross-border transactions and their impact on the identification of risks in business activities).

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13th International Scientific Conference
"Karviná Ph.D. Conference on Business and Economics"
November 2-3, 2022, Horní Lomná, Czech Republic

Conference Proceedings
Silesian University in Opava, School of
Business Administration in Karvina, 2022

A PROJECT OF A CROWDFUNDING CAMPAIGN

A K M Zakaria[1]

[1]*Silesian University in Opava, School of Business Administration in Karvina,*
Univerzitní nám. 1934/3, 733 40 Karvina, Czech Republic
email: zakaria@opf.slu.cz

Abstract
Few decades ago when information technology was not much popular that time this crowdfunding concept was not popular too. By the bless of information technology crowdfunding fund rising concept become very popular fund rising source for new entrepreneur and researcher. Crowdfunding is a fund rising concept where student, researcher or a new entrepreneur can raise fund for their project A large number of people with a small-small amount of money they contribute for project. A successful campaign is enough to raise fund for new project. So crowdfunding concept is much popular among student, researcher and scientist who have not enough fund for their project specially in developing countries. The aim of this paper is to motivate fund seeker specially NGO's and researcher how to create a successful campaign with more engagement of contributor to raise expected fund for their projects.

Keywords
Crowdfunding, fund for NGOs, fund raising, fund for social work, crowdfunding campaign.

JEL classification
L31, L26

1 Introduction

Crowdfunding is one of the most popular funds rising method for small entrepreneurs and NGOs specially for social development works and scientific projects. It is a very effective way to collect fund for a project by a large number of donors or investors through both online and off-line campaigns. The main concept of this fund raising method is to involve a large number of people with a small amount of financial contribution for the project (Dreser, 2016,p.3).

Now a days to create a crowdfunding campaign and get success to achieve expected amount of fund become easier to compare with previous time by the blase of development of modern technology such as social media, lots of crowdfunding website and promotional tools. In this time people like to use online platform to collect their funds because a statistic shows that in 2021, total number of internet user is around 59.5 percent1(4.66 Billion) of world population. Few decades before this crowdfunding process was more complex specially when internet was not available among mass population, that time fund seekers organize different kind of campaigns to raise their fund, sometime they organized music concert, campaign for local people. For instance, in 1971 a musical program called "The Concert for Bangladesh" was organized by George Harrison, Ravi Shankar to collect fund for Bangladeshi people in New York city. A total of 40000 people participated on that concert and around 250000 U. S. dollars fund raiser for Bangladesh which administered by UNICEF.

A well organize campaign of crowdfunding very much important to attract the contributors. The main purpose of this papers to help those people who is seeking for fund for new project specially for NGOs. In this diploma paper I will describe all important factors about crowdfunding campaign. In first chapter, basic terms of crowdfunding will be discussed, how to create a successful campaign, some examples of crowdfunding platforms, advantages and disadvantages of crowdfunding. In second chapter, problems of crowdfunding will be presented, in third chapter, presentation of data analysis will be made and fourth chapter, we will discuss about problems solutions and recommendation.

[1]The Statistic Portal[Online accessed to 7th November 2021]. Available at: https://www.statista.com/statistics/617136/digital-population-worldwide/

The main goal of the paper is to analysis fund raising methods of nonprofit organizations. Find out its problems and solutions. This paper will help to NGOs to collect their funds for social development works as well as it will help to new entrepreneurs to collect their seed capital for business. In our society, there are lots of people who have great business ideas, and some people want to do social work, but they cannot start their project because of fund. But in this time, crowdfunding is a solution of this funding problem for few entrepreneurs. In my paper those new entrepreneurs will know about this alternative funding methods.

In this paper is focused on one of nonprofit organization "Jagrato Juba Shangha (JJS)", it is situated in Bangladesh. JJS operate different kinds of projects in Bangladesh specially implements projects in south-west (Khulna) part of Bangladesh. Among their all social development projects, they operate one project name "Shishu Kendra" for Autism children health care, education and training. Shishu Kendra was started this journey from 2001 and right now they are serving 14 disable children. That project is operated by some well-wishers' fund. In my paper I will analysis their data about that project fund raising.

2 Background of Crowdfunding

The volume of crowdfunding increasing globally very fast. In this time, it is one of the major fund collection method for researcher, NGOs and small entrepreneurs. In 2021, the global transaction volume of crowdfunding campaign[2] is 1.05 billion U. S. dollars and it is projected to reach 1.2 billion U. S. dollars by 2025 with 2.63% growth rate. Statistic show that in 2016, this crowdfunding raised fund was 738.9 million U.S. dollars globally. Every year a huge number of campaigns are created all over the world in online and offline to raise funds. But the average success rate of crowdfunding campaign is 38.92 percent globally. After that, this time crowdfunding is one of the potential fund-raising method among academic researcher, NGOs and entrepreneurs for its high global volume.

2.1 Definition of crowdfunding

Crowdfunding is a concept of fund raising for projects with small amount from a large number of people (crowd) through internet (Dreser, 2016,p.16). Basic concept to reach innovative idea among huge number of people and to create interest of general people for contribution of that project. Most of the cases contributor do not expect any kind of return for contribution. Although there are few types of crowdfunding methods but most of the case they don't expect anything. An entrepreneur who has great idea but have no fund to implement his/her idea, it is a good way to collect fund for project. Non profit organization operate lots of social development projects and for their projects they collect fund by crowdfunding. They explain what they are going to do for society and how it will bring changes for society. They increase people interest on their project and influence them to contribute a small amount money and involve with them. For scientific research projects, researchers also collect funds with this method for their projects. Small amount together can make a very big amount which can bring a good change in our society. First real example of crowdfunding, mentioned in 1885, another campaign was created by Joseph Pulitzer in his newspaper to collect fund for the project of the Statue of Liberty on Liberty Island off New York in USA (Freedman and Nutting, 2015, p.2) He promised he will publish all donors name in his magazine. In five months campaign, over 160000 donors with total amount of 100000 U.S. dollar donated for that project.

The first internet based successful campaign was occurred in 1997 by British rock band fans for their reunion[3]. They collect fund form their fans. After that successful fund raising, ArtistShare

[2] The Statistic Portal[Online accessed to 8th November 2021]. Available at: https://www.statista.com/outlook/dmo/fintech/alternative-financing/crowdfunding/worldwide

[3]Fundable[Online accessed to 8th November 2021]. Available at: https://www.fundable.com/crowdfunding101/history-of-crowdfunding

become first modern crowdfunding platform for fund seekers (Freedman and Nutting, 2015, p.5). After that some other crowdfunding platform started their service for fund seekers.

2.2 History of crowdfunding

Crowdfunding has very old history. To know that history we need to look back eighteenth century. In Ireland, Irish loan fund was created by father of microcredits, Jonathan Swift. They offered a small amount of loan to low-income rural family in Ireland specially those family who have no ability to get loan from Bank or other financial company. In nineteenth-century, more than 300 programs were implemented in Ireland and around 20% of Irish family used that program.
Modern microfinance concept was established in 1976 when professor Dr. Muhammad Yunus implements his microfinance concept in Bangladesh. He visited a village of Bangladesh called Jabra near the Chittagong University and he saw very poor woman who are making bamboo furniture if they get small loan they can buy bamboo and make more profit but they are not able to have traditional bank loan. Then he decided to provide a small loan, amount of 27 U.S. dollar to 42 women in that village (Yunus and Jolis, 1998, p.8). By that program he started today's modern microfinance concept. In 1983, professor Dr. Muhammad Yunus funded Grameen Bank to provide small amount of loan among poor villagers. Grameen Bank[4] is going to serve 8.81 million low income people, 97% of them are woman.

In 1997, British rock band fans created a campaign to collect fund for their bands. They collected amount of 60000 U.S. dollar through internet. It was a successful online based modern first successful campaign. In 2003, artistshare was launched to collect fund for creative artist by their fans. It was the first online base platform. In 2006, professor Dr. Muhammmad Yunus and his Grameen bank win Nobel Peace Prize.

After that in next one decade there are lots of online platform was launched for crowdfunding fund seekers. For example, Indigogo, kickstarters, GofundMe. Those platforms got much popularity for fund seekers specially among researcher, NGOs and small entrepreneurs. Every day they are collecting lots of funds through their websites and already completed a huge number of successful campaigns.

Although this crowdfunding concept came long time ago, after that it was not much popular that time but the bless of internet and modern technology, now a days crowdfunding concept become huge popularity. And day by day the amount of raising funds are increasing.

3 Background of Jagrata Juba Shangha (JJS) and Shishu Kendra

JJS is a national level, non-political, non-profitable and non-governmental (NGO), right based environmental and social development organization[5] and is a development associate of Government of Bangladesh (GoB). It has been working since 1985 and works in some parts of the country with focus to the South-West costal region and covers both urban and rural area. JJS is continuing and expanding in terms of activities, area coverage, projects, issue of dealing and number of serving people. It has legal entity from relevant GoB department and authorities.
JJS work focus includes governance and human rights, climate change adaptation and resilience, disaster risk reduction, WaSH, food security, child rights & child protection and gender mainstreaming & empowerment. JJS works for poor and marginal people, poor occupation groups, woman, children, vulnerable woman, disaster vulnerable people, children, and people with differently able.

[4] Grameen Bank[Online accessed to 9th November 2021]. Available at: https://grameenbank.org/founder-2/

[5] JJS[Online accessed to 17th November 2021]. Available at: http://www.jjsbangladesh.org/

For funding JJS gets support from government of Bangladesh, international organizations such UNICEF, Save the Children, UNDP, Jica. They also have micro finance program and some projects operate by crowdfunding.

3.1 Background of Shishu Kendra

Shishu Kendra was established in 2001 to give support to the intellectually disable and autistic children. In 2001, executive director of JJS, ATM Zakir Hossain realized to start this school in Rupsa Upazilla under Khulan district of Bangladesh. In 2021, they provided their service for 14 students by two teachers and one support staff. Management committee also well experienced. Shahana Parvin is the head of management, and she was a high school teacher. She has long time experience about teaching and school management issue. The main aim of Shishu Kendra is to prepare those disable children to enroll in mainstream education system and also, they will be capable to earn some money in future for living by receiving vocational training. Shishu Kendra is a project of Jagrata Juba Shangha (JJS).

Goal of Shishu Kendra

Greatness enable environment for mentally challenged children and creating recreation opportunities, parent's education and social education to mainstream them in the society.

Objective of Shishu Kendra

Shishu Kendra is was established on some of main objects.

- To support the Children with Autism and ADHD for their overall development, establish their right in the society and assist in self-sufficiency.
- Create positive attitude, include in mainstream education and create positive in the society for the autistic children.
- Create awareness among civil society and motivate for participation for the children.
- To ensure the development support to the children with autism, ADHD and intellectually disabled.

Location of Shishu Kendra

The center Shishu Kendra situated at Talimpur in the Rupsa Upazila of Khulna district to support intellectually disable children associated with epileptic and attention deficiency hyperactivity disorder within the age of 1-16 years.

Activities of Shishu Kendra

Shishu Kendra operate some different kind of activities for intellectually disabled children to develop their personal developments. Last two decade they are operating this novel work for society. In that time, they archived lots of success. Shishu Kendra provide academic education to intellectually disable children as well as they also social education and family life education.

Education and training

1. Academic education
2. Everyday assembly
3. Social education
4. Family life education
5. Cultural education
6. Skill development/Vocational training
7. Entertainment class for the children

Different events

1. Parents awareness Raising
2. Day Observation
3. Annual Sports Cultural Program and drawing competition

Facilities for the students

1. Transportation
2. Health facilities
3. Tiffin
4. Special day gift

4 Financial Analysis of Shishu Kendra

Shishu Kendra mostly depend on crowdfunding. They collect their funds from general people. The staff of JJS contribute some money in every month for Shishu Kendra.

Table 1. Source of Income of Shishu Kendra (in BDT)

Sources	2021	2020	2019	2018
JJS office staff	144500	140750	152300	141100
General People	169450	151050	257200	244650
Total	313950	291800	409500	385750

Source: Internal information of Shishu Kendra

In table 1, we can clearly notice that in 2020 fund of Shishu Kendra was reduce from previous years. The main reason of fall down of their fund was COVID-19. In that time financial condition of the general people was not good. So, they were not interested to give support to others. In 2019, Shishu Kendra raised their maximum fund and it was 409500 BDT, in this year they had 62670 BDT remaining fund. But in 2020 and 2021, they raised less than their budget amount. However, in 2021, Shishu Kendra raised fund more than last year. In 2019 and previous years, almost 60% to 65% fund of Shishu Kendra was raised by general people and rest of the 35% to 40% came from JJS office staff. From 2020 to 2021, the number of general crowdfunding donor was reduced heavily. On the other hand, donation from JJS office staff was not reduce as much as general people.

Rupsa is situated in south part of Bangladesh. Shishu Kendra is located in this area. In Rupsa, majority of villagers are not financially strong. Mostly they do small business in nearest local market. Those people are contributing Shishu Kendra from the beginning with a very small amount of money. But in 2019, for COVID-19 they lost their source of earning, some people become jobless. As a result, the number of donors reduce in last 2 years by 10% to 15%. In 2020, the situation was so bad and total amount of the raising fund for Shishu Kendra was fall down suddenly. But in 2021, it's brought some hope again among the management team because the number of donors is increasing slowly.

Shishu Kendra need around 500000 BDT[6] (5000 euro) per year to give proper support to that disable children. After talking with the authority of Shishu Kendra they told me they need around 22000 BDT to 25000 BDT which is equivalent of 220 euro to 250 euro per year for one student to maintain everything such as teacher salary, tiffin, house rent and other expenses. If they have 25000 BDT in a year for per student they can give more facility to those autistic children. With 500000 BDT (5000 Euro) they can provide their service among 20 students. In last two years Shishu Kendra had shortage of fund than budget amount. So, they used their previous years remaining fund.

Shishu Kendra is a project of Jargata Juba Shangha (JJS). So almost 40% donation of total fund came from internal of JJS. After conversation with managing committee it was clear that most of the internal donation come from executive director of JJS and other staff also keep contribution to raise Shishu Kenda fund in every month after getting their salary. Shishu Kendra completely depend on crowdfunding. They collect fund from Rupsa and JJS staff. But the people of Rupsa who donate some money for Shishu Kendra they are not much financially strong. So, lots of people of Rupsa upazila donate small amount of money for this novel project. Management of the Shishu Kendra sometimes invite some people who are well establish in society to participate some program of Shishu Kendra and donate some amount for them.

Shishu Kendra fully depend on donation of well-wisher, they have not any other source of income. If people donate more they can give support for more students but if they donate less that year they cannot give support to maximum students. For fund raising they use their network who are directly or indirectly connected with JJS. Almost same donors are donating every year.

Table 2. Expenditure of Shishu Kendra (in BDT)

Expenditure area	**2021**	**2020**	**2019**
Staff Salary	192000	192000	186000
House Rent	60000	60000	60000
Tiffin	87360	99840	87320
Electricity expenses	9630	9480	7872
Other	7320	4322	5638
Total	356310	365642	346830

Source: Internal information of Shishu Kendra

According to table 2, Most of expenses of Shishu Kendra goes through staff salary and student tiffin purpose. They almost spend 50% of their total expenses for staff salary and 25% to 28% they spend for student tiffin purpose. Those two are their major field of expenses. Shishu Kendra also need to pay house rent. Every month they need to provide 5000 BDT (50 Euro), so in a year they need to pay 60000 BDT which is 600 Euro. Then electricity and other expenses in total almost 15000 BDT (150 euro) in a year. From 2019 to 2021, Shishu Kendra yearly expenses in total around 350000 (3500 euro). After talking with them, I know that they reduce their budget because of lack of fund. But if they get more fund, they can increase few more students and also want to make better environment for students. Expenses in Bangladesh is low on the other hand earning of Bangladesh also much lower, as a result people also have less ability to donate.

[6] Exchange rate of BDT to euro at 5th January 2022. 1 Euro = 97.11 BDT
Shishu Kendra's data collected by interview with the founder and other staffs

Shishu Kendra is located at Talimpur in Rupsa upazilla. It is village area. So, they got two teachers with 5000 BDT monthly salary each. It is possible in that location and also other expenses also less there such as schoolhouse rent, transportation. Shishu Kendra try to reduce their expenses and provide maximum number of students. They also need some equipment in their classroom and some toys for students, but they have lack of fund to maintain those expenses.

The best method of fund raising for social work project such as Shishu Kendra is crowdfunding. People want to contribute some amount of money for this type of project which can bring changes in society. But we need to inform people as much as possible that what we are going to do and what we want to do by this fund. If we don't inform it to huge number of people, we cannot expect our expected fund from them. So, in generally we try to collect fund locally and intentionally. But for Shishu Kendra, they did not try to collect from internationally, even not from the other corner of Bangladesh. Their target amount is only 5,00,000 BDT (5000 Euro) in a year, and they are able to raise only 60% of their target amount. Some other organization also doing social work in Bangladesh, and they are operating different kind of charity program and successfully they are collecting their target fund for project by crowdfunding. They are trying to collect fund locally and globally. Shishu Kendra is fully dependent on crowdfunding but they collect fund from a small target area of Bangladesh. For lacking fund, they cannot maintain all of their cost properly. If they can raise their expected amount of fund, they want to provide some extra facility to the student such as more often outside activities and participate in different kind of cultural programs, they also want to provide some gift box in festival time. In table we can clearly observed that they spend them most of the fund for some basic and fundamental needs. Bangladesh people have less income and there expenses also low. Annual average income of Bangladeshi people is $2554 in 2020-21 but most of the village people earn very less of that average amount and Shishu Kendra target donor area also one village of Bangladesh where that school is located and JJS office staffs.

4.1 SWOT analysis and Estimated value (EMV)

In SWOT analysis, I used above mention SWOT and here I put numerical values for outcome. I created three categories and it is higher, middle, and low. In my research I find out which one have high impact and probability, and which one have medium and low impact and probability. For impact value, I also created three categories. In my analysis medium impact value was 50000-euro, lowest impact value was 30000 euro and higher was 70000 euro. Strengths and opportunities have positive value and weakness, and threats have negative value. Finally, I calculate total SWOT value and it was positive value. When I did this analysis, I think myself as a general donor and I put that value to get real outcome.

Table 3. EMV matrix analysis of Shishu Kendra

Validity	SWOT	Description	Probability	Impact	Impact Value	Weight	EMV
2022 -2024	S1	Reputation of Jagrata Juba Shangha	85%	70%	60000 €	50%	51000€
2022 -2024	S2	Teachers and Trainers Skills	75%	85%	55000€	55%	41250€
2022 -2024	S3	Geographically benefits	80%	75%	40000€	35%	32000€
2022 -2024	S4	Expert Management team management	55%	50%	35000€	45%	19250€
2022 -2024	S5	First school in Rupsa	80%	70%	50000€	55%	40000€
2022 -2024	S6	Environment of school campus	85%	60%	45000€	45%	42500€
2022 -2024	S7	Monthly health checkup facility	85%	90%	70000€	65%	59500€
2022 -2024	W1	Number of students and classroom	60%	70%	-40000€	50%	-24000€
2022 -2024	W2	Lack of learning and entertainment tool	80%	80%	-45000€	60%	-36000€

Validity	SWOT	Description	Probability	Impact	Impact Value	Weight	EMV
2022 -2024	W3	Number of campuses	75%	60%	-30000€	45%	-22500€
2022 -2024	O1	Rupsa is important economic zone of Bangladesh	77%	75%	40000€	50%	30800€
2022 -2024	O2	Possibility to provide service among more students	85%	80%	55000€	65%	46750€
2022 -2024	O3	Available teachers and staff in Rupsa	70%	50%	40000€	55%	28000€
2022 -2024	O4	Easy accessibility with health service providers	80%	50%	50000€	55%	40000€
2022 -2024	T1	Lack of funds	85%	80%	-65000€	70%	-55250€
2022 -2024	T2	Less educated villagers	60%	70%	-32000€	50%	-19200€
2022 -2024	T3	General people's trust on NGOs	82%	75%	-50000€	60%	-41000€
2022 -2024	T4	Global financial crisis	65%	50%	-40000€	45%	-26000€
2022 -2024	T5	Awareness of villagers	70%	55%	-30000€	50%	-21000€
2022 -2024	T6	Competitive project in Bangladesh	60%	45%	-35000€	40%	-21000€

Source: own calculations

Table 4. SWOT matrix analysis of Shishu Kendra

SWOT	Description	EMV
Strengths		
S1	Reputation of Jagrata Juba Shangha	51000€
S2	Teachers and Trainers Skills	41250€
S3	Geographically benefits	32000€
S4	Expert Management team management	19250€
S5	First school in Rupsa	40000€
S6	Environment of school campus	42500€
S7	Monthly health checkup facility	59500€
Strengths Total		**285500€**
Weaknesses		
W1	Number of students and classroom	-24000€
W2	Lack of learning and entertainment tool	-36000€
W3	Number of campuses	-22500€
Weaknesses Total		**-82500€**
Opportunities		
O1	Rupsa is important economic zone of Bangladesh	30800€
O2	Possibility to provide service among more students	46750€
O3	Available teachers and staff in Rupsa	28000€
O4	Easy accessibility with health service providers	40000€
Opportunities Total		**145550€**
Threats		
T1	Lack of funds	-55250€
T2	Less educated villagers	-19200€
T3	General people's trust on NGOs	-41000€
T4	Global financial crisis	-26000€
T5	Awareness of villagers	-21000€
T6	Competitive project in Bangladesh	-21000€
Threats Total		**-183450€**
SWOT Total		**165100 €**

Sources: own calculations

SWOT analysis, we can see Shishu kendra has strengths total 285500 €, on the other hand, their weakness total is only -82500 €. Opportunities total is 145550 € and threats total is -183450 €. Final result of SWOT total value is positive value, and it is 165100 €. So, after SWOT analysis, we can see Shishu Kendra has more positive sides compare with negative one.

5 Suggestions to improve crowdfunding campaigns

Shishu Kendra can increase their fund both online and offline campaign. A social organization can collect fund from locality by organizing local campaign, but this opportunity will wide range if we use any online platform to collect our fund. So, both can be a good source to collect our desired amount. Shishu Kendra mostly focus on local campaign in Bangladesh. But the general people's financial capability and social responsibility are not enough to collect expect funds for Shishu Kendra to continue their activities by doing local campaign. Shishu Kendra should give same priority to collect their fund by both offline and online campaign.

5.1 Improvement of local campaigns

Shishu Kendra can overcome their all kind lacking and raise their funds for their noble works.

- Shishu Kendra can organize seminar more often with potential local donor and inform them about their activities. They are doing great work for society but if people do not know it well, expected fund will not raise.
- Shishu Kendra is operated by JJS (Jagrata Juba Shangha), so they put their information in JJS main website. But who will donate for Shishu Kendra, they want to know more about that center and their current activities? But information about Shishu Kendra is not enough and update. So, they should create their own website and regularly should update it.
- They can collect fund through website. This time most of the social development organization collect their fund through their website. They put very clear information about their project in their website and keep a donation option. So, people from the other corner of the world can donate them easily. To keep easy donation option in their website is much important to raise fund.
- As much as possible to collect potential donors contact information in their database. After a certain time, a letter with original signature of director can be sent to donor's postal address with a small gift. In that letter that can talk about their projects and can request them for donation. In this way Shishu Kendra can inspire people to donate in their project.
- For raising fund Shishu Kendra can setup a temporary camp in city area and they can give information to general people about their projects. They can talk with general people and give them information about Shishu Kendra and invite them to participate in seminar and also, they can offer for donation.
- Video marketing is good way to touch human heart and inspire people for donation. When someone can see Skishu Kendra activities, they can keep more trust on them and donate more. So Shishu Kendra can create good emotional video content and put it in website and play it in seminar. It will help them to raise their fund.

Table 5. Financial requirements of improvements – A simulation (In BDT)

Methods	Expected costs	Details	Expected Funds
One Seminar in each month. So, 12 seminars in a year	0	Each seminar they can find 10 to 15 donors and if each give 500 BDT, in total it will 5000 to 7000 BDT	For 12 seminars in a year 5000X12 = 60000 BDT 7000X12 = 72000 BDT
Campaign in online	Free	Two campaigns in two platforms. Each will raise minimum 150000 BDT	150000 X 2 = 300000 BDT
Invite financially strong person to visit School	Free	If 5 to 7 want to give donation, each give 30000 to 40000 BDT	By 5 donors, 30000X 5 = 150000 BDT 40000 X5 =200000 BDT By 7 donors, 30000X7=210000 BDT 40000X7=280000 BDT
Create 7 days temporary camp in city area	250 BDT for a day (2 volunteers food cost)	If they get 70 people and each give 50 BDT 70X50 = 3500 BDT	3250 X 7 = 22750 BDT in 7 days camp

Sources: own calculations

In above table, I put some of my expectation and prediction to raise their fund in some different way. Shishu Kendra also have some fund from before. For example, they raise some fund from JJS office staff and local donors. With that if they try to raise more fund and give more support to new students, they can raise more than their expected amount. Main purpose to organize a seminar is to increase awareness among people. In seminar time maybe Shishu Kendra will not get much response but in long term they will get its benefit. It will create some new donors and they can donate money or yearly basis, not only for one time. For getting long term benefit, Shishu Kendra need to create awareness program more often. It will give them opportunities to create more potential new donors.

5.2 Improvement of online base campaigns

Offline base local crowdfunding is a way to rise their funds, but it is not enough to reach their target amount. Now it is time to use technology, without using of technology, we cannot spread our message among huge population. So beside offline campaign, Shishu Kendra can focus more about online base crowdfunding campaign, and it will help them to raise more fund to continue their project smoothly.

Shishu Kendra need to plan their journey before starting campaign in online platform. Before starting a campaign should have very clear goal of their projects. With this campaign how, they can develop their project and how many financial supports they need for their project. After that they can choose a crowdfunding platform. In this stage they should concern about fees and other supports. All platforms will not take same fees and will not provide same service. Even some of the platforms provide their service in Bangladesh. So Shishu Kendra can choose one the best donation base crowdfunding platform for their campaign. Then they need to care a very good campaign page where a donor will get details information and idea about their project. A donor before donating in your project, they want to know about that project and where he/she is going to donate money. So, in campaign page Shishu Kendra need to provide details information. They can use their logo and projects activities photos. I will help them to create more effective campaign. In campaign page they can give short and emotional videos. Some survey on previous campaign show that which campaign use video in their page they are more successful.

Then they can motivate their supporter to donate for their project. They can share it with their well-wishers. They can give a small gift to their supporters. After creating a campaign, they should now

stop working and wait for fund, they can do advertisement in social media and they can do email marketing, video marketing. When Shuishu Kendra will get personal data of their donor they should keep it in their database and send them follow up email. When a donor donates some money for a project, they want to know project update. So Shishu Kendra should keep their project updated. For a crowdfunding a good campaign page is important but campaign marketing also same important to be success. So, if we create only good campaign in an online base good platform but we do not spread it among our network and other corner of the world, it has less possibility to get success. And if we want to start a crowdfunding campaign, we need to plan about it 3-6 months before of starting.

Shishu Kendra is social development project. Many young people will be interested to do work with them as a volunteer, some people will give financial support but some young people who is not able to give financial support they might be provide them time to collect funds. Shishu Kendra need to motivate young people to do volunteer work with Shishu Kendra.

6 Conclusion

Crowdfunding is not only way to collect fund for business, NGOs or research project but also it is a way of millions of people to have happy life in society and for new entrepreneurs it is like dream maker. This microfinance concept was introduced few decades ago among people but now this is one of the major and popular sources for entrepreneurs to collect seed capital for their dream project.

Crowdfunding presents one of the most exciting means of raising project capital seen in decades, and most promising ways to gauge consumer appetite for new ideas witnessed in the history of the industry. (Scott and Rusel, 2012)

Even it is also a major source of fund for NOGs. Lots of social project raise their fund by crowdfunding campaigns. Before this microfinance concept, collecting fund for new project was hard for new entrepreneurs but now by crowdfunding campaign and using modern technology they can collect fund from another corner of the world.

People can easily start crowdfunding campaign and asking for fund, but all campaign will not be success to raise fund. Raising fund successfully, fund raiser needs to create a good campaign with more details about projects as well as their idea should be unique and creative. In my research, if an entrepreneur has very creative business idea, for funding they no need to worry. Easily they will get investors through crowdfunding campaigns. In this paper, my main research area was NGOs and donation base crowdfunding campaign. In this research, it was clear that donation base crowdfunding success depend on campaign marketing. I did research about one project in Bangladesh for autistic children and it called Shishu Kendra. Shishu Kendra has lack of fund. Although they are doing a noble work for society. A lot of people want to be part of this activities around the world. But Shishu Kendra has lack of fund. But why they have lack of fund to do this great work? Finding that answer, I did a vast research about Shishu Kendra. I tried to find out their main problems and solutions. In my opinion, their main problem is they don't try to collect fund by international crowdfunding campaign through internet. Shishu Kendra depend on local crowdfunding and Jagrata Juba Shangha (JJS) staff donations. But lots of similar type of projects around the world are collecting huge amount of money by crowdfunding campaigns.

Now a days, there are lots of crowdfunding platforms in the world with huge number of donors and investors, but all are not suitable for all kinds of project. So which platform is good for specific project, we need to find out that and we can start raising fund by creating campaign? All platforms' fees are not same, but most of the cases donation base campaigns have less fees or sometime free of charge. Another important issue is all platforms do not provide their services everywhere in the world. So, we need to find out first which one provides service to Bangladesh.

Crowdfunding is very much popular and alternative source of fund among entrepreneurs, NGOs worker and researchers. It has lots of positive side but it's also has some negative side. So, we need to careful about it. Finally, and lastly, I want to say, if someone wants to create a successful crowdfunding campaign, they need to be well prepared for campaign. It's an easy way to collect seed

capital but a well-organized campaign and creative idea also very important to get success. So, if you have a creative business plan or want to do something for society which will bring change in our society, do study more about other successful campaigns before you start your own campaign and create a large and strong social network who can give your support. On campaign time do your campaign marketing among your network and others as much as possible.

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Title: **Proceedings of 13th International Scientific Conference "KARVINÁ PH.D. CONFERENCE ON BUSINESS AND ECONOMICS"**

Editor: Iveta Palečková

Publisher: Silesian University in Opava
School of Business Administration in Karviná

Number of pages: 100

Number of copies: 35

Printing Office: Profi-tisk s.r.o., Olomouc

Karviná 2022

ISBN 978-80-7510-529-5