Environmental and Financial Performance: Review of Selected Studies

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ABSTRACT

The main objective of this paper is to examine selected literature on the relationship between environmental performance and financial performance on firm-level. Specific objectives are defined in accordance with the observed group of environmental performance measures. We decided to investigate environmental performance measured that refer to pollutant emissions, waste, and environmental disclosures. Examined studies cover different periods, regions, and companies. In observed literature, we found mixed results. The results depend on many factors such as the used environmental measures, the financial performance measure, the control variables, the industry type, and the characteristics of companies.

Key words: *environmental performance, financial performance, emissions, waste, environmental disclosure, companies*

JEL Classification: Q51, Q53, G32

INTRODUCTION

The relevant question in the literature that studies the relationship between environmental performance (EP) and financial performance (FP) of the companies is whether improving environmental performance is related to the financial success of the companies. Nature of this relationship, but different measurements of environmental and financial performance is also examined in many studies. Improved environmental performance of the companies that are the result of investments leads to an increase in expenditures, but the trust and reputation of companies can increase too. The companies that have poor environmental performance risk to pay higher environmental levies or fines, and more importantly, they can lose trust and reputation from companies' stakeholders.

In order to avoid that possibility and to meet the stakeholder demands, companies need to express its responsibility towards society, especially when it comes to the environment. This is closely linked to the concept of environmental disclosure because the company is a public institution and an open system. This aspect is more emphasized in the case when the company does its business globally. In that context, the link between the disclosure of the environment activities and the company's financial performances is an economic issue that needs to be analysed.

The main objective of this paper is to examine studies on the relationship between environmental performance and financial performance on the level of companies. Specific

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objectives are defined in accordance with the observed group of environmental performance measures. The first specific objective is to investigate literature on the relationship between pollutant emissions and financial performance. The research on waste financial performance link is examined as the second objective. The third specific objective refers to analyse environmental disclosures-financial performance nexus. The motivation of this paper is to present studies that investigate the relationship between environmental performance and financial performance before starting to analyse this kind of relationship in the case of Serbian companies.

The studies examined in this paper cover the different periods, regions, and groups of the companies. In observed studies, we found mix results. The effects of environmental performance on financial performance depend on many factors such as the used methodologies, used environmental measures, the financial performance measure, the control variables, geographic areas considered, the industry type, and characteristics of companies.

The contribution of this paper to economic literature is a comparative analysis of studies that examined the relationship between environmental and financial performances using company-level data. This paper may have policy implications for companies' stakeholders that have to be conscious of corporate environmental management. Solving environmental problems, companies can achieve financial success. The relationship between economic growth and environmental pollution on a macro level is researched by Mitić et al. (2019) in their literature survey of the Environmental Kuznets curve.

The paper has an introduction, three interrelated sections, conclusions, and literature list. In the first section, we review the literature on the relationship between pollutant emissions and financial performance. The relationship between waste and financial performance is reviewed in the second section. The special part included the analyses of the link between environmental disclosures and financial performances. The final section concludes the paper research.

POLLUTANT EMISSIONS AND FINANCIAL PERFORMANCES

Indicators for the evaluation of environmental quality can use a qualitative or quantitative environmental variable. The type of environmental performance indicator affects the environmental-financial performance relationship because of that, the choice of EP indicators is relevant (Horvathova, 2010). While researchers consider different indicators as measures of environmental performance, in this part of the paper, we observe measures that refer to pollutant emissions.

The GHG Protocol developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) categorizes GHG emissions into three different scopes that are defined for accounting and reporting purposes. Scopes emissions include direct GHG emissions occur from sources that are owned or controlled by the company (Scope 1), GHG emissions from the generation of purchased electricity consumed by the company (Scope 2) and emissions from the activities of the company that occur from sources not owned or controlled by the company (Scope 3).

Some papers focus on a particular emission, but some studies mix various emissions and use indexes consisting of several pollutants. Pollutants as greenhouse gases, acids, particles, and ozone precursors are used in Telle's study (2006) for computing the index. Wagner et al. (2002) construct an index aggregated of SO_2, NO_X, and Chemical Oxygen Demand emissions. Using the same emissions as Telle, Wagner (2005) computes the outputs-oriented index. For constructing the inputs-oriented index, Wagner chooses total energy input and total water input. Horvathova (2012) uses more than 90 types of emissions and propose to normalize different emissions according to their impact on the environment. As a measure of the impact of each pollutant on the environment, she chooses the reporting thresholds as set out by the European Union.

The comparative analyses of selected studies that investigate the relationship between emissions (E) and financial performance (FP) are presented in table 1. Analysed studies are published in the period from 2011 (by Iwata and Okada) to 2017 (by Trumpp and Guenther). The five-year period is the most frequent research period. One study has emission data for just one year. The longest research period covers 20 years. Some studies cover different research period for different emissions depending on data availability.

Table 1. Comparative analyses of selected studies: pollutant emissions-financial performances link

Studies	Sample	Period	EP measures	FP measures	Methodology	Impact
Iwata and Okada (2011)	268 Japanese manufacturing firms	2004 – 2008	GHG emissions	ROE, ROA, ROI, ROIC, ROS, Tobin's Q	Panel data model	Win-win; no impact
Wang et al. (2014)	69 Australian public companies	2010	GHG emissions	Tobin's Q	Multiple regression model	Win–lose
Delmas et al. (2015)	1,095 US publicly traded companies	2004-2008	GHG emissions	ROA, Tobin's Q	Panel data model	Mixed
Trumpp and Guenther (2017)	696 manufacturing companies part of the CDP Global 500, S&P 500 or FTSE 350	2008-2012	Carbon perfor mance	ROA, TSR	Panel data model	Mixed
Misani and Pogutz (2015)	127 companies from different countries	2007-2013	Carbon emissions	Tobin's Q	Panel data model	Mixed
Qi et al. (2014)	39 Chinese industrial sectors	1990-2010	SO_2 emission intensity	ROA	Panel data model	Win-win
Fujii et al. (2012)	Japanese manufacturing firms listed on TSE; CO_2: 758; chemical emission: 2,498	2006-2008; 2001-2008	CO_2 Chemical emissions	ROA	Regression models	Mixed
Lee et al. (2015)	362 Japanese manufacturing firms	2003-2010	Carbon emissions	Tobin's Q, ROA	Panel data model	Win-win
Perez-Calderon et al. (2012)	122 European companies listed on DJSEI	2007-2009	CO_2, NO_x and SO_2 emissions	ROA, ROI, MBR	Cluster analysis and SFA based on panel data	Mixed
Horvathova (2012)	136 Czech firms	2004 – 2008	Emissions in E-PRTR	ROA, ROE	Generic regression model	Mixed
Muhammad et al. (2015)	Australian publicly listed companies	2001-2010	Emissions in Australian PRTR; toxicity weighting scores	Tobin's Q, ROA	Panel data model	Win-win; no impact

Source: Authors

Note: EP – environmental performance; FP – financial performance; GHG - greenhouse gas; ROE – return on equity; ROA – return on assets; ROI – return on investments; ROIC - return on investing capital; ROS - return on sales; TSR - total shareholder return; TSE - Tokyo stock exchange; DJSEI - Dow Jones Sustainability Europe Index; MBR - the market to book ratio; SFA - Stochastic Frontier Analysis; PRTR - Pollutant Release and Transfer Register.

Researchers in the mentioned studies use different types of emissions as a measure of environmental performance. The amount of greenhouse gas emissions as environmental performance is used by Iwata and Okada (2011), Wang et al. (2014), Delmas et al. (2015). Wang et al. (2014) convert the average GHG emission in tonnes equivalent to CO_2. Delmas et al. (2015) converted all six of the GHGs identified by the GHG Protocol into CO_2-equivalent too. Wang et al. (2014) and Delmas et al. (2015) use the logarithm of total emission as a proxy for environmental performances.

Trumpp and Guenther (2017) and Misani and Pogutz (2015) use GHG emissions to defined carbon performance. Misani and Pogutz (2015) calculate carbon performance as the ratio of the firm's Scope 1 and Scope 2 emissions to sales. Environmental emission intensity also can be used for measuring environmental performance. Trumpp and Guenther (2017) use carbon intensity calculated as total GHG emissions divided by sales. Qi et al. (2014) use the SO_2 emission intensity, where the industry environmental emission intensity is measured as SO_2 emissions per unit of industry value-added.

Fujii et al. (2012) use CO_2 emissions and the amounts of emitted chemical substances to calculate the environmental efficiency indicator. They observe the ratio between sales and mentioned environmental pollution measures (CO_2 emissions and toxic release). Lee et al. (2015) investigate EP-FP relationship focusing on the carbon emissions (CO_2 emissions) as an EP measure and focusing on the impact and environmental research and development investments on company performance. Perez-Calderon et al. (2012) use consumption of energy and water, and emissions-to-air of CO_2, NO_x, and SO_2 as variables representing environmental performance.

Some authors use EP measure based on the PRTR (Pollutant Release and Transfer Register data (Horvatova, 2012; Muhammad et al., 2015). Horvatova (2012) uses a comprehensive measure of EP based on E-PRTR data, which includes 93 pollutants releases to air, water, land, off-site transfers of waste and pollutants in wastewater. An absolute amount of emission for each included pollutant is normalized according to their reporting threshold. Muhammad et al. (2015) use Australian PRTR data as a proxy for environmental performance, but they include the toxicities of the chemical substances' emissions using toxicity weighting scores.

Financial performance measures are more standardized then EP measures. In studies analyzed in this part of our paper, financial performance is measured only by ROA in two studies (Qi et al.,2014; Fujii et al., 2012) and only by Tobin's q by Wang et al. (2014) and Misani and Pogutz (2015). Fujii et al. (2012) observe ROA through both returns on sales and capital turnover. Most of the analyzed papers use two and more financial performance measures. The majority of analyzed studies include among other things ROA in FP measures (Iwata and Okada, 2011; Horvathova, 2012; Trumpp and Guenther, 2017; Lee et al., 2015; Muhammad et al., 2015; Delmas et al., 2015). Few authors used two FP measures: ROA and ROE by Horvathova (2012); ROA and the total shareholder return by Trumpp and Guenther (2017); Tobin's q and ROA by Lee et al. (2015), Muhammad et al. (2015) and Delmas et al. (2015). Except for ROA and Tobin's q, Iwata and Okada (2011) use the natural log of Tobin's q ROE, ROI, ROIC and ROS as measures of financial performance. Perez-Calderon et al. (2012) chose to use the ROA, ROI, and MBR as variables representing financial performance.

The results in emissions financial performance studies are obtained mostly using regression models. Some authors used regression models based on Japanese manufacturing company's data (Iwata and Okada, 2011; Fujii et al., 2012; Lee et al., 2015). Iwata and Okada (2011) applied regression model based on five-year panel data on 268 Japanese manufacturing firms, while Lee et al. (2015) did ordinary least square analysis based on 362 Japanese manufacturing firms. Fujii et al. (2012) examined the relationships between environmental and financial performances on firms listed on TSE that are assumed to be linear and quadratic in two models. Several of the other observed studies were also conducted on the companies' level in individual countries. Wang et al. (2014) used least-square regression model that is applied by multiple regression

analysis with data from 69 Australian public companies, and Muhammad et al. (2015) applied a generic regression model on Australian publicly listed companies too. Delmas et al. (2015) conducted panel data analysis on 1,095 US publicly traded companies using fixed effects model estimation. Horvathova (2012) estimated a generic regression model on 136 Czech companies, also running regressions for the restricted sample.

Misani and Pogutz (2015) applied hierarchical ordinary least square regression on data 127 companies from different countries. Trumpp and Guenther (2017) used a non-linear regression model for 696 manufacturing companies that are part of the CDP Global 500, S&P 500 or FTSE 350. They addressed the company effects in a panel dataset using a one-way clustered ordinary least squares panel regression. Qi et al. (2014) developed regression models to test the impact of independent on dependent variables on 39 Chinese industrial sectors. Perez-Calderon et al. (2012) used the Stochastic Frontier Analysis (SFA) and cluster analysis observing 122 European companies listed on DJSEI, where SFA is applied basing on a data panel.

Studies mentioned in table 1 include various sources of data to determine EP and FP measures. The source of data can be PRTR data that contains quantitative environmental data. Horvatova (2012) used the Czech PRTR, Muhammad et al. (2015) used Australian PRTR data. Fujii et al. (2012) use emissions data conducted by Pollutant Release and Transfer Register (PRTR) system report published by the Ministry of the Environment in Japan and Mandatory Greenhouse Gas Accounting and Reporting System of the Ministry of the Environment. Iwata and Okada (2011) use the national corporate social responsibility (CSR) database released by data services, more precisely the Japanese CSR database. Some researchers use a comprehensive database that includes environmental emission and financial datasets (Qi et al., 2014). The data are often obtained by organizations and companies that run data disclosure system for stakeholders (Trumpp and Guenther, 2017; Wang et al., 2014; Misani and Pogutz, 2015) and provides environmental performance data for the socially responsible investment community (Delmas et al., 2015). Delmas et al. (2015) use KLD Analytics data for compiling environmental performance ratings. Muhammad et al. (2015) obtain environmental data from the National Pollutant Inventory (NPI) and firm performance data were collated from the ASX database. Lee et al. (2015) obtain firm-level data on carbon emissions from Environmental Report Plaza, which is released by the Japanese Ministry of Economy, Trade, and Industry.

The researchers find the different effects of each environmental performance on financial performance, depending on used methodologies, periods, and geographic areas considered. Environmental performance can enhance firm or industry financial performance. This is proved by Iwata and Okada (2011), Qi et al. (2014) and Lee et al. (2015). Iwata and Okada (2011) found that greenhouse gas emissions have significant negative impacts on ROA, ROI, ROIC, and Tobin's q−1. Lee et al. (2015) imply that carbon emissions decrease firm value and report a consistently negative coefficient of carbon emissions on firm value. Muhammad et al. (2015) found a strong win-win association between environmental performance and financial performance during the pre-financial crisis period, but during the financial crisis there is no relationship between environmental performance and financial performance. Some studies found a positive relationship between financial performance and emissions. This kind of relation (win–lose) is explained in the literature that money spent on reduction of emissions could possibly negative affects company competitiveness. The finding of Wang et al. (2014) shows that companies with high GHG emissions can generate more profit when a carbon tax is not enforced.

Majority analysed studies have mixed research results depending on used financial performance measures (Delmas et al., 2015; Iwata and Okada, 2011), types of pollution (Fujii et al., 2012). Delmas et al. (2015) found that GHG emissions negatively affect Tobin's q and positively affect ROA. They show that improved environmental performance reduce return on assets as a short-term financial performance measure, but enhanced environmental performance has the potential long-term value measured by Tobin's q . Iwata and Okada (2011) find that financial performances are different depending on different environmental issue. The

fact is that ROE reflects equity capital and does not include debt, therefore the effect of greenhouse gas emissions on ROE is insignificant. The coefficient of greenhouse gas on the natural logarithm of Tobin's q is not significant too. The greenhouse gas reduction does not have a significant effect on ROS as the short-run financial performance, but increases the most long-run financial performance. Fujii et al. (2012) find a significant, positive relationship between financial performance indexes and environmental performance measured by CO_2 emissions, and demonstrates that there is a significant, inverted U-shaped relationship between ROA and environmental performance calculated by aggregated toxic risk.

Trumpp and Guenther (2017) in their study show a negative EP – FP relationship for companies with low EP and a positive association for high EP. Misani and Pogutz (2015) confirmed that environmental processes positively moderate the relationship between carbon performance and Tobin's q. The carbon performance improves financial performance up to a certain point. After that point, the further reduction of carbon emissions do not offset the marginal cost. Perez-Calderon et al. (2012) found that the business groups which showed the greatest efficiency in energy and water consumption are also the ones who achieved the best economic and financial profitability indicators but cannot maintain the preceding for emissions efficiency. Horvathova (2012) observes that increased company´s emissions reduce firm profitability in the two years lag period but improve in the one-year lag period.

WASTE AND FINANCIAL PERFORMANCES

Waste management in the developed countries, as well as in the low and middle-income countries all over the world recognize several activities which are the same in all of them: waste prevention, reuse of used products, recycling activities and final disposal of the rest of municipal waste. Depending on national and local conditions for their enforcement in developed and less developed countries, the effects of waste management activities on health and environment can be very different among them. Environmental policy and government activities are intensively related with the degree of social and economic activities in the domain of waste reduction and ways for its treatment. The ways in which waste is generated and how it is treated are significant for all population, all enterprises (small and medium-sized), big companies and corporations as well as for all policymakers; so adequate activities in the field of waste management can contribute in the improvement of overall population health and conditions of living.

Analysis of literature in the field of environmental protection shows that waste is recognized as a serious economic and social problem. On the one hand, waste causes environmental pollution, but on the other hand waste can be a great potential as a resource of secondary raw material and energy. Special attention in the literature is dedicated to agriculture waste because some kinds can be a great potential for agricultural production like an animal or biodegradable waste. No matter what type of waste is generated (municipal waste, industrial waste or agricultural waste), his treatment can be a significant challenge from technical aspects. Waste management companies are continually improving their technical capacities as well as personnel with new skills and knowledge. In overall economic development in recent years, this sector contributing through the creation of new jobs and opportunities for new business development.

In recent years, waste-related activities in business can be viewed from two different approaches. One approach sees waste as an opportunity for business because waste management is a socially desirable and socially beneficial activity that is profitable in most cases. Another approach treats waste activities as a way of improving company business, but also improving living conditions for all populations. Improving the core business of a company includes the environmental responsibility of managers who take care of all generated waste in one company – recycling is not only a business but also a way of everyday life.

The link between waste and financial performances of companies is a newer topic in the field of environmental protection and sustainable development. Studies that were conducted in the last decades trying to describe the causal relationship between these two variables. The subject of this segment in the paper is to present an overview of several significant studies that are different in many ways. On the one hand, the selected papers are very important in this scientific field because they represent a similar methodology, even if independent and control variables in models are different; sample size and sources also are not consistent as well as period of time and geographical region. On the other hand, analyzed studies are conducted and published in the last twenty years, which implies that this topic became very interesting for researchers. Qualitative studies are not good enough to be the basis for public policy recommendations, so a quantitative approach is more appropriate because those results are quite reliable. Table 2 shows comparative analyses of these selected studies.

Table 2. Comparative analyses of selected studies: the link between waste and financial performances

Studies	Sample	Period	EP measures	FP measures	Methodology	Impact
Bartolacci F. et al. (2018)	45 Italian companies in the field of MSW collection	2012-2015	SWC per capita; SWC%	ROA	Regression analysis	Win-win and weak
Maleka T., Nyirenda G., Fakoya M.B. (2017)	30 firms listed on JSE SRI	2007-2016	Waste Reduction Targets	Waste Management Expenditure, Firms profitability	Panel data models	Mixed
Trumpp C., Guenther T. (2017)	2361 companies	2008-2012	Waste intensity	ROA, TSR	Panel data model	Mixed
Bartolacci F. et al (2016)	298 companies registered in AIDA database	2010-2013	Municipality Solid Waste treated with SC/total MSW produced in each province	ROI, ROS, working capital turnover ratio	Panel data models	Mixed
Pintea M., Stanca L., Achim S., Pop I. (2014)	81 companies registered on the Bucharest Stock Exchange	2005-2010	Waste pollution	ROA; ROE	Panel data models	No impact
Iwata H., Okada K. (2011)	268 Japanese manufacturing firms	2004 – 2008	Waste emission	ROE, ROA, ROI, ROIC, ROS, Tobin's Q	Panel data model	Win-win; no impact
King A., Lenox M. (2002)	614 companies	1991-1996	Waste generation, waste prevention	ROA; Tobin's q	Panel data models	Win-win

Source: Authors

Note: EP – environmental performance; FP – financial performance; MSW- municipal solid waste; SWC- solid waste collection; MSW – municipal solid waste; JSE SRI – South African Johannesburg Stock Exchange's (JSE) Socially Responsible Index (SRI); AIDA - Bureau van Dijk's; ROA – return on assets; ROI – return on investments; ROS - return on sales.

Bartolaci et al. (2018) analysed the relationship between good environmental practice and financial performances in waste management companies. Authors recognized waste management companies as very important in the domain of recycling and reusing products, so they decide to investigate the link between selected financial performances with selected environmental performances. The sample included 45 Italian companies in the field of municipal

solid waste collection. The selected companies do their business in the municipalities with more than 50,000 habitants. The sample is based on the Green Book survey of medium and large companies in 2013 and includes entities that only deal with municipal waste and have an obligation to follow Italian accounting regulations. The primary financial performance used by Bartolaci et al. (2018) is the return on assets because it depends on the revenues (based on recycling or reusing products) and operating costs. Operating costs in Italian public waste management companies can be slightly higher, taking into account their social and institutional goals, so it is important to consider them in the analysis of the overall financial performances. In empirical research conducted by mentioned authors, return on assets is an independent variable. Environmental performances are dependent variables, so authors try to identify the most common variables for all companies in the survey. One of them is solid waste collection ratio measured as the ratio between the quantities of the collected waste and size of the population of the municipality. Another one is ratio between the amount of the solid and total waste in the municipality (solid waste collection in %). The source for the environmental performance data was Italian Ministry of Environment during period 2012 till 2015. The methodology used in this paper implies chi-square index and standard regression analysis to identify the type and direction of causation between financial and environmental performances. The results for the observed period showed that the relationship between selected dependent and independent variables is linear, positive and weak, which is in line with the results of the studies referred to in this paper. Bartolaci et al. (2018) present findings useful for policymakers and managers of the waste companies. For policymakers, the results can be significant in the domain of institutional support to waste management activities. On the other hand, for managers the mentioned findings can suggest improving recycling and reusing waste activities.

Another study analyzed in this paper is conducted in South Africa. Maleka et al. (2017) researched the link between waste management expenditures on waste reduction targets and financial performances. The main objective in Maleka et al. study is to present the first results about this type of relationship in South Africa because other studies conducted in this region are more focused on disclosure activities. Authors selected 30 companies listed on JSE SRI for a period of 10 years - 2007 to 2016; selected companies were high pollutants. As in other research studies, financial performance variables are independent variables, so authors identify two important and comparable. Waste management expenditure is one of the two selected variables. It represents the total costs of activities during the realization of the waste reduction targets (waste prevention, waste recycling, etc.). Another independent variable is the firm's profitability measured as difference between total expenditures and total revenues. Also, authors used the two control variables – change in the turnover and financial leverage. Environmental performance measured as waste reduction targets is dependent variable, so this study provides the answer about the influence of waste expenditure and firm's profitability on waste reduction targets. The authors used panel data with fixed- effects model and the random-effects model. The results showed positive relationship between waste management expenditures and waste reduction targets, which means that increase in waste management expenditures will lead to increase in waste reduction targets. Also, the relationship between financial leverage and waste reduction targets is negative indicating that growth in financial leverage will lead to a decrease in waste reduction targets.

One of the studies which is also citaden in the field of environmental is written and conducted by Trumpp and Guenther (2017). According to the objective of the study, two measuers of environmental performances were used. One of them was waste intensity. The authors research the hypothesis that relationship between waste intensity and company's profitability. Sample size include 2361 firms which were part of the CDP Global 500, S&P 500 or similar lists. The companies were separated in line with registered activities, so sample covered manufacturing industry and service industry. Panel data methodology resulted in the mixed results, because the authors can not claim that both environmental performance measuers had significant positive impact on firm's profitability.

Bartolaci et al. (2016) published an interesting study conducted on 298 Italian companies. They tried to investigate the link between profitability and environmental performances in selected companies. This study is quite different than the survey published in 2018 for several reasons, but one of them certainly is sample size. The database used in this survey is AIDA (Bureau van Dijk's), authors selected only companies registered for two main activities with waste – a collection of solid and treatment and disposal of other waste. As financial performance variables, authors decided to calculate return on investment, return on sales and working capital turnover ratio. As dependent environmental performance variable, authors have chosen to analyze solid waste collection. After they collected the relevant data via desk research, authors divide the country into a large number of municipalities (81) and rank them using the ranking technique in decreasing order. For every municipality, companies were listed according the value of variables. Panel regression data for the period 2010 till 2013 showed inconsistent results; the relationship between financial selected performances can be either positive or negative.

This research topic is entirely new in the South Eastern Europe (SEE) region, just several research studies were published during the last decade. One of the recent studies is published by Pintea et al. (2014) and was conducted in Romania. Following the literature and similar researches for other developed countries in Europe, authors try to test a starting hypothesis that better environmental performances lead to an increase in companies' revenues and decrease in companies' costs. Even authors analyze the period from 2005 up to 2010, they separated on period before and after financial crises during 2008. This methodology is specific; it gives a possibility to compare environmental and financial performances of companies before and after critical period of time. Like other authors, Pintea et al. decided to take into account return on assets, return on equity as independent variables, waste performances as carbon dioxide pollution, while including control variables such as firm size eliminate the effects of the different economic performances between companies. The data collected from two official and public databases: Bucharest Stock Exchange and The National Pollutant Release and Transfer Register. The econometric analysis involves panel data models – models with fixed effects and models with random effects. The main conclusion of this study is the absence of the link between environmental and financial performances in Romanian companies in overall period.

In the first part of the paper, two authors were mentioned because they researched the different approaches in environmental performances – Iwata and Okada (2016). One of them was greenhouse gas and another was waste emission. In Japan, waste emission was strictly regulated with government lows and control policies. So the research hypothesis that waste emission had significant effects on financial performances is very interesting for nacional economy, but also for other countries which is facing with increasing waste emissions. As other studies that we present in the paper, methodology is consis of using panel data and model with fixed effects. Observed period was 2004 till 2008 and the results showed that research hypothesis is not true, authors did not have enough evidence to confirm that between waste emission and financial performanes exsist significant impact.

King and Lenox (2002) investigated two research hypotheses. The first research hypothesis argues that more waste prevention activities lead to higher financial performances of the company. The second research hypothesis argues that less onsite waste treatment leads to the higher financial performance of the company. Their research covered the period from 1991 till 1996 while sample size includes 614 companies. It can be said that this is the largest sample size between selected studies presented in this paper. All companies were listed on the Compustat database and had reported about waste activities. Financial performances such as return on assets and Tobin's q were calculated based on balance sheet for all companies. Based on similar researches, authors decide to calculate waste generation as the sum of total toxic outcome and waste prevention based on total production of the company. Also, authors constructed new variables as the ratio between treated waste and the total waste generated. To control the effects

of differences between selected companies, authors include control variables such as the firm's size and financial leverage in regression model. The econometric framework in this paper is based on panel data and use of model with fixed – effects, where authors try to identify the best model specification. Authors confirmed both hypotheses and find that between firm emission of waste and financial performances exists negative relationship. Thus, waste prevention is very significant for company's profitability.

ENVIRONMENTAL AND FINANCIAL DISCLOSURES

Some authors, like Milton Friedman (1970) claimed that the company has just one responsibility: to make a profit. On the other hand, in the teachings of stakeholder theory (Freeman, 1984), business organizations, as bearers of economic and social activities, exist not just for themselves, but to fulfil a specific social purpose and meet the particular need of society, community or individuals (Drucker, 1986). In other words, they have a certain degree of responsibility towards society. Fulfilling these responsibilities can be identified through the annual or another type of reports, which can be mandatory and voluntary. Reports can also be financial and nonfinancial. In financial reports we can find information about the company's economic performance and conclude is the company profitable or not. There is nothing wrong with being profitable, but just like the Drucker said, companies don't exist just for themselves, which means that we need to consider not just the companies' financial data but also the nonfinancial information about the companies social, environmental and human rights activities. In that aspect, our focus is on nonfinancial reporting which describes how the company communicates with its stakeholders by disclosing their nonfinancial data, more precisely on environmental disclosure because of increased public interest regarding ecological issues.

Regarding the fact that the companies became financially powerful as well as one of the pillars of economic development, environment protection became a global trend. In that aspect, the researches wanted to explore is there an empirical link between the company's responsibility toward the society and its financial performance. This issue is critical because the classic economic equation tells us that the primary goal of a business subject is profit maximization. If in this equation we add the environment, the question is: does it pay to be green? In other words, is it possible for a company to be "green and competitive" (Porter and van der Linde, 1995) at the same time? In that aspect, we analyze the literature regarding the disclosure practice among companies, with a particular focus on environmental disclosure and its relationship with financial performance. It is essential to notice that a specific discussion regarding the specific industry, period or region, was not included in this review.

In one of the early works dealing with disclosure, Mobley (1970) uses the term *social accounting*, stating that it "*refers to the ordering, measuring and analysis of the social and economic consequences of governmental and entrepreneurial behaviour".* Generally, the history of nonfinancial reporting dates back to 18 century, as explained in the research done by Guthrie and Parker (1989) who examined social and environmental disclosure practices of an Australian steel company, Broken Hill Proprietary Company Ltd (BHP), for the period of 100 years (1885 – 1985). In practice, when disclosing the nonfinancial data company comes out of the classical reporting frame emphasizing their social engagement, which is essential for the stakeholder's decision-making process.

Regarding the link between social and financial performance, it started to gain interest during the 1970s (Moskowitz, 1972; Parket and Eilbirt, 1975; Vance, 1975; Sturdivant and Ginter, 1977; Alexander and Buchholz, 1978 and many others). What is important to notice is that not only one result is possible, but it depends on several factors such as the used measure of disclosure, the used financial performance measure, the used control variables, the industry type, specific characteristics of the firm, company size, etc. That means that the relationship between social

and financial performance can be positive, negative and neutral or inclusive. This situation is also present in the case of environmental disclosure, which will be explained below.

Teoh et al. (1998) analyzed 60 Singapore publicly listed companies identified as polluting the environment or potentially polluting the environment. Authors used content analysis covering the period of seven years, from 1990 to 1996. They used accounting-based variables (ROA, ROE, cash basis return on assets, cash basis return on equity, operating ROA, operating ROE, net margin and net operating margin). The results of the study can be caregorized as followos: a) firms that disclose their environmental practice have, in general, better financial performance, b) firms that disclose more about their environmental practice have better performance than firms with less disclosure practice, c) firms with better prior financial performance make more significant subsequent environmental disclosures and d) rms that disclose more about their environmental practice will have a positive impact on subsequent financial performance.

Similar research was done by Stanwick and Stanwick (2000), who researched the current practice among relatively large corporations in the aspect of the relationship between environmental disclosure and financial performance. The analysis included 469 companies listed in the Forbes 500 for the year 1994. The authors sent a letter with a question: does their organization has a formal environmental policy and environmental commitment? If the answer was affirmative, they were required to send back the information to the authors. Financial paramaters used in the research were net income for the firm divided by their total assets. The results showed that there is a link between the environmental disclosure and financial performance in a way that firms that had higher financial perfromes also have a higher incidence of environmental policies and gave more detail about their commitment to the environment practice. At the same time, firms ranked as medium financial performers had the highest incidences of firm environmental policies and a description of their environmental commitment.

To determine the relationship between environmental disclosure and financial performance in the case of Europe companies, Dragomir (2009) extracted data from the FTSEuroFirst 300 Index for the 60 largest European industrial business groups. The author created an environmental disclosure index using GRI Guidelines based on content analysis. The results showed a significant association between contemporaneous environmental performance and disclosure but no association between environmental performance and financial performance.

A similar result was found by Rahman et al. (2009), who analyzed the relationship between environmental disclosure and financial performance in the case of Malaysia, Thailand, and Singapore. In their study, the authors used the term *"detailed environmental reporting"* to describe company practice of environmental disclosure in the companiy's annual report. The disclosure can be in the form of one paragraph or more. The resultt shows that in the analysed countries, the performance of the company has no relationship with the types of environmental disclosure.

Another country from Asia was analysed by Makori and Jagongo (2013), who wanted to explore is there any significant relationship between environmental accounting and the profitability of selected firms listed in India. They selected 14 randomly companies listed in the Bombay Stock Exchange in India and analysed their annual reports by using multiple regression models. Results where mixed in terms that there is a significant negative relationship between Environmental Accounting and Return on Capital Employed (ROCE) and Earnings per Share (EPS) but at the same time a significant positive relationship between Environmental Accounting and Net Profit Margin and Dividend per Share.

Mixed results were also found by Akbas (2014), who analysed environmental disclosure and financial performance among 62 non-financial Turkish firms listed on the BIST-100 Index. The study employed content analysis for the year of 2011. Independent variables used in the research were size, leverage, profitability, industry membership and age. Results showed that size and industry membership is positively related to the extent of environmental disclosure

while in the case of the profitability the relationship is negative. On the other hand, leverage and age have no statistically significant association with the extent of disclosure.

In order to determain the link between environmental disclosure and financial performance among different sectors, Tasneem et al., (2016) carried out research based on the US Manufacturing Industry on companies listed on NASDAQ with a total sample of 100 companies taking 20 companies from each sector (energy, health care, technology, public utilities, and capital goods). Their result indicates that Greenhouse Gas Emissions, Water Consumption and Waste Disposal) are key indicators of environmental reporting.

Another research done by using companies from the index was by Qiu et al. (2016), who analyzed the FTSE350 index companies covering the years 2005-2009. The aim of their research was to examine the link between a firm's environmental and social disclosures and its profitability and market value. The results indicate that there is no relation between environmental disclosure and profitability while in the case of social disclosure, firms that make higher social disclosure have higher market values.

A similar result was shown by Nor et al., (2016), who analyzed the relationship between environmental disclosure and financial performance among the top 100 companies of market capitalization in Malaysia for the year 2011. The authors created the environmental index containing 20 units while ROA, ROE, EPS, and profit margin were chosen as financial performances. The results showed a significant relationship between total environmental disclosure and profit margin but not a significant relationship between full environmental disclosures with ROA, ROE, and EPS.

Fonseka et al., (2019) explored what is the effect of environmental information disclosure and energy product type on firms cost of debt on the example of companies from China. The analysis included the period 2008–2014. The authors found a significant negative association between the observed variables. Results also indicate that there is a significant negative association between several energy product types (hydro power, oil, solar, and wind) and energy firms' cost of debt.

CONCLUSION

This paper analysis studies that rely on researching the relationship between environmental and financial performance, and it makes a relevant contribution to the literature on environmental performance and financial performance, especially in domestic literature. Authors of this paper chose to investigate studies that use pollutant emissions, waste emissions and prevention and environmental disclosure as main environmental measures, because pollutants and waste emissions are relevant aspects of environmental problems. The qualitative research studies are not enough for policymakers, their decisions can be improved with quantitative studies based on empirical research and reliable data sources. The lack of the adequate company level empirical research in the SEE region motivate authors of this paper to compare studies conducted in different areas all over the world and to identify adequate theoretical and econometric framework for future research.

The results of selected analysed studies are mixed, suggesting that the evaluation of each pollutant emission measure is different among various financial performance, industries, regions and periods. In some circumstances, there is no impact of emissions on financial performances. A decrease in pollutant emissions can improve financial performance. The win-win situation is created when environmental improvement leads to financial advantage. These negative effects on financial performance can indicate that companies want to reduce emissions in order to build company legitimacy, mitigate future risks and improve their competitive advantage, corporate reputation, and image. Stakeholders take the performance of these companies into account and evaluate them better. The win-lose situation is conducted when environmental improvement doesn't lead to financial improvement, on the contrary, money

spent on environmental improvement would possibly harm company competitiveness. Some studies have shown mixed results because the relationship between environmental and financial performance depends on the time horizon. The mitigating emissions can be unprofitable in the short-term because the costs of reducing emissions were difficult to offset in the short term but profitable in long term. The selected studies in the field of waste management also indicate different results. While in several studies better environmental performance improves higher financial performances, in other studies results were opposite. Even if the methodology were similar as well as the variables which measured both performances, the results are not unique. The main reason for the mixed results can be found in the overall characteristics of the national economy and business environment as well as in the degree of implementation of environmental measures. In the case of environmental disclosure, the results were also mixed regardless of the region or the the used financial measures. This indicates all the complexity of this research area.

Analysis of selected studies can be very valuable to authors to create a similar study. Further research should investigate the environmental and financial performance relationship in Serbian companies. Environmental performance measures should be chosen depending on environmental data availability.

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