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Efficiency in Business and Economics

Proceedings from the 7th International Conference on Efficiency as a Source of the Wealth of Nations (ESWN), Wrocław 2017

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Preface

"A nation that most economically disposes its riches and powers and applies them to the best performance ratio will increase its prosperity and outstrip other nations". Although these words were spoken by F. Neuhausen, director of the Borsig factory in 1913,[1] they still apply today. Efficiency was and continues to be a prerequisite for increasing prosperity. And this is not changed despite the fact that it is differently understood. The word efficiency itself comes from the Latin word *effectus* meaning execution, effect. In today's times, many authors attribute to it the dual meaning defined as efficiency and effectiveness. Such duality of efficacy was already defined in 1912 by Harrington Emerson, a co-author of scientific management and author of the famous *Twelve Principles of Efficiency*, who wrote that "efficiency is the right thing done in the right way".[2] This view was also shared by P. F. Drucker, who thought that although "efficiency" or doing things properly was an important criterion for evaluating a manager, the most important thing is effectivity or doing the right thing. An indispensable condition for doing the right thing is planning aimed at achieving socially useful goals.[3] Whereas the condition for achieving these goals is to measure the effects without which the achievement of goals cannot be tracked and therefore managed by the organization. Although overall efficiency is measured by the ratio of effects to inputs, the measurement of both effects and inputs is often complicated, ambiguous and thus disputable. Of key importance for efficiency measurement are accounting standards that determine a way of measuring inputs and effects disclosed in financial reports. Although at present there are two opposing concepts: Anglo-American standards represented by IFRS and Continental (European) standards represented by the national GAAP, both of which met with criticism after the financial crisis, neither concept deals with

[1]K. Adamiecki (1932) Uwagi do definicji nauki organizacji, *Przegląd organizacji*, (1).

[2]Harrington Emerson (1912) The twelve principles of efficiency, New York, *The Engineering Magazine*.

[3]P. Drucker (1954) *The practice of management*, New York: Harper & Row.

the measurement of intellectual capital as the dominant resource of an enterprise. Therefore, the adoption of new aspects of efficiency, the recognition of new conditions for efficiency and improvement of measurement are invariably the current goal of science and the subject of the VII International Conference titled "Efficiency as a Source of the Wealth of Nations" (ESWN, 2017). The conference served as a platform for researchers, business practitioners and academics to discover different aspects underlying new approaches to efficiency and to deliberate upon the causes of inefficiency. Each paper submitted to ESWN 2017 has gone through a stringent peer-review process by members of the International Programme Committee. Finally, we would like to thank all the contributing authors, members of the Programme Committee and the rest of the Organizing Committee for their highly valuable work in enabling the success of this seventh edition of ESWN 2017.

Wrocław, Poland
June 2017

Tadeusz Dudycz
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Factors Affecting the Internal Audit Effectiveness: A Survey of the Polish Private and Public Sectors

Piotr Bednarek

Abstract Recently the attention of the scientific community focuses on internal audit and its role in the organization. Previous studies have shown that internal audit does not always achieve their goals, that is why this study sought to understand the factors that affect internal audit effectiveness. Based on the survey from 342 organizations in Poland it was found that the internal audit effectiveness is affected by: (1) the characteristics of the internal audit, (2) audit activity, and (3) inter-organizational relationships. The effectiveness increases when the age of the internal audit grows, performing audit engagements is regularly monitored, the results of measuring the audit performance and self-assessment are employed for introducing changes, audit committee indicates significant risks and sets priorities for the annual and strategic audit plans, and commissioned audits do not exceed 20% of the work of the internal audit.

Keywords Internal audit effectiveness • Audit committee • Quality assurance

1 Introduction

A number of recent studies (Sarens and De Beelde 2006; Fraser and Henry 2007; Cohen and Sayag 2010) have reported significant changes in the role of internal audit functions (IAF) as a result of recent regulatory reforms in Belgium, Israel and the USA. In Poland, where this research was carried out, internal audit was introduced to the public sector entities over 14 years ago as the result of aligning Polish law with the requirements of the European Union. Since then its role has changed several times from compliance auditing to performance auditing (Bartoszewicz 2015; Pogodzińska-Mizdrak 2007).

Although there is evidence that some IAF in Polish private and public sectors add value and improve the efficiency of an organization's operation (Ciak 2016), there are also indications that IAFs not always are efficient and effective (Ciak 2016; Mazurek and Piołunowicz 2008; Bednarek 2015a).

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Ridley (2008, p. 287) claims that modern IA has been constructed upon the three "E's" of effectiveness, efficiency and economy. Chambers (1992, p. 22) views effectiveness as "doing the right thing", efficiency means "doing them well" and economy means "doing them cheaply". The above definition suggests that effectiveness is a more important characteristic of IAF than efficiency. If IA is ineffective, it is ultimately not important how efficiently or economically it is performed. Therefore it is of great importance to identify the significant factors affecting the IA effectiveness. Based on that it will be possible to redesign IA processes, competencies and roles in order to improve its performance.

Moreover there are a few previous studies that call for further research into the changing nature and effectiveness of the IAF in various geographic and regulatory contexts (Arena and Azzone 2009; Lenz and Hahn 2015; Tackie et al. 2016; Badara and Saidin 2013). The present study aims to contribute to the literature by responding to these calls and providing evidence on the significant factors affecting IA effectiveness in the private and public sector organizations in Poland.

Based on the survey from 342 public and private sector organizations in Poland, it was found that the effectiveness of the internal audit is affected by: (1) the characteristics of the internal audit, (2) audit activity, and (3) inter-organizational relationships. These findings will be useful in informing the deliberations of regulators and standard setters (e.g. Ministry of Finance in Poland and Internal Audit Standards Board), as well as providing a benchmark for practitioners (e.g. audit committees, management and chief audit executives). The results of this study are also important for external auditors who are supposed to consider IAF's objectivity and quality when assessing an organization's control environment and potential reliance on the work of IAF (ISA 610 2017). Finally, the results of this study may stimulate further consideration of current evaluation practices of IAF quality and effectiveness.

The remainder of the paper is structured as follows. The next section of the paper is devoted to research hypothesis. This is followed by a presentation of the research methodology employed in this study. The following section describes the main results. The paper concludes with the discussion of results and their implications.

2 Research Hypotheses

Internal audit effectiveness was associated to three sets of elements that create three basic organisational dimensions: resources and competencies of the IA team, performed activities and processes, and the organisational role. These dimensions have appeared in former studies as elements that characterise internal audit and can potentially affect its effectiveness (Arena and Azzone 2009).

One of the obligatory conditions to be met in order to allow an internal audit department to fulfill its obligations is the availability of a relevant number of qualified experts. The size of an internal audit team is one of the key criteria applied by external auditors in internal audit quality assessment (Mat Zain et al. 2006), as it

clearly determines the amount of time to be dedicated by internal auditors to performing audit engagements.

Therefore, the first research hypothesis is as follows:

H1: The effectiveness of internal audit is positively related to the size of an audit team.

Competencies of internal auditors are taken by external auditors into consideration, provided that they determine the extent to which they will rely on the results of the work performed by internal auditors. Qualified auditors are more predisposed towards consulting on how to improve an internal control system, performing audit engagements, finding relevant solutions based on previous experience, and managing complex situations and conflicts (Mat Zain et al. 2006).

Competencies of internal auditors can also improve internal audit effectiveness, as they are the source of a greater acknowledgement for the IAF's role within an organisation. In a situation where the management considers internal auditors' knowledge not sufficient to allow them to offer useful support to the management, the latter do not take their advice into consideration and thus, the effectiveness of internal audit is low (Van Peursem 2005).

For the above reasons, the second research hypothesis is as follows:

H2: The effectiveness of internal audit is positively related to the competencies of internal auditors.

The existence of the Quality Assurance and Improvement Programme (QAIP) is one of the factors that affect the role of internal audit in corporate governance (Sarens et al. 2012). Due to the use of quality assurance techniques in the course of fieldwork, internal audit plays a greater role in revealing significant weaknesses of the internal control system, i.e. its effectiveness improves (Lin et al. 2011). QAIP adds value to IAF in particular through identifying critical areas and points for improvements, documenting and evaluating the performance of critical processes, and enhancing internal auditors' professionalism and specialized skills (IIARF 2014).

Thus, the third research hypothesis is as follows:

H3: The effectiveness of internal audit is positively related to an IAF's commitment to ensuring and improving internal audit quality.

The IAF has a limited capability to act within an organisation. Though it should have a large degree of autonomy and independence so that it can conduct its engagements properly, its role depends on relations with the AC. The IAF operates within an organisation, whereas ACs are formed in companies by members of the supervisory board or independent experts in the case of ministries. Both teams have similar objectives. One of the objectives of the AC is to monitor and assess management control systems, which is also the key objective of the IAF (COSO 1992; UOFP 2009).

Actual cooperation between the IAF and the AC is highly important for both parties. First of all, a good collaboration with the IAF affects the effectiveness of the

AC (Raghunandan et al. 1998), and second of all, the collaboration between the IAF and the AC facilitates the exchange of information and data accessibility (Mat Zain et al. 2006). The monitoring of the IAF activity by the AC may also prove helpful in identifying problems of the internal audit itself and determining possible ways of improvement.

The role of internal audit within an organisation grows if the IAF reports to the AC. In such a situation, management issues are more easily forwarded to the senior management of a company (Goodwin and Yeo 2001). According to professional standards, the chief audit executive should report to a level of management that allows the internal auditor to fulfill his duties (IIARF 2012).

Therefore, the fourth research hypothesis is as follows:

H4: The effectiveness of internal audit is positively related to the level of an AC's commitment to cooperating with an IAF.

According to research conducted in Malaysia, in the event of conflicting roles when at least two groups of stakeholders pressure an internal audit department, internal auditors become less independent (Ahmad and Taylor 2009). Other studies confirmed that the condition that ensures internal audit effectiveness is a clear role of internal audit, particularly regarding risk management (Fazli et al. 2013, p. 6).

Therefore, the last research hypothesis is as follows:

H5: The effectiveness of internal audit is negatively related to the high level of the IAF's commitment to executing commissioned audits.

3 Research Method

Empirical research was performed using a survey as the key method. The printed questionnaire was sent by mail to 1057 departments of public finance sector entities listed in the current database kept by the Ministry of Finance. In order to obtain a more diverse research sample, the very same questionnaire was also published in an electronic form on the SurveyMonkey website. Internal auditors who were at the time members of the Institute of Internal Auditors (IIA) in Poland, 1020 of whom work in the private sector, received electronic mail with a link to the questionnaire four times.

One of the obligatory conditions to be met in order to allow an internal audit department to fulfil its obligations is the availability of a relevant number of qualified experts. The size of an internal audit team is one of the key criteria applied by external auditors in internal audit quality assessment (Mat Zain et al. 2006), as it clearly determines the amount of time to be dedicated by internal auditors to performing audit engagements.

The questionnaire template was developed in a way that allowed target respondents, i.e., chief audit executives and internal auditors with independent positions, to easily answer all the questions. In order to develop the research tool in an

accurate manner, the questions were previously presented to several internal auditors to learn how they might be interpreted by future respondents. Furthermore, before the survey questionnaire was sent to target respondents, it was first verified during an annual conference of the Institute of Internal Auditors. A pilot test contributed to a few modifications that made the questions clearer. The questions involved in the survey questionnaire pertained to several aspects of internal audit, particularly, performance measurement, self-assessment, effectiveness, changes in the performance, rewarding auditors, and the activity of audit committees. In this article, only those questions that pertained to internal audit effectiveness and its determinants were applied.

The data was collected from June to September 2013. A total number of 500 completed surveys were received, yielding a return rate of 24%. Considering that some surveys were not completed by chief audit executives or internal auditors with independent positions and that not all respondents provided answers to all the questions, the final number of surveys subjected to analysis was 342, yielding a return rate of over 16%.

The dependent variable used in the study was the internal audit effectiveness. In general, effectiveness can be defined as an activity that leads to some extent to an outcome intended as the target (Zieleniewski 1969). Effectiveness is determined by the degree of alignment with the target, whereas in effectiveness assessment one does not consider the cost and when it comes to useful effects, only those predictable are taken into account. In general, the process of internal audit can be considered effective if the engagement is planned and performed in a way that the intended effect is achieved. Nevertheless, there is still disagreement among scientists regarding the accurate method for measuring internal audit effectiveness. According to the performed literature analysis, three different approaches can be distinguished (cf. Bednarek 2016).

The first approach focuses on the very process of auditing. It involves a quality assessment performed for internal audit procedures through comparing them with standards of the Institute of Internal Auditors or an assessment of audit planning, execution, and communicating audit outcomes (Dittenhofer 2001). Though such an approach used to be repeatedly applied in the past, it has a fundamental limitation, since it assumes that internal audit is effective when audit procedures are carried out properly, yet it does not take into account the needs of the key internal audit stakeholders.

The second approach focuses on output, which can be determined directly after audit engagements are completed. Therefore, this manner of assessing internal audit effectiveness takes into account changing expectations of audit clients and activities that add value to an organisation (Frigo 2002). Of the possible measures, particular attention is put on the responsiveness of internal audit to auditees' needs (Ziegenfuss 2000). Furthermore, another publication of this author suggested that the level of satisfaction among the auditees determined based on survey research, as well as the degree of implementation of the accepted recommendations are considered by chief audit executives more appropriate for measuring internal audit effectiveness. The first measure, though potentially interesting, might prove

difficult to apply in large-scale survey research, as it requires taking a representative sample from among the auditees in every organisation. The second measure also has some limitations, as it is not controlled by internal audit—at least to some extent—and does not reflect qualitative differences between recommendations (Salierno 2000). This measure was used in previous studies in order to measure IA effectiveness i.e. (Arena and Azzone 2009). Although some scholars suggest that it is the efficiency not effectiveness measure (Lenz and Hahn 2015; Soh and Martinov-Bennie 2011), still it seems a more appropriate choice for this study than the level of the auditees satisfaction.

The third approach focuses on outcome attained as a consequence of performance obtained directly after the completion of audit engagements. According to Mortimer Dittenhofer (2001), internal audit is effective provided that the internal auditor examines whether targets were successfully achieved by the auditee and no issues are revealed both in the course of the audit and afterwards; alternatively, on the condition that the internal auditor examines and discovers problems; and recommends solutions that solve these problems. It seems, hence, that outcome measurement pertains to a broad range of aspects affected by internal audit. These include not only the efficiency and effectiveness of audited processes, but also the performance of the entire organisation. At the process level, this can take the form of cost reduction resulting from the implementation of recommendations suggested by auditors. At the level of an entire organisation, an audit may result in a contribution to the attainment of a specific outcome, e.g., a profit, progress, a share price or a contribution to the avoidance of spectacular scandals. Although this approach seems potentially interesting, outcome measurement encounters particular difficulties. The fundamental problem here is the time interval between the moment when a specific action is taken and the moment when its impact is possible to be determined. Moreover, the contribution made by all these actions taken by internal auditors may be difficult to be distinguished.

In line with the above consideration, internal audit effectiveness was measured in this study as the recommendation implementation rate (RIR). This indicator specifies the extent to which the audit recommendations approved by the management have been implemented by the auditees. With this indicator, top management can make sure that executives carry out approved action plans in response to audit recommendations and can assess the impact of internal audit on the organization. This indicator demonstrates also how management evaluates the importance of audit recommendations. Though this method has certain limitations, it allowed to determine the impact of internal audit and, at the very same time, to avoid issues related to the measurement of outcomes. It is assumed that the RIR should be at least 80% (Gagne 2010, p. 44). Therefore the RIR was measured using a two-item scale, where for recommendations suggested by internal auditors 0 refers to a low recommendation implementation rate (below 80%) and 1 stands for a high rate of recommendation implementation (over 80%).

Independent variables in the study are: (1) the size of the IAF, (2) internal auditors' competencies, (3) the IAF's commitment to performing activities related to quality assurance and improvement, (4) the impact exerted by the AC on the

activity of the IAF, and (5) the IAF's commitment to performing commissioned audits.

In order to measure the size of an IAF, the number of employed internal auditors (EMP) was used, which had been also applied in previous studies as a measure of resources potentially available to internal audit departments (Arena and Azzone 2009; Goodwin and Yeo 2001; Mat Zain et al. 2006). In this article, the size of an IAF was measured using a variable number of employed internal auditors (EMP) according to FTE as of 31 December 2012, where 1 stands for an external service provider, 2—less than ½ FTE, 3—from ½ FTE to 1 FTE, 4—1 FTE, 5—over 1 FTE to 2 FTEs, 6—over 2 FTEs to 5 FTEs, 7—over 5 FTEs.

The second construct refers to the competencies of internal auditors, which are higher in the IAFs that were operational for a longer period according to previous studies (Sarens et al. 2010). Hence, in this study they were measured using the number of years of the founding of a department or the position of an internal auditor in a given organisation (YRS), where 1 stands for a period of up to 1 year, 2—from 2 to 5 years, 3—from 6 to 10 years, 4—over 10 years. Table 1 shows relevant descriptive statistics.

The level of the IAF's commitment to performing activities rated to quality assurance and improvement is measured by means of four variables: ongoing monitoring (MON), periodic self-assessment (SLF), external assessment (EXT), and changes in the activity of a given IAF (CHS).

The first variable is the ongoing monitoring, interpreted by IIA as processes, tools, and information that serve for assuring proper quality of audit engagements (IIARF 2012, p. 46). In particular, it involves measuring the effectiveness and efficiency of audit processes and assessing conformance of the work performed by internal auditors with procedures adopted by a given IAF and the IIA's Professional

Table 1 Descriptive statistics

Variable	Mean	Std. dev.	Min	Max
EMP	4.029154	1.184338	1.0	7.0
YRS	2.906706	0.681876	1.0	4.0
MON	0.752187	0.432474	0.0	1.0
SLF	0.798834	0.401458	0.0	1.0
EXT	0.408163	0.492212	0.0	1.0
CHS	0.755102	0.430655	0.0	1.0
FRQ	0.317784	0.973871	0.0	4.0
CRS	0.437318	1.170298	0.0	5.0
CWS	0.434402	1.157576	0.0	5.0
CPS	0.446064	1.210036	0.0	5.0
CPR	0.524781	1.363196	0.0	5.0
CRR	0.472303	1.246617	0.0	5.0
CEM	0.489796	1.288403	0.0	5.0
EXA	0.959184	0.198154	0.0	1.0
COS	3.274052	1.344514	1.0	5.0
SEC	1.909621	0.367536	0.0	2.0

Practices Framework (i.e. the definition of internal audit, the code of ethics, and standards) on an ongoing basis. According to normative literature, ongoing monitoring may contribute to improved risk analysis and internal environment, enhanced relations with the management and supervisory authorities, and ultimately, higher efficiency of audit processes (IIARF 2012, p. 46). The ongoing monitoring variable (MON) takes the value of 1, if the IAF's activity is monitored within an organisation on an ongoing basis or 0, if otherwise.

The second variable is the periodic self-assessment (SLF), defined as a systematic, versatile and comprehensive review of an organisation's activity and performance by model criteria with the objective to identify strengths of a given organisation and areas that require improvement, allowing for a prioritisation of the planned improvement efforts that ought to be systematically monitored (Haffer 2011, p. 193). According to previous studies, executing self-assessment allowed most IAFs to identify opportunities for improving audit processes, ensure conformance of an IAF's activities with the standard 1311, and to improve awareness among internal auditors regarding the quality level of their work (Bednarek 2015b, p. 235). The variable of periodic assessment (SLF) takes the value of 1, if a periodic assessment of an IAF is conducted in a given organisation, or 0, if otherwise.

The third variable is the external assessment (EXT), which in line with the IIA's interpretation may be conducted in the form of a comprehensive external quality assessment of internal audit or a self-assessment with validation performed by a qualified independent person or an external team. Previous studies suggest that this assessment: (1) is a certificate of internal audit quality issued by an independent entity; (2) adds to the visibility of a given IAF; (3) constitutes an assurance for stakeholders that the IAF is managed in an efficient and effective manner, in line with IIA standards. The external assessment variable (EXT) takes the value of 1, if external assessments of the IAF's quality were performed within the organisation by the Ministry of Finance, the Supreme Audit Office or other independent entity (in the form of a comprehensive external assessment, a peer review or an independent validation), or 0, if otherwise.

The fourth variable is changes in the IAF's activity (CHS), introduced based on results of audit processes effectiveness and efficiency measurements, and periodic assessment. Previous studies suggest that these changes pertain to internal audit rules and procedures, professional development programmes for IAF employees or their attitude to auditing (Bednarek 2015b, p. 235). The change in the IAF's activity variable (CHS) takes the value of 1, if relevant changes in the IAF's activity were introduced, or 0, if otherwise.

The level of the AC's impact on the IAF's activity was measured using two variables: the frequency of meetings between the AC and the CAE, and the degree to which the AC is committed to the IAF's activity.

The frequency of meetings between the AC and the CAE was oftentimes applied in former studies for measuring relations between these two entities (Goodwin and Yeo 2001; Mat Zain et al. 2006). For the purpose of this study, the frequency of these meetings was measured using a numeric variable (FRQ), where 0 stands for no meetings held between the CAE and the AC, 1—one meeting per year, 2—two

meetings per year, 3—three meetings per year, and 4—four and more meetings per year.

The level of AC's commitment to the IAF's activity was measured by means of six elements. Since there were no commonly accepted measurement scales, the six elements were formed under Article 289, section 1 of the Public Finance Law with the aim to identify various possible activities of the AC: signalling significant risks (CRS), signalling significant weaknesses of management control and suggesting improvement (CWS), determining priorities for annual and strategic internal audit plans (CPS), reviewing significant internal audit results and monitoring implementation of these results (CPR), reviewing reports on the execution of internal audit plans and management control assessments (CRR), and monitoring internal audit work efficiency, and reviewing results of internal and external assessments of internal audit work (CEM). The level of the AC's commitment to these activities was measured using a 5-point Likert scale, with 1 as the lowest value and 5 as the highest value.

In order to measure the IAF's commitment to performing commissioned audits, the author has employed in the study the working time of IAF employees dedicated in 2012 to performing commissioned audits provided for under Article 292 of the Public Finance Law or audits commissioned by the corporate headquarters, as well as reviews performed at the request of the management accountable for a given area of activity (EXA). This measure, expressed as a percentage, determines the internal auditors' commitment to a given organisation and their reliability as considered by the management, who asks them to solve an urgent problem. Such audit engagements conducted at the request of the management ought not to become a daily practice. Though the consulting role of internal audit is oftentimes valued, it should not hinder the performance of audit engagements provided for in the annual audit plan. Thus, it is recommended that the measure is limited to 20% of the total working time of an IAF (Bednarek 2015b, p. 58). In this study, the variable EXA takes the value of 1, if IAF employees' working time dedicated to performing commissioned audits does not exceed 20% of the IAF working time, or 0, if otherwise.

In order to verify some environmental factors that could affect the outcome of this analysis, the following control variables were considered in the model: the size of an organisation, the sector, and the listing on the stock exchange.

The size of an organisation was treated as a control variable in previous studies on internal audit organisation and its effectiveness (Arena and Azzone 2009; Mat Zain et al. 2006). In this study, the size of an organisation was measured by the level of annual expenditure or annual costs (COS), where 1 stands for up to PLN 25 million, 2—from PLN 26 to 50 million, 3—from PLN 51 to 100 million, 4—from PLN 101 to 200 million, and 5—over PLN 200 million.

The second control variable pertains to the sector and a given company's decision on being listed on the stock exchange (SEC). The sector was taken into consideration in this study to verify the possible impact of various normative requirements placed on internal auditors in the public and the private sector. In contrast to a private sector organisation, the functioning of internal audit in public

finance sector entities is governed by provisions of law. The decision on being listed on the stock exchange may affect the scope of activities performed by an IAF and its effectiveness within a given company (Allegrini and DOnza 2003). Publicly listed companies have more specific requirements regarding internal control mechanisms compared to other companies. The listing and the sector were measured using a single variable (SEC), which takes the value of 0, if a private sector organisation is not publicly listed or 1, if a listed company or 2, if a public finance sector entity.

The research hypotheses were verified using a logistic regression model with a dichotomous dependent variable. Next, the model was verified, which showed that the assumptions of the model are fulfilled (Rabiej 2012, p. 272). The chi-square test is significant, meaning that the estimated model is significantly better adjusted to the data than the zero model, which involved only the absolute term (chi-square = 65.017, p = 0.00000).

The following regression model was tested:

$$P(RIR = 1) = \frac{e^{-\propto 0+\propto 1EMP+\propto 2YRS+\propto 3MON+\propto 4SLF+\propto 4EXT+\propto 5CHS+\propto 6FRQ+\propto 7CRS+\propto 8CWS+\ldots+\propto 15SEC}}{1+e^{-\propto 0+\propto 1EMP+\propto 2YRS+\propto 3MON+\propto 4SLF+\propto 4EXT+\propto 5CHS+\propto 6FRQ+\propto 7CRS+\propto 8CWS+\ldots+\propto 15SEC}}$$

The first variable EMP was used for verifying the first research hypothesis (H1), the second variable YRS was used for verifying the second research hypothesis (H2), the variables MON, SLF, EXT and CHS were used for verifying the third research hypothesis (H3), whereas the variables FRQ, CRS, CWS, CPS, KPW, CRR and CEM were used for verifying the fourth research hypothesis (H4). Lastly, the variable EXA was used for verifying the last research hypothesis (H5).

4 Results

Table 2 presents results of the conducted regression analysis for the degree of implementation of internal auditors' recommendations by the auditees. The data analysis proved that the sector and the listing of a company on the stock exchange are statistically significantly related to internal audit effectiveness. Moreover, the regression analysis also allowed the author to confirm the previously formed hypotheses—at least to some extent.

Regarding the first research hypothesis, the conducted statistical analysis did not reveal the number of employed internal auditors to be correlated with internal audit effectiveness in any way.

The second research hypothesis concerns competencies of IAFs. Here, the regression analysis revealed the IAF operating period to be positively related to internal audit effectiveness (Wald chi-square = 3.31; p = 0.0696), which thus confirms this research hypothesis.

Table 2 Logistic regression model

N=343	Constant B0	EMP	YRS	MON
Estimation	−2.278409	0.143168	0.3802515	0.8875291
Standard error	1.189113	0.1324189	0.2088771	0.305272
t(326)	−1.916058	1.081175	1.820456	2.907339
p	0.05623211	0.2804184	0.06960637	0.003894986
−95%CL	−4.617712	−0.1173354	−0.03066563	0.2869775
+95%CL	0.06089448	0.4036713	0.7911686	1.488081
Wald's Chi-square	3.671277	1.16894	3.314059	8.45262
p	0.05536666	0.2796274	0.06869896	0.003647683
Unit odds ratio	0.1024471	1.153924	1.462652	2.42912
−95%CL	0.009875366	0.8892869	0.9697998	1.332394
+95%CL	1.062787	1.497312	2.205973	4.428588
Odds ratio		2.360817	3.129128	2.42912
−95%CL		0.4945969	0.912108	1.332394
+95%CL		11.26869	10.73496	4.428588
N=343	SLF	EXT	CHS	FRQ
Estimation	0.1216015	−0.1180896	1.214529	0.05963456
Standard error	0.3545546	0.2715426	0.3309678	0.2532038
t(326)	0.3429697	−0.4348843	3.669628	0.23552
p	0.7318423	0.6639341	0.0002836603	0.813953
−95%CL	−0.5759023	−0.6522866	0.5634265	−0.438485
+95%CL	0.8191053	0.4161073	1.865631	0.5577541
Wald's Chi-square	0.1176282	0.1891244	13.46617	0.05546968
p	0.7316235	0.6636493	0.0002432979	0.8138067
Unit odds ratio	1.129304	0.8886164	3.368706	1.061449
−95%CL	0.5621974	0.5208535	1.756681	0.6450129
+95%CL	2.268469	1.516049	6.460009	1.746745
Odds ratio	1.129304	0.8886164	3.368706	1.269392
−95%CL	0.5621974	0.5208535	1.756681	0.1730906
+95%CL	2.268469	1.516049	6.460009	9.309324
N=343	CRS	CWS	CPS	CPR
Estimation	−1.352155	1.027041	−0.2893221	0.9543845
Standard error	0.7220238	0.7979889	0.4165346	0.4418171
t(326)	−1.872729	1.287037	−0.6945933	2.160135
p	0.0620007	0.1989944	0.4878049	0.0314907
−95%CL	−2.772569	−0.5428162	−1.108757	0.08521201
+95%CL	0.06825931	2.596899	0.5301129	1.823557
Wald's Chi-square	3.507113	1.656465	0.4824598	4.666182
p	0.06111496	0.1980906	0.4873153	0.03076964
Unit odds ratio	0.2586823	2.792791	0.748771	2.597072
−95%CL	0.06250126	0.5811094	0.3299688	1.088948

(continued)

Table 2 (continued)

N=343	CRS	CWS	CPS	CPR
+95%CL	1.070643	13.42205	1.699124	6.193851
Odds ratio	0.001158333	169.8996	0.2353667	118.1462
−95%CL	0.0000009537703	0.06626581	0.003911691	1.531213
+95%CL	1.40677	435607.1	14.16203	9115.99
N=343	CRR	CEM	EXA	COS
Estimation	−0.3212292	−0.2755055	1.172956	−0.02391028
Standard error	0.5065472	0.4596902	0.6880506	0.09723203
t(326)	−0.6341545	−0.5993286	1.704753	−0.2459095
p	0.5264247	0.5493701	0.08919329	0.8059071
−95%CL	−1.317743	−1.179839	−0.1806236	−0.2151917
+95%CL	0.6752846	0.6288282	2.526536	0.1673711
Wald's Chi-square	0.4021519	0.3591948	2.906181	0.06047146
p	0.5259845	0.548958	0.08825029	0.8057539
Unit odds ratio	0.725257	0.7591882	3.231531	0.9763733
−95%CL	0.2677389	0.3073281	0.8347495	0.8063868
+95%CL	1.964592	1.875412	12.51009	1.182193
Odds ratio	0.2006595	0.2522013	3.231531	0.9087901
−95%CL	0.001375807	0.002741648	0.8347495	0.4228377
+95%CL	29.2659	23.19974	12.51009	1.95323

N=343	SEC
Estimation	−0.9747302
Standard error	0.466392
t(326)	−2.089937
p	0.03739799
−95%CL	−1.892248
+95%CL	−0.05721228
Wald's Chi-square	4.367839
p	0.03663128
Unit odds ratio	0.3772942
−95%CL	0.1507326
+95%CL	0.9443936
Odds ratio	0.1423509
−95%CL	0.02272031
+95%CL	0.8918792

The third research hypothesis pertains to the IAF's commitment to ensuring and improving internal audit quality. The statistical analysis showed conflicting results. The recommendation implementation rate is positively related to the ongoing monitoring (Wald chi-square = 8.45; p = 0.0038) and changes introduced based on results of the IAF's performance measurement, and the periodic assessment (Wald chi-square = 13.46; p = 0.0002). The data did not, however, provide any

proof of any relationship between self-assessment and external assessment, and internal audit effectiveness.

The fourth research hypothesis pertains to the level of the AC's commitment to collaborating with the IAF. Here, the statistical analysis shows conflicting results. The recommendation implementation rate is negatively related to the signalling of significant risks (Wald chi-square = 3.50; p = 0.0620) and positively related to determining priorities for annual and strategic internal audit plans (Wald chi-square = 4.66; p = 0.0314). However the data did not confirm the relationship between internal audit effectiveness and the other AC responsibilities, i.e. signalling of significant weaknesses of the management control, suggesting an improvement of the management control, reviewing significant internal audit results, monitoring the implementation of recommendations, reviewing reports on the execution of the internal audit plan and management control assessments and, lastly, monitoring of the efficiency of the internal audit work, including reviews of the results of internal and external quality assessments of the IAF.

The last research hypothesis pertains to the level of the IAF's commitment to performing commissioned audits. In this case, the regression analysis proved the IAF's commitment to performing commissioned audits to be negatively related to internal audit effectiveness (Wald chi-square = 2.90; p = 0.0891), which thus confirms this research hypothesis.

5 Discussion and Conclusions

The recent change in the Public Finance Law regarding internal audit and management control has triggered the management to change the role played by internal audit in the public sector. The intention of the legislature was to target activities taken by an IAF to assess management control and provide consulting activities. Similar tendencies for broadening the range of an IAF's activities to include assessment of risk management, control and corporate governance processes occurred in the private sector under the influence of growing expectations of the Polish Securities and Exchange Commission regarding ensuring good governance in publicly listed companies. However, such changes require competencies of internal auditors, internal audit processes and its role within an organisation to be sufficiently aligned in order for the activity to be effective.

Considering the above, an analysis was conducted to determine dimensions in which actions should be taken to improve the rate of internal audit target achievement. By means of verifying the hypotheses, it has been proven that internal audit effectiveness is affected by features of the IAF, audit activities, and internal relations. The rate of recommendations grows with:

- the growing number of years in the IAF operating period,
- the internal audit activity being monitored on an ongoing basis,

- audit performance measurement results and self-assessment measurement results being employed for introducing changes,
- the audit committee signalling significant risks and designating priorities for annual and strategic internal audit plans,
- the share of the working time of IAF employees dedicated to conducting commissioned audits not exceeding 20% of the working time of a given internal audit department.

The above conclusions may be helpful in designing changes oriented at improving internal audit effectiveness in specific organisations. These findings might be both practically and theoretically significant. The role of an audit committee for the internal audit effectiveness underlines the meaning of proper positioning of an internal audit department. The significance of ongoing monitoring in the quality assurance and improvement programme proves that it is more important than self-assessment and periodic external assessments. Moreover, neither audit performance measurements alone nor quality assessments ensure internal audit effectiveness if no further steps are taken to implement changes.

When discussing the results of this study, one ought to note its key limitations. Firstly, the empirical data was collected using survey methodology, which does not allow respondents to provide detailed explanations for the questions asked, and thus, probably does not ensure high accuracy, as a researcher cannot thoroughly control how these questions are interpreted by the respondents. Hence, the nature of the study ought to be considered innovative, and thus, its findings may be further verified and examined in more detail using case studies.

Secondly, since the survey research was carried out in the public and the private sectors, the collected data can be considered representative for public finance sector entities and companies whose internal auditors are members of the Institute of Internal Auditors. It is necessary to exercise some caution when relating these results to other companies.

Another limitation pertains to the definition of the internal auditors' competencies. In the study, the IAF operating period was used as the measure of the competences of an IAF. Although the IAF operating period and internal audit team qualifications have been previously proven to be correlated, future studies should begin with a more detailed analysis of competencies theoretically required from internal auditors in order to understand which particular skills may affect internal audit effectiveness.

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Appendix

See Table 2.

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Measuring Social Effectiveness of Public Institutions: A Contribution to Methodology

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Abstract This paper brings an outline and preliminary results of a 2-year project aiming at assessing the social effectiveness of public policy institutions. The effectiveness of public institutions is an important indicator of the success and prosperity of a country. It is usually measured indirectly via data such as public officer numbers, the quality of legislation regulating the relations between the public administration and its users, and by the satisfaction of the population with the public administration bodies. In this area, the Czech Republic sadly lags behind most developed countries. The authors bring their own concept of social effectiveness, which is inspired mainly by the principles of good public administration, open government, public value, and social and ethical auditing.

Keywords Mind maps • Public policy • Efficiency and effectiveness • Social climate • Organizational culture

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1 Introduction

The existing analyses of public administration show that the Czech Republic is significantly falling behind on an international scale. This situation is convincingly illustrated by OECD reviews and surveys. According to a recent study of 2015 (OECD 2015a, b, p. 41–42), spending on public administration is, per capita (PPP-adjusted), less than three quarters of the average OECD country. However, indicators of the performance of the public administration—the degree of corruption and regulation, the quality of justice and the level of government efficiency—are also comparatively low. In this context, the study explains (OECD 2015a, b, p. 41) that even allowing for low spending levels, performance could be improved by around one-third.

A major outlook is also represented by confidence in government and public administration. Not even in this aspect may the situation be marked as satisfactory as evidenced, for instance, by the level of confidence published in an OECD comparative study Government at a Glance (available at http://www.oecd-ilibrary.org/governance/government-at-a-glance-2015). Perception surveys conducted by Gallup World Poll show that the confidence of Czech citizens and business in the government reached only 36% in 2014 which is about 5 p.p., below the OECD average. The only positive feature which can be stressed is the fact that this level has been growing since 2007, when the OECD average had declined by 3.3 p.p.

Clearly reasons behind this situation are quite complex. Some are linked to problems in the area of public procurement leading to wasted spending. As special detailed analyses have been devoted to this topic, we are not addressing it specifically in our research.

Another important factor causing low performance has been a lacking political will to adopt a modern civil service act which would depoliticize and stabilize the public service. The Civil service act was finally adopted in December 2014 and came into force in 2015. Its impact on the functioning of the civil service and the development of the organizational culture is at the centre of our attention.

Due to the unsatisfactory quality of public administration in the Czech Republic, attempts at improving the functioning of the public administration bodies both at the central and self-government local levels are quite legitimate. The present research has been carried out due to this problem. The paper mainly focuses on the research methodology, which can be thought of as pioneering. A major part of the empirical research is based on the MAXQDA qualitative software, designed for data processing of the qualitative research. Using semi-structured interviews, the required data are obtained on the main principles of the public administration, the main processes, the social climate, and organisational structures of organisations. Mind maps are then used to define issues to be addressed showing the areas that need to be improved. Thus, it is expected that the research will contribute to an improvement in the functioning of those Czech institutions that are criticised by the European Commission and the OECD. This paper presents a sample of last year's

mind maps showing strengths and weaknesses of government institutions in the Czech Republic. The project will be finished in December of 2017.

2 Methodological Approach

The success of public policies is usually measured by outputs representing the amount of goods and services provided by governments and by outcomes in terms of welfare gains, educational gains, health gains, etc. It stands to reason that the outputs and outcomes are influenced by public management practices undertaken by governments to implement policies, as well as by behavioural factors and organizational culture of bodies executing public policies. Procedures are essential for ensuring the rule of law, accountability, fairness and transparency of actions which represent principles of good governance. In order to address such a complexity, we have developed a concept of social effectiveness of public administration which aims at integrating various perspectives supporting inclusive growth and building a fairer society. Thus, social effectiveness encompasses such components as coherent policy making, addressing public needs, coordination of conflicting goals, empowerment, motivation and satisfaction of public servants, creation of public value and participation and satisfaction of citizens with the public service outcomes. Basically, we derive this concept from the public value philosophy with respect to citizens and from social and ethical auditing in the public administration.

The public value approach, putting the citizen at the centre—considering him/her not only as a client of public administration but also as an actor in democratic processes—replaces the NPM philosophy serving anticipated needs of public service clients and using a regime of targets and key performance indicators. The experience has shown that the targets are focused on internal management, audit and control questions that may be operationally useful but often have little resonance with the public. The public value model stresses things which the public really value and reinstates the notion of citizenship which is missing in the target driven approaches to public service management (Hills and Sullivan 2006).

Social and ethical auditing emerged in the 1990s as a process of defining, observing, and reporting measures of the ethical behaviour and social impact of an organisation in relation to its aims and those of its stakeholders (Zadek et al. 1997). This area has developed significantly over time and De Colle and Gonella (2002) argue that both, methodology and focus have substantially differentiated. The motivation is complex, covering on one hand internal purposes, such as improving behaviour and organisational culture via shared values and ensuring alignment of company's policies, processes and individual behaviours with the stated values, and external purposes dealing with social issues and communicating the impact on key stakeholders on the other hand. Currently we can observe that social and ethical auditing and reporting (SEEAR) is being used by organisations as a strategic management tool and a communication tool going beyond traditional financial reporting, simultaneously enabling the organisation to engage in dialogue

with stakeholders. The experience shows that this is a very beneficial approach for companies. Its main elements are officially recommended by the OECD and the European Commission for improving corporate governance, and even a global standard called AA 1000 Accountability Principles focused on "securing the quality of social and ethical accounting, auditing and reporting" was developed. It stands to reason that SEEAR has also a great potential for public administration.

The approach also integrates principles of good governance as they have emerged in democratic states over time. There is no *acquis communautaire* in the public administration of the EU, but a consensus has established principles shared by Member States with different legal traditions and different systems of governance. These principles have been defined and refined through the jurisprudence of national courts and subsequently, the jurisprudence of the European Court of Justice. They encompass the rule of law principles of reliability, predictability, accountability and transparency on one hand, and also technical and managerial competence, organisational capacity and citizens' participation on the other hand (Principles for Public Administration 2014, available at http://www.sigmaweb.org/publications/Principles-Public-Administration-Nov2014.pdf).

We see social effectiveness of public administration as a complex concept involving such components as coherent policy making focused on the needs of society, coordination or conflicting goals, empowerment, motivation and satisfaction of public servants, public value, participation of citizens in public administration and their satisfaction with the outcomes. Put simply, social effectiveness may be defined as achievement of desired social objectives, which means effectiveness of public administration through the eyes of citizens. This concept reflects the principles of good governance, public value philosophy, as well as social and ethical auditing.

The main outcome of our research project will be a methodology for assessing social effectiveness which will be based on empirical research. In line with the above featured approach the data covering major building blocks, such as strategic planning, priority setting, coordination, risk management, leadership, transparency and accountability, stakeholder consultation, employee relations and organisational behaviour, participation of citizens, has been collected from central administration bodies, such as ministries and government agencies by means of semi-structured interviews, and focus group discussions. Czech citizens' perceptions of public administration have been collected by a survey.

3 Empirical Research

The empirical research to be used as a basis for the methodology of the assessment of institutions implementing public policies consists of case studies carried out at ministries and other administration bodies and an enquiry into the citizen satisfaction with the public administration. This paper deals with analysis of qualitative data using the method of mind maps.

In our project, qualitative data characterize the management system, social climate and culture of the organizations carrying out public policies. To acquire the data, semi-structured interviews were conducted in five state administration bodies according to previously defined problem areas. Resulting from an expert analysis, these areas have been piloted and have passed an external examination at the public institutions in question.

List of Areas:
System of management and performance
Communication with clients/citizens and other stakeholders
Employment policy
Education and training
Diversity and equal opportunities
Transparency
Code of Conduct

Each of the above areas has been thoroughly analysed. As an example, we elaborate on the Code of Conduct area to demonstrate the use of mind maps.

3.1 Code of Conduct

1. Does the organisation have a clearly defined code of conduct?

   If there is, then:

2. Is this code written? Are all the employees aware of the code? How is the code of conduct perceived in the organisation? Is the code of conduct meant for the entire state administration or is it specific for the organisation?

   If there is not, then:

3. Do you think that it would be useful if a code of conduct were written down? Why yes, why not? What should be the shared values or rules for dealing with difficult situations?
4. Is there a person in the organisation who is concerned with ethical problems and/or can help if the code of conduct rules are not clear or relevant to a particular problem?
5. Does the organisation have a whistle-blowing policy?
6. Is the compliance with the code of conduct monitored on a regular basis and is the non-compliance sanctioned?
7. What are the organisation's anti-corruption rules and policy and how are cases of conflict of interests resolved?
8. Do the employees have discretion for taking decisions when the given rules are not followed?

3.2 Places of Enquiries: Public Institutions

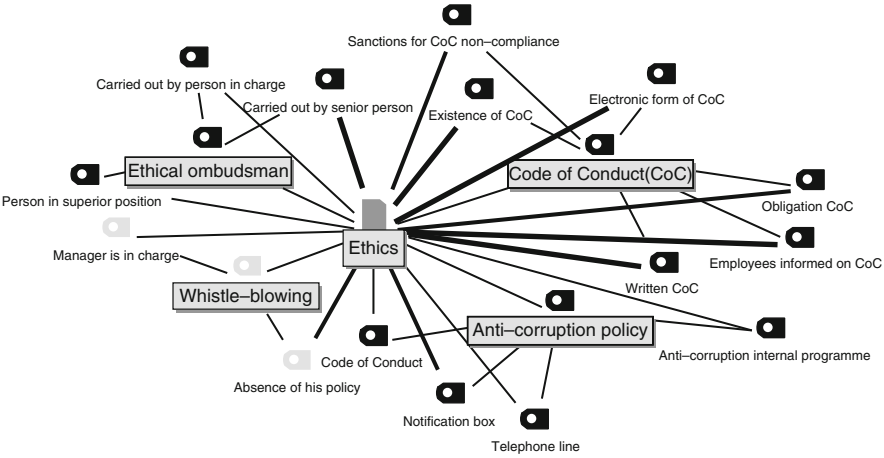
Data collected at five public administration bodies:

- Ministry of Industry and Trade,
- Ministry of Transport,
- Ministry of Culture,
- Czech Statistical Office
- State Fund for Housing Development

The collected data were analysed by a model technique using the MAXQDA qualitative software designed for the data processing within qualitative research. In particular, the interviews were rewritten and analysed by the grounded theory, which can be included among classic qualitative methods. The whole process of data collection and analysis was built on searching of concepts that were related to the research area and on subsequent uncovering of relationships among them. Various types of coding such as the tools for the text analysis were used. The interviews were subsequently analysed by the software MAXQDA, enabling simple sorting, structuring and analysis of a large quantity of text by a code of segment. Data were analysed according to individual areas and sub-areas and based on the content of interviews. The final outcome of data processing is the calculated strength of interconnections in individual mental maps.

3.3 Results of the Empirical Research: Example

The below picture summarizes the outcomes of our code of conduct research.



The above map shows the area of ethics and ethical management of an organisation. Having a written form, a code of conduct is the most prominent part of every organisation with each employee being informed about it, its rules being binding on all the members of the organisation and non-compliance being sanctioned.

Code of conduct as a tool of prevention that sets clear rules for the organisation to follow has become a standard part of public administration (Seknička and Putnová 2016, p. 146).

An ethical ombudsman, on the other hand, does not exist in organisations. In the interviews, as a rule, the respondents answered that this role is played by their superior. The finding that the person in charge of what happens in a workplace is regarded as an independent pundit suggests that this area is not well managed.

Another example is the concept of whistle-blowing. It is not clearly defined as part of an anti-corruption policy as an option to inform about a suspicion by phone, in writing or through a box. An anticorruption policy or even an anti-corruption programme is usually included in a code of conduct.

A clearly outlined problem area shows both strengths and weaknesses of the ethical infrastructure, quickly showing the institutions where the survey was carried out the right direction.

4 Summary

This paper aims to contribute to an assessment of functioning and finding ways to improve public administration. The research is among the first in the Czech Republic. The authors are aware of the facts that such a sophisticated system as public administration cannot, in its entirety, be covered by research within 2 years, which is the time allocated to this project. Nevertheless, they are convinced that the existing outcomes already yield original results. The method employed has already been verified and the authors are convinced that it can assess important features of public administration bodies. It will be the task of further research to find other links with the efficiency of public administration and other subject areas listed in the Methodology part.

The present paper brings a sample of results achieved by a method of mind maps. To our knowledge, this type of research has not yet been used to investigate the efficiency of public institutions. Using semi-structured interviews, maps may be drawn of the strengths and weaknesses in the effectiveness of public institutions defining problem areas that need increased attention. The subject areas selected for research have been tested in a pilot project with representatives of the institutions in which the survey was carried out providing their comments. A set of such mind maps provides a good basis for detecting the particular barriers to improving services rendered as part of public policies. At the same time, it suggests further application areas of this original method on a local or regional scale. The value

added by this research consists not only in assessing a given public administration body using a predefined methodology but also in formulating recommendations/collecting good practices.

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Does High IPO Valuation Benefit Investors?

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Abstract This paper examines whether investors use information contained in the prospectus as indicators of firm quality and incorporate this information when pricing an IPO firm, and then it relates these IPO valuations to post-IPO returns. The study is based on a sample of IPO firms that went public on the Warsaw Stock Exchange during the period from 1998 to 2011. We find that a firm's performance before going public is perceived by investors as an indicator of future performance and it affects IPO valuation. Specifically, our results indicate that high profitability achieved before IPO allows to obtain a high issue price to book value per share ratio. However, our results indicate that the relation between valuation during issuance and profitability gets weaker and ultimately completely disappears after IPO. As a result, 2 years after issuance there are no differences between firms' performance no matter how high they were valued during IPO. Investors willing to pay a higher price for IPO shares do not achieve extra benefits both in terms of accounting and market rates of return.

Keywords Initial public offering • IPO valuation • Profitability • Post-IPO performance

1 Introduction

Investors making investment decisions regarding the shares of initial public offerings (IPO) face a high degree of uncertainty and asymmetric information, and hence IPOs create a potential for mispricing. Researchers trying to explain the price behaviour of IPO stocks emphasize the role of investor sentiment (e.g. Derrien 2005; Dorn 2009; Ljungqvist et al. 2006). Defined broadly, investor sentiment is a belief about future cash flows and investment risks that is not justified by fundamentals (Baker and Wurgler 2007), thus, during some periods investors are overly optimistic and they overvalue the shares at the time of IPO. Consequently, firms

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even "time" their IPOs to take advantage of investor sentiment and overvaluations on the stock markets, causing IPO volume to be high in these periods (e.g. Baker and Wurgler 2002; Lowry 2003[1]).

The possible source of investor optimism may be that investors when valuing an IPO firm base their expectations of the firm's future performance on information that does not reflect accurately its underlying economic performance. In this paper we firstly examine whether investors use information contained in the prospectus as indicators of firm quality and incorporate this information when pricing an IPO firm, and then we relate these IPO valuations to post-IPO returns.

In our previous studies, we showed that pre-IPO profitability strongly affects the success of the issuance, but it does not provide investors with better performance after going public (Brycz et al. 2017). As the measure of IPO success, we used percentage increase in shareholders' equity divided by the percentage of shares sold via the issuance. The measure concentrates on the issuer's perspective because it takes into account two crucial factors: (1) amount of selling rights to share capital and (2) the price at which they will be sold. However, according to Dudycz (2014), investors do not compare the issue price of the shares to their nominal price. This allows issuers to maximize the share premium, and take over a large share of the capital raised by IPO.

In this study, we assume that investors make their decisions based on companies' valuation, reflected during IPO in relation between issue price and book value per share (IP/BV). Such an assumption is consistent with extant literature analyses that indicate the relation between market and book value (MtB) and its predictive ability for stock returns (e.g. Fama and French 1992; Lewellen 1999, 2004; Pontiff and Schall 1998). We examine the determinants of valuation and compare them to the results achieved by the success of the IPO from the issuer perspective. IP/BV as MtB ratio could be viewed as a multiple that the market attaches to earnings. Investors tend to value companies in relation to their profitability. Above average earnings and profitability may be viewed by the investors as a signal of firms' intellectual capital. This is consistent with the principles of intellectual capital defined as the difference between a firm's market value and book value (Edvinsson and Malone 1997), and numerous studies hypothesizing that firms' intellectual capital has a positive impact on market value and financial performance (Chen et al. 2005; Maditinos et al. 2011). Interestingly, studies on underperformance and MtB effect[2] as well as our findings concerning IPO success ratio do not seem to suggest that high IPO valuation reflects performance after IPO.

The rest of the paper is organized as follows. In Sect. 2 we begin with a literature review and develop the hypotheses. Section 3 presents the sample selection, the

[1]Lowry (2003) indicates that not only the level of investor sentiment but also companies' demand for capital explain a significant amount of the variation in IPO volume.

[2]MtB effect states that securities with high ratios between their market value and their book or equity value, persistently obtain lower returns than those securities with low MtB ratios (e g. Fama and French 1992).

data and the methodology of our study. In Sect. 4, we present and discuss the empirical results, and Sect. 5 summarizes the results of the paper.

2 Literature Review and Research Hypotheses

At the time of going public, there is considerable uncertainty regarding the long-term economic viability of IPO firms. Managers know far more about the true value of their company than do investors and to reduce the uncertainty they try to send positive signals to the market about the quality of their public offerings to obtain higher prices at the offering. The main source of such signals that can be useful for a potential investor to assess a firm's quality and its projected future performance when valuing IPOs is the offering prospectus.

The existing empirical literature provides evidence on the usefulness of the IPO prospectus data to a potential investor. For example, Hensler et al. (1997) and Jain and Kini (2000) investigate the effects of some firm characteristics that can be found in the offering prospectuses on the IPOs' survival. Hensler et al. (1997) find that the survival time for IPOs increases with the issuer's size, age, level of underpricing, insider ownership and the IPO activity level, and it decreases with increasing number of risk characteristics. Jain and Kini (2000) indicate that venture capitalist involvement in the IPOs improves their survival profile by influencing managers to allocate higher resources on R&D expenditures, attracting prestigious investment bankers and a larger analyst following to their portfolio firm.

There is also empirical evidence on the usefulness of prospectus information in valuing IPOs (e.g. Clarkson et al. 1992; Firth 1998; Jog and McConomy 2003; Kim et al. 1995). For example, Firth and Liau-Tan (1997) find that such variables as retained ownership, risk, historical profit margin, and age of the business provide incremental information for valuing an IPO. Purnanandam and Swaminathan (2004) show that IPO stocks are, on average, overpriced compared to their industry peers, and profitability and expected growth are the key differences across overvalued and undervalued IPO firms. Overvalued IPOs have lower current profitability but higher anticipated earnings growth, while undervalued IPOs have higher current profitability but lower anticipated earnings growth. The authors conclude that IPO investors focus too much on optimistic earnings growth forecasts and too little on current profitability in valuing IPOs. On the other hand, Lonkani and Firth (2005) find that earnings forecasts published in prospectuses are significantly more accurate than extrapolations of historical earnings in providing valuable information to investors.

Investors tend to believe that companies that are highly profitable before IPO, after the issue will invest investors' capital with the same or even better efficiency and they take this factor into account when valuing IPOs. Thus, we hypothesize that (H1) High valuation of IPO firms is strongly determined by current profitability.

However, as indicated by many researchers, managers have an incentive to inflate earnings prior to initial public offerings to influence IPO pricing and this leads to poor long-run post-IPO return (e.g. Teoh et al. 1998). Bhabra and Pettway (2003) find that the pre-IPO profitability, the relative size of the offering, and the

level of underpricing are significantly related to the 1 year abnormal returns, but firm performance before IPO offers little or no indication of subsequent long-term performance. This suggests that investors should be cautious when they use past results in valuing IPOs. The previously mentioned study of Purnanandam and Swaminathan (2004) shows that overvalued IPOs provide higher returns than undervalued IPOs on the first day after going public but lower long-run risk-adjusted returns. The overvaluation result is consistent with the view that IPO firms tend to underperform in the long term. This long-run underperformance of IPOs was first reported in the US but then also in financial markets in other countries (e.g. Álvarez and González 2005; Auret and Britten 2008; Cai and Wei 1997; Carter et al. 1998; Dudycz 2013; Jain and Kini 1994; Jaskiewicz et al. 2005; Jelic and Briston 2003; Jewartowski and Lizińska 2012; Khurshed et al. 2005; Kim et al. 2004; Lizińska and Czapiewski 2014; Loughran and Ritter 1995; Mikkelson et al. 1997; Pagano et al. 1998; Ritter 1991).

Building on the existing body of evidence this paper relates IPO pricing not only to pre-IPO profitability of IPO firms but also to their long-term post-IPO performance. We want to investigate whether investors who decide to pay a high price for IPOs can get a high return in the future. Thus, we hypothesize that (H2) High valuation of IPO firms is not reflected in their long-term performance.

3 Sample Description and Research Methods

In this study all IPO firms that went public on the Warsaw Stock Exchange during the period of 1998–2011 were examined. There were 454 IPOs during this period, however after excluding financial institutions, IPOs that were not connected with new common stock issuance and IPOs that had incomplete information, we were left with a total of 250 IPOs in our sample. Moreover, to minimize the potentially detrimental effect, the extreme outliers were removed at each research step.

The primary source of data used in this study was Notoria Service, but because there are sometimes incomplete or incorrect data in the database, other sources of data were used to supplement them, such as IPO prospectuses and annual reports available on the companies' websites and at www.gpwinfostrefa.pl.

Table 1 provides basic characteristics of the sample. It presents the average size of the companies (assets, net assets, sales), profitability [return on sales (ROS), return on equity (ROE), return on assets (ROA)] and share value [nominal price, issue price, book value per share and issue price to book value per share (IP/BV)]. IP/BV is calculated by dividing the issue price of the stock by the book value per share. The size of the companies, profitability, book value per share and IP/BV are measured for the year before IPO.

To test the first hypothesis, in the first step the IP/BV ratio is used as the dependent variable in ordinary least squares regression to ascertain the relation between this variable and some factors that can affect IPO pricing, including pre-IPO profitability. In the next step, we classified IPOs into quartiles based on the IP/BV ratio, and then we used a parametric one-way ANOVA and non-parametric Kruskal–Wallis test to

Table 1 Sample characteristics

Parameter	Mean	Winsor's mean	Median	Lower quartile	Upper quartile	Standard deviation
Assets [PLN million]	334	126	52	24	130	1768
Sales [PLN million]	257	135	54	22	138	979
Net Assets [PLN million]	207	56	20	10	53	1330
EBIT [PLN million]	19	9	5	2	11	98
ROS [%]	10.5	10.6	9.3	4.3	15.1	12.2
ROE [%]	22.6	21.8	19.0	7.3	33.1	29.8
ROA [%]	13.2	12.6	10.6	5.1	19.1	14.2
Nominal price [PLN]	2.3	1.9	1.0	0.3	1.4	6.8
Issue price [PLN]	24.0	19.6	12.0	7.0	25.0	40.8
Book value per share [PLN]	9.9	6.7	3.2	1.6	7.4	30.8
IP/BV [n/d]	6.3	5.2	3.7	1.9	7.4	9.5

Table presents descriptive statistics of the sample. Accounting data were taken from the financial statements at the end of the year before IPO. IP means issue price, BV means book value per share, n/d means that the unit of ratio is not determined

investigate differences in pre-IPO profitability—measured by return on equity (ROE) and return on assets (ROA)—between the four quartiles. Then, we used range tests, a parametric Tukey's test, and post-hoc test for the Kruskal–Wallis test to compare the average value of these profitability measures in each quartile.

To test the second hypothesis we examined accounting rates of return and stock returns after the IPO. Specifically, we used the same two measures of accounting returns—ROA and ROE—and two measures of long-term stock returns: cumulative abnormal return (CAR) and buy-and-hold abnormal return (BHAR). The accounting returns were calculated for four periods after the IPO, i.e. at the end of the IPO year and at the end of the three subsequent years. The stock returns were calculated for three intervals: 12, 24 and 36 months after going public. In measuring the abnormal stock returns, the WIG index was used as a benchmark portfolio return. Similarly to the procedure in the previous step, in this step we also classified IPOs into quartiles based on the IP/BV ratio, and then we used a parametric one-way ANOVA and non-parametric Kruskal–Wallis test to investigate differences in rates of return between the four quartiles, followed by the post-hoc tests.

4 Results

In our regression model we used several variables that based on the previous studies seem to have significant explanatory power of IPO pricing. As profitability and efficiency ratios we used return on assets (ROA), return on equity (ROE), return on sales (ROS) and asset turnover calculated at the end of the year before offering. We

Table 2 Regression analysis of the determinants of IPO pricing

	Independent variables			
	Ln sales$_{i,t-1}$	ROE$_{i,t-1}$	D/A$_{i,t-1}$	WIG$_t$
Standardized coefficient	−0.270*	0.467*	0.189*	0.200*
Standard error	0.053	0.051	0.053	0.051
R	0.616			
R^2	0.379			
Adj. R^2	0.369			
F	37.261			

This table reports the results of the regressions from the following model:
$IP/BV_{i,t-1} = \alpha + \beta_1 LnSales_{i,t-1} + \beta_2 ROE_{i,t-1} + \beta_3 D/A_{i,t-1} + \beta_4 WIG_t + \varepsilon_t$
The subscript $t-1$ denotes the end of the fiscal year before IPO, subscript t denotes the IPO year, and the subscript i denotes firm i. The constant term is not reported. (*) indicates that coefficient is significant at 1 % levels of significance

also used the natural logarithm of total assets and natural logarithm of sales revenue reported at the end of the year before IPO as a proxy for the firm size. To examine whether leverage influences IPO pricing we used debt ratio (calculated by dividing total debt by total assets reported at the end of the year before offering), long-term debt ratio (calculated by dividing long-term liabilities by the sum of long-term debt and shareholders' equity reported at the end of the year before IPO) and shareholders' equity to fixed assets ratio (calculated as shareholders' equity to total fixed assets both reported at the end of the year before offering). Based on the empirical evidence on investor sentiment and market condition we also included WIG index and GDP growth rate as proxies of the factors.

After removing multicollinearity among variables we included four independent variables in our regression model: sales, return on equity, debt ratio, and WIG index. The results are provided in Table 2. As predicted, the pre-IPO profitability is significantly positively related to IP/BV ratio suggesting that investors focus on current profitability in valuing IPOs. There is also a positive, albeit weaker, relationship between IPO pricing and two other factors such as investor optimism and leverage, as well as a negative relationship between size of the IPO firms and IPO pricing. The results are consistent with our previous results showing that current profitability of IPO firms, their size and leverage as well as investor optimism determine the issuers' success in raising capital at the IPO (Brycz et al. 2017). Compared to our previous study (Brycz et al. 2017), the fit of the proposed regression model is slightly worse, however, the impact of ROE on the IP/BV ratio is larger than on the success of IPO firms in raising capital. Furthermore, the natural logarithm of sales reflects the size of firms better than the natural logarithm of total assets, which was used previously. Similar results to our previous study are expected because IP/BV ratio has a direct impact on the amount of capital raised through the IPO. However, if we consider IP/BV ratio as a measure of intellectual capital, it may be surprising that factors directly linked to the level of intellectual capital, such as asset turnover, do not significantly affect the IP/BV ratio.

Table 3 presents the mean and median pre-IPO profitability for four groups of IPO firms classified into quartiles based on IP/BV ratio. The pre-IPO profitability is

Table 3 ROE and ROA before IPO

Panel A: Pre-IPO operating performance				
IP/BV quartile	ROE_{t-1}		ROA_{t-1}	
	Mean [%]	Median [%]	Mean [%]	Median [%]
Q1	12.02	9.56	9.25	8.75
Q2	14.57	15.99	10.07	8.28
Q3	24.28	22.99	14.57	11.39
Q4	35.07	36.78	18.52	16.14
Total	21.34	18.65	13.08	10.70
F	17.735***		9.415**	
K-W test	52.446***		20.666***	
Panel B: Range tests				
IP/BV quartile	ROE_{t-1}		ROA_{t-1}	
	Yes/No	signif.	Yes/No	signif.
Q2 > Q1	Yes	/	Yes	/
Q3 > Q1	Yes	***/***	Yes	**/*
Q4 > Q1	Yes	***/***	Yes	***/***
Q3 > Q2	Yes	**/	Yes	/
Q4 > Q2	Yes	***/***	Yes	***/***
Q4 > Q3	Yes	**/**	Yes	/

Panel A presents mean and median for the return on equity (ROE) and return on assets (ROA) achieved by companies at the end of the year before IPO. Analysed companies are grouped according to the quartiles of IP/BV ratio. The one-way ANOVA and Kruskal-Wallis (K-W test) tests were used to compare groups. (*), (**) and (***) indicate that the differences are significant at 10, 5 and 1% levels of significance, respectively. Panel B presents the results of range tests. The post-hoc Tukey test (the first indicator before slash) and non-parametric Kruskal-Wallis test (the second indicator after slash) were used to indicate significant differences. The columns signif. identify statistical significance in the same way as in Panel A

measured by return on equity (ROE) and return on assets (ROA) at the end of the year before IPO. The interdependence between IPO valuation and pre-IPO operating performance is observed. Companies in the first quartile of IP/BV (IP/BV between 0.6 and 1.90) achieved, on average, ROE of 12.2% and in the fourth quartile (IP/BV between 7.36 and 82.54) ROE of 35.07%. The average ROE systematically increases in subsequent quartiles.

Similar regularity is observed for returns on assets at the end of the year before IPO. The results are presented in column ROA_{t-1} in Table 3. The mean of ROA in the first and fourth quartiles of IP/BV amounts to 9.25 and 18.52%, respectively. Return on assets consistently increases, however, differences observed between quartiles of IP/BV are smaller compared to ROE.

To verify the results we conducted range tests, the results are presented in Panel B of Table 3. The differences in ROE achieved by companies in the first and second quartiles are not statistically significant, however, ROE in extreme quartiles differs significantly. We conclude that in the case of companies that achieve low levels of profitability, the performance is not relevant for higher valuation. When the profitability increases, the relation between the performance and IPO pricing becomes visible. High ROE allows to attain significantly higher valuation during IPO.

Range tests confirm, in accordance with our expectations, that the observed relation between return on assets and IP/BV is weaker compared to return on equity. Statistically significant differences between ROA are observed only in extreme quartiles, i.e. between the first and the fourth, the first and the third, as well as the second and the fourth quartiles. Of course the influence of profits on ROA is lower compared to ROE, which may explain our results.

The high profitability achieved before IPO allows to obtain high valuation and issue price. However, the long-term underperformance phenomenon and market-to-book value effect suggest that after IPO performance can drop significantly. The decreases can be especially acute in the case of companies with high profitability before IPO. A high ROE before IPO may dramatically change and have disastrous effects for investors, who were tempted by high performance and naively trust that companies will maintain it in the future.

In Table 4 we present the profitability measured by ROE achieved by companies in each quartile of valuation at the IPO measured by IP/BV ratio. Decreases in ROE

Table 4 ROE after IPO

Panel A: Post-IPO operating performance								
IP/BV quartile	ROE_t		ROE_{t+1}		ROE_{t+2}		ROE_{t+3}	
	Mean [%]	Median [%]	Mean [%]	Median [%]	Mean [%]	Median [%]	Mean [%]	Median [%]
Q1	2.73	5.64	−0.67	3.62	−2.7	3.2	−3.44	3.03
Q2	9.00	10.01	5.83	7.59	−1.28	5.1	2.37	4.23
Q3	12.51	12.37	8.3	11.47	4.13	4.54	4.05	5.1
Q4	14.68	12.47	4.06	6.78	2.36	8.83	1.31	6.93
Total	9.68	10.22	4.38	7.2	0.68	4.76	1.18	4.44
F	9.243***		2.800**		1.141		2.341*	
K-W test	29.427***		18.499***		5.594		6.014	
Panel B: Range tests								
IP/BV quartile	ROE_t		ROE_{t+1}		ROE_{t+2}		ROE_{t+3}	
	Yes/No	signif.	Yes/No	signif.	Yes/No	signif.	Yes/No	signif.
Q2>Q1	Yes	*/**	Yes	/	Yes	/	Yes	/
Q3>Q1	Yes	***/***	Yes	*/***	Yes	/	Yes	/
Q4>Q1	Yes	***/***	Yes	/	Yes	/	Yes	**/
Q3>Q2	Yes	/	Yes	/	Yes	/	Yes	/
Q4>Q2	Yes	*/	No	/	Yes	/	No	/
Q4>Q3	Yes	/	No	/	No	/	No	/

Panel A presents means and medians for return on equity (ROE) at the end of the year of IPO and 1 and 2 years after IPO. Companies are grouped according to quartiles of IP/BV. The one-way ANOVA and Kruskal-Wallis tests (K-W test) were used to compare results, (*), (**) and (***) indicate that the differences are significant at 10, 5 and 1% levels of significance, respectively. Panel B presents the results of range tests for ROE. Returns for each quartile pair are compared, Yes/No means that a relationship in Column one is confirmed/not confirmed. The post-hoc Tukey test (the first indicator before slash) and non-parametric Kruskal-Wallis test (the second indicator after slash) were used, columns signif. identify statistical significance in the same way

are observed for companies in each quartile of IP/BV and they are persistent i.e. are observed in every subsequent year.

Moreover, the relation between IP/BV and profitability measured by ROE is clearly visible before IPO, but after IPO it gets weaker and ultimately completely disappears. In Panel A of Table 4 we present ROE at the end of the year of IPO and at the end of the three following years. At the end of the IPO year, the interdependence observed before IPO also occurs, i.e. ROE increases in subsequent quartiles of IP/BV, however, range tests presented in Panel B of Table 4 show that only differences between extreme quartiles are statistically significant. In the following years the situation changes. At the end of the year after IPO, companies from the third quartile of IP/BV achieve the highest ROE and the ROE for companies from the fourth quartile is lower than from the third and also the second quartile. Range tests indicate that differences in ROE are significant only between the companies in the third and the first quartile. At the end of the second and the third year after IPO, a statistical significance between ROE achieved by companies in each quartile of IP/BV is not observed. One can state that after 2 years, there are no differences between firms' performance despite some investors paying a higher price for issue of companies with the best performance before IPO.

In Table 5 we present the results for return on assets. Conclusions are very similar to the ones formulated for ROE. The phenomenon of underperformance is observed for companies in each quartile of IP/BV and it occurs in each subsequent

Table 5 ROA after IPO

Panel A: Post-IPO operating performance								
IP/BV quartile	ROA_t		ROA_{t+1}		ROA_{t+2}		ROA_{t+3}	
	Mean [%]	Median [%]	Mean [%]	Median [%]	Mean [%]	Median [%]	Mean [%]	Median [%]
Q1	4.97	5.66	2.26	3.54	−0.73	2.83	−1.73	2.25
Q2	7.06	6.85	4.93	5.23	1.23	3.65	1.8	2.69
Q3	10.69	9.39	7.96	7.64	3.13	4.18	4.84	3.76
Q4	10.49	9.29	3.74	5.14	2.98	3.67	3.36	4.48
Total	8.28	7.38	4.73	5.4	1.63	3.4	2.07	3.21
F	7.684***		4.289***		1.146		2.769**	
K-W test	20.319***		6.209***		5.338		6.422*	
Panel B: Range tests								
IP/BV quartile	ROA_t		ROA_{t+1}		ROA_{t+2}		ROA_{t+3}	
	Yes/ No	signif.	Yes/ No	signif.	Yes/ No	signif.	Yes/ No	signif.
Q2 > Q1	Yes	/**	Yes	/	Yes	/	Yes	/
Q3 > Q1	Yes	***/***	Yes	***/***	Yes	/	Yes	/
Q4 > Q1	Yes	***/***	Yes	/	Yes	/	Yes	**/
Q3 > Q2	Yes	*/*	Yes	/	Yes	/	Yes	/
Q4 > Q2	Yes	*/	No	/	Yes	/	Yes	/
Q4 > Q3	No	/	No	*/	No	/	No	/

Explanations of abbreviations, data and structure of the chart as mention in Table 4

year. Likewise, differences between ROA for companies in different quartiles of IPO vanish with time.

The above findings suggest that firms that achieve higher IPO valuation do not provide better long-term operating performance after going public. In Table 6 we also provide results based on abnormal stock returns. Panel A of Table 6 presents the mean and median cumulative abnormal return (CAR) for each quartile of IPO firms ranked by pricing at the IPO. Analogously, Panel B of Table 6 presents the mean and median buy-and-hold abnormal return (BHAR) for these firms. The results indicate that there are no statistically significant differences between averages of CAR and BHAR across quartiles, and we cannot observe any systematic patterns between the level of IPO pricing and long-run stock abnormal returns.

Table 6 Long-run post-IPO abnormal stock returns

Panel A: Cumulative abnormal return (CAR)						
IP/BV quartile	1-year CAR		2-year CAR		3-year CAR	
	Mean [%]	Median [%]	Mean [%]	Median [%]	Mean [%]	Median [%]
Q1	−13.47	−13.67	−10.15	−12.60	−11.96	0.65
Q2	−14.05	−25.80	−8.97	−15.28	−20.32	−26.77
Q3	−1.33	−10.91	−0.97	1.27	−16.92	−22.27
Q4	−5.31	−0.81	−20.74	−15.72	−17.82	−14.16
Total	−8.58	−11.99	−10.16	−9.32	−16.70	−19.02
F	0.953		0.730		0.111	
K-W test	3.069		2.442		1.069	
Panel B: Buy-and-hold abnormal return (BHAR)						
IP/BV quartile	1-year BHAR		2-year BHAR		3-year BHAR	
	Mean [%]	Median [%]	Mean [%]	Median [%]	Mean [%]	Median [%]
Q1	−14.93	−23.88	−16.59	−29.86	−7.99	−23.17
Q2	−14.47	−28.09	−11.47	−27.91	−45.33	−44.86
Q3	−1.51	−19.03	2.54	−14.27	−31.67	−34.85
Q4	−7.24	−5.30	−22.80	−23.29	−27.93	−28.05
Total	−9.60	−19.12	−12.02	−23.75	−27.84	−35.07
F	1.1909		1.227		2.456	
K-W test	5.566		2.984		4.637	

Table 6 presents the means and medians of CAR and BHAR for IPO firms, classified into quartiles based on IP/BV ratio. The CAR and BHAR were calculated as follows: $CAR_K = \sum_{k=1}^{K}\left[\frac{\sum_{i=1}^{N}(R_{ik} - R_{Bk})}{N}\right]$, $BHAR_K = \frac{1}{N}\sum_{i=1}^{N}\left[\prod_{k=1}^{K}(1+R_{ik}) - \prod_{k=1}^{K}(1+R_{Bk})\right]$, where R_{ik} is the return on IPO firm i in month k, R_{Bk} is the return on the benchmark portfolio in month k and WIG index was used as a benchmark portfolio return, N is the number of IPO firms, and K is the number of months. The one-way ANOVA and Kruskal-Wallis tests (K-W test) were used to compare the results. (*), (**) and (***) indicate that the differences are significant at 10, 5 and 1% levels of significance, respectively

5 Conclusions

Our study confirms the view that firm's performance before going public is perceived by investors as an indicator of future performance and it affects IPO valuation. Specifically, our results indicate that high profitability achieved before IPO allows to obtain high issue price to book value per share ratio. The relation between IP/BV and profitability before IPO is clearly visible for both investigated measures: return on equity and return on assets.

Our results seem consistent with the investor overoptimism at the time of IPO, long-term underperformance of IPO firms and market to book value effect. The average profitability of the companies falls in three subsequent years after IPO in each quartile of IP/BV IPOs. Additionally, our results indicate that the relation between valuation during issuance and profitability gets weaker and ultimately completely disappears after IPO. The differences in profitability between companies classified in quartiles of valuation during IPO vanish with time. As a result, 2 years after issuance there are no differences between firms' performance no matter how high they were valued during IPO. Investors willing to pay a higher price for IPO shares do not achieve extra benefits both in terms of accounting and market rates of return. The results of long-run abnormal stock returns confirm that, on average, the IPO firms underperform relative to the market for 3 years after going public and the differences in abnormal returns between quartiles of IP/BV IPOs are not statistically significant. An important conclusion from our studies is recognition of IP/BV as a measure of intellectual capital. Uncertainty about the future success of the company measured by the IP/BV that the company had before going public could indicate either a very unstable level of intellectual capital in the company or a low quality prediction of that category by IP/BV ratio. In our opinion, the former is more likely because intellectual capital cannot change dramatically within a year despite being volatile and fragile up to a point. The results obtained may also suggest that information about intellectual capital included in prospectuses (regarding strategy, customers, processes, research, development, and innovation) are misvalued and the widely published relations between intellectual capital measures and companies' performance, including ROE, are not observed in the case of IPO companies.

The conducted studies indicate the directions for further analyses. Further research should, in our opinion, concentrate on investigation of determinants of issuers' valuation after IPO by capital market. Comparing our results with factors that in subsequent years influence market to book value could provide additional insight into IPO research.

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CEO Succession in the Polish Capital Market in 2000–2015

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Abstract A change in the person holding a key managerial position in a company is an important event for the company's stakeholders, and even more important when the company operates in the continental system of corporate governance and the CEO is the key person responsible for the strategic directions of operations and day to day control of different organizational structures of the enterprise. Based on such premises, in this article we analyze CEO succession in companies quoted on the Warsaw Stock Exchange. The article presents the basic characteristics of 1904 CEO appointments which were made in 2000–2015 and is an introduction to a series of articles which explain this phenomenon from different points of view. It was determined, for example, that in the entire period under analysis, preference was given to the appointment of a new CEO (997) rather than to an extension of the term of office of the existing CEO (850). However, in the last three years a reversed trend can be observed (213/258). It is worth adding that in the actual succession subgroup, supervisory boards prefer to appoint CEOs from among outsiders.

Keywords CEO • Succession • Management • Capital market

1 Introduction

A two-tier (dual, Continental, Rhine) corporate governance system prevails in Poland, Germany and other European countries; supervisory and control functions are separate from decision making functions. The former belong to the supervisory board whereas the latter belong to the management board. In a two-tier system

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nearly all authority in the company belongs to the management board which is controlled by the supervisory board. The supervisory board is a passive body of the company; it is mainly responsible for the appointment of the management board. Therefore, it is the CEO who is responsible for the development and implementation of the company strategy, its structure and results. In most organizations the CEO is the person who identifies and implements directions of business development. Therefore, it is often emphasized in literature that leadership is an important element of corporate governance which impacts on the level of profits (Davidson et al. 2006). In public companies, CEO changes can result in different perception of the company's development opportunities by stock investors, which, particularly in the short term, can result in a sudden change of company valuation and in the long term in limited access to capital and thus smaller potential of the company to generate profits.

In light of the more and more frequent rotation of CEO positions and since their term of office is becoming shorter and shorter, CEO succession has been studied both theoretically and empirically. However, nearly all empirical analyses relate to developed capital markets. The only study on the impact of the resignation of a management board member on market prices of stock quoted companies in the Polish and other Central European markets was conducted by Gurgul and Majdosz (2007). However, the research period was relatively short—from January 2000 to June 2005 and the study comprised only 60 successions. The study did not take into account the determinants of the market response. In this paper the research period is much longer, i.e. from 2000 to 2015, and comprises 1904 successions made in companies quoted on the Warsaw Stock Exchange. We hope that our study, which focuses on the Polish market, fills the long existing gap in research.

2 Literature Review

The beginnings of succession studies date back to the 1960s (Grusky 1960). The work of Hambrick and Mason (1984) started research into key managerial teams. In the mid 1990s Kesner and Sebora (1994) noticed that research into succession significantly increased when it began to be perceived as a key condition for the development of organizations during their life cycle. In their opinion, the following were the main contributors to that trend:

- the work of organizations often reflects the attitudes of their management board members,
- CEOs make final decisions,
- CEOs most often represent companies in contacts with shareholders and other stakeholders,
- successful companies plan succession.

Succession becomes very important in the global economy and with the growing sophistication of business structures, which is reflected in the number and diversity

of academic papers which address this issue. In view of its complexity, this problem is studied by academics interested in human resources management, finance and accounting. Some theories have also been formulated.

From the point of view of organization theory, the succession of a key person in the organization can be explained by three theories—the common sense theory, the vicious circle theory and the ritual scapegoating theory. The common sense theory assumes that the results of an organization should improve whenever an ineffective CEO is replaced (Grusky 1963; Helmich 1975; Allen et al. 1979; Dalton and Kesner 1985; Kesner and Sebora 1994). In contrast, the vicious circle theory assumes that as a result of succession the situation of the enterprise will worsen, because both business relations and relations within the enterprise have been upset and relations with customers, suppliers and employees can be impaired (Grusky 1960; Beatty and Zajac 1987; Ishak and Latif 2013). According to the scapegoating theory a CEO is dismissed even when not responsible for poor results (Gamson and Scotch 1964; Boeker 1992; Khanna and Poulsen 1995). Consequently, appointment of a new CEO does not mean that the economic results of the enterprise will improve.

In finance, succession and related processes are considered to be significant market signals. The so-called signaling effect theory, coined by Spence (1973), assumes that the decision of the management body to choose a new CEO, particularly when the CEO change has been motivated by poor financial results, is a signal sent to the market about future results (Wiersema and Moliterno 2006). According to the signaling effect theory, changes in company value resulting from a CEO change can be ascribed to the informational or real effect, or a combination of the two. If the CEO change was unexpected, the signalled message can suggest that the results of the company will be worse than expected. In this situation investors will negatively respond to the informational component of the message. If the investors expect an improvement in results, a positive real effect from the message will be generated. Consequences in the form of changing share price, and consequently lower or higher company valuation, may be different and will depend on the dominant trend (Adams and Mansi 2009).

Based on a detailed analysis of 227 academic articles (of which 181 were empirical and 46 were conceptual), Cragun et al. (2016) created a typology of research on succession. They started their literature study with an analysis of Finkelstein et al. (2009), who conducted their study in the following dimensions: (1) Will there be a succession?, (2) How will the succession be conducted (as a result of which process)?, (3) Who will become CEO?, and (4) What will be the consequences of succession?

Cragun et al. (2016) expanded the four dimensions and added second- and third-level problems, thus arriving at a multi-layer structure with 32 types of studies. Each of the empirical articles they analyzed was classified into at least one of the third-level components, and a few articles were classified into more than five types (multi-aspect publications). The articles authored by Berry et al. (2006) and Hillier et al. (2005) were considered to be most comprehensive.

When we look at the initial division into four dimensions, we notice that the authors had most often studied the consequences of succession—156 articles were

Table 1 Statistical summary of the typology proposed by Cragun et al. (2016)

Will there be a succession?	How will the succession be conducted?	Who will become CEO?	What will be the consequences of succession?
Number of study types (n)			
12	4	5	11
Number of articles classified into a given study area (n)			
86	65	46	156
Publications addressing more than one study type (n)			
67	2	34	76
Type of study with the greatest number of articles (n)			
Economic situation before succession (58)	Type of change (61)	Demographic features of CEO candidate (43)	Economic situation after succession (49)
Type of study with the smallest number of articles (n)			
Phase of the company's life cycle at incorporation (1)	Reason for succession? (1)	Number of candidates/nominations (5)	Opinions of market analysts (2)

Source: own on the basis of Cragun et al. (2016)

classified in this group. On the other hand, only 46 articles addressed the features and qualifications of the CEO successor. It should also be pointed out that succession from the point of view of the effective functioning of the entire company and circumstances in which succession takes place, were most frequently studied (Table 1).

This article is the first in a series on CEO successions in the Polish capital market. We focused on identification of the greatest number of CEO appointments in 2000–2015. In addition to the evaluation of market responses, we also identified factors which affected the response to actual succession, so as to be able to try to answer the question whether the CEO change affected the long term financial results of the enterprise. The entire publication series, in accordance with the typology proposed by Finkelstein et al. (2009) and Cragun et al. (2016), will be part of the studies which analyze succession from the point of view of the consequences of the CEO change and which also take into account such aspects as the circumstances of the change, CEO profile and economic situation of the company before succession.

3 Sample Selection

A database of CEO successions comprising companies quoted on the Warsaw Stock Exchange was developed by the authors from scratch. This decision was made after an analysis of available lists of changes in the governance structure of Polish public companies offered by commercial providers. However, all of them proved to be

incomplete, both with respect to the event itself (many CEO appointments were not included) and with respect to its description (no specific characteristics of succession). Consequently, it was considered that an adoption of such lists as a basic research material would impact negatively upon the entire inference process. Thus, it became important to determine the right search, identification and selection procedures to obtain a high quality database of CEO successions. The process was formulated on the basis of our experience described in Byrka-Kita et al. (2017).

Our study only comprises companies whose shares in 2000–2015 were traded on the regulated public capital market. This was done on purpose—we wanted to differentiate between companies with different information requirements. Polish public companies, which operate under the Polish legal regime, must comply with the provisions of Article 56(1) of the Act on Public Offering (Dz.U. 184/2005, item 1539 as amended), according to which the issuer [. . .] is obliged [. . .] to simultaneously provide the following information to the Financial Supervision Authority, to the company operating the regulated market and to the public:

1. *confidential information within the meaning of Art. 154 of the Act on Trading in Financial Instruments, hereinafter referred to as "confidential information"*[1]*;*
2. *current and periodic information.*

A precise catalogue of events, which, if they take place requires generation of current information by the company, is given in the implementing acts of the minister responsible for supervision over the capital market. The legal grounds for the mandatory publication of information about changes in management board structures, including in the CEO position, require companies to immediately disclose this situation. Investors, on the other hand, must verify the valuation of financial assets in their portfolios. These regulations apply mainly to companies traded on the unregulated market which makes them less transparent, and was the main factor on the basis of which they were excluded from the study[2].

CEO successions were identified on the basis of newswires published by the companies. Preparation of the CEO succession database was divided into four stages.

[1]Inside (confidential) information within the meaning of Art. 154 of the Act on Trading in Financial Instruments is any information of a precise nature, relating, whether directly or indirectly, to one or more issuers of financial instruments, one or more financial instruments, or acquisition or disposal of such instruments, which has not been made public and which, if made public, would be likely to have a significant effect on the prices of financial instruments or related derivative financial instruments. Additional requirements for inside (confidential) information are given in Art. 154(1–3). See the Act of 29 July 2005 on Trading in Financial Instruments (Dz.U. 183/2005, item 1538 as amended).

[2]For example, NewConnect or an Alternative Stock Exchange (trading facility) organized by the Warsaw Stock Exchange and operating since 2007. Although §3 of the Rules of the Alternative Stock Exchange facility, in Appendix 3 obliged the issuer of shares on the NewConnect market to provide information about removal or appointment of CEO in the form of current report, such issuers are exempted from the provision of confidential information.

First a newswire search engine available on the website of GPWInfoStrefa was used.[3] The newswires were a secondary informational materials compared to the information provided by the companies in the form of current and periodic reports. We searched the database using such key words as "powołano" (was appointed), "powołanie" (appointment) or "prezes" (CEO). At the study stage no equally efficient tool to search "raw" company reports had been found. We identified over 10,000 newswires,[4] and verified them to see if they could be used in our study. Some of the hits were rejected on the basis of the title because they clearly referred to an event other than CEO appointment. We also rejected some results when the newswire informed about an appointment in a company operating in the unregulated market. In this way we obtained a so-called base list of 1324 appointments in the period January 2005 to June 2015.

Despite the fact that public companies are obliged to publish such information in the form of current reports, the Polish Securities and Exchange Commission (presently the Financial Supervision Authority) launched their Electronic Information Transfer System (EITS) as late as the end of 2004. Its resources were made available on the GPWInfoStrefa website. Previously, communications from public companies were provided to the EMITENT system, but they were not arranged in the way they are arranged in the EITS system. Furthermore, they could be identified only by browsing the publications of company reports on the websites of Bankier.pl and Money.pl services. At the same time current reports for 2000–2004 prepared by companies, which were no longer quoted in 2016, were unavailable in the databases of GPWInfoStrefy, Bankier.pl and Money.pl, Polish Press Agency and the Rzeczpospolita daily. The missing reports were obtained directly from the Financial Supervision Authority. In this way the number of newswires was increased to 1511 and the analysis comprised the period starting 1 January 2000.

At the next stage of the selection process the completeness of the base list was verified. The risk that a significant part of newswires were omitted resulted from the preliminary estimation of the potential number of successions. If we assumed that each year a CEO was appointed in half of the companies operating in the regulated market, the complete set was estimated to include approx. 2700 newswires. In this situation, the base list represented 55% of all the possible appointments, which was found to be insufficient to reliably generalize the results. In order to identify the omitted events, we used the resources of Notoria Serwis On-Line, to generate a list of newswires qualified to the "change in governing bodies" group. This list was compared with the base list, which was then supplemented with the missing events. In total, at the second stage of the selection procedure, the number of observations was increased by 393 appointments, which produced a database of 1904 events.

[3]The service changed its name to InfoStrefa.com in November 2016 and combines the functionalities of the former GPWInfoStrefa.pl and GPWMedia.pl services.

[4]It is difficult to determine the exact number of newswires since despite the use of different words and terms in the search engine the same newswires were found. The greatest number of hits (12,261 newswires) was generated by the word "powołanie" (appointment).

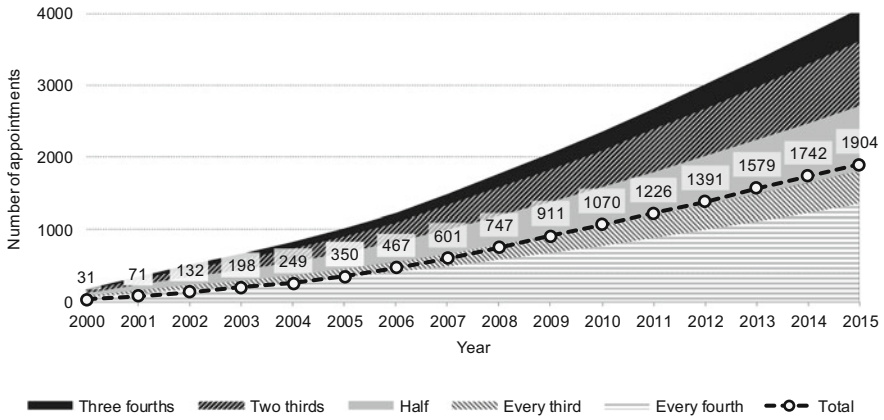

Fig. 1 Total number of CEO appointments on the Polish capital market vs. an estimated number of appointments if changes were made in every fourth or every third (etc.) company

This number suggests that on average CEO appointments occurred in more than every third but in less than half of the companies traded on the Polish capital market (Fig. 1).

Subsequently, we made a detailed selection of the newswires and supplemented individual observations with additional characteristics of the companies and their environment, succession process and CEO appointments (Table 2). At the fourth stage of the procedure we included the period in which companies were quoted on the stock exchange. The companies whose shares were traded for a relatively short time and therefore there was insufficient information necessary to calculate additional rates of return and volumes, were rejected. The final number of companies is not fixed; it depends on the research aspect. In subsequent publications we redefine the details of the final stage of selection as it depends on the research hypotheses.

The results described in the subsequent part of the article relate to the sample generated in the third stage of the procedure.

4 Results

The database comprising 1904 CEO appointments in companies traded on the Polish capital market is not a sample representing the actual successions. Detailed verification revealed that 2.89% of the events (n = 55) should have been rejected at the earlier selection stages or that there were no detailed data about them. 112 (5.88%) of the newswires informed about appointment of acting CEOs, which in fact means that the appointment was made temporarily and the company continued its CEO selection process and searched for the right candidate or waited for the approval of relevant governing bodies or determination of the management board composition. On the basis of the data it is also possible to say that the

Table 2 Variable definitions

Variable name	Short name	Variable type	Variable description
Successor's features			
Gender	gen	Dichotomous	Woman = 1, man = 2
Age	n_age	Continuous	Successor's age (in numbers) at the event time
Year of birth	y_birth	Continuous	Successor's year of birth
Generation	ag_y_birth	Categorical	Group of successors with a possible post-communist mentality, i.e. born before 1960 r = 1, group of successors who were educated and who got their professional experience in market economy, i.e. born after 1970 r = 2, group of persons born between 1960 and 1969 = 3
Education profile	proedu	Categorical	Completed university studies in humanities = 1, theology = 2, social sciences = 3, economics = 4, law = 5, mathematics = 6, physics = 7, chemistry = 0, biology = 9, Earth sciences = 10, technology = 11, agriculture = 12, forestry = 13, veterinary = 14, medical sciences = 15, pharmaceutical sciences = 16, health sciences = 17, physical culture = 18, art = 19. No tertiary level education = 20
Aggregated education profile	ag_proedu	Categorical	Completed university studies qualified into the group of social sciences = 1, exact sciences = 2, other sciences = 3. No tertiary level education = 4
Education place	study	Categorical	The appointed person was educated in Poland only = 1, in Poland and abroad = 2, in foreign schools only = 3
Education level	levedu	Dichotomous	Education: general = 1, elite = 2
Insider/ Outsider	inout	Dichotomous	The successor did not work in the company but could work in a capital group, i.e. in associated companies = 1. If the appointed person is related to the company, including only when it is re-appointment for another term of office, the successor is treated as an insider = 2
Reappointment	reapp	Dichotomous	Appointment for the first term of office or as acting CEO = 1. Re-appointment of the existing CEO for another term of office = 2
Promotion	promo	Dichotomous	If the appointment is the effect of promotion, e.g. from the position of board member or deputy CEO or head of department = 2, otherwise = 1. Transition from the Supervisory Board to the Management Board (Board of Directors) is not treated as promotion. A situation when a person who was employed in the position of deputy CEO or board member of a company not related to the company is not treated as promotion

(continued)

Table 2 (continued)

Variable name	Short name	Variable type	Variable description
Functional background	funback	Categorical	In the case of re-appointment n/d (not applicable) is selected = 1. If the appointed person has been responsible for marketing and sales = 2, finance, accounting and law = 3, production, management of operations, R&D and HR = 4. If it was not possible to determine functional origin (no data) = 5
Experience	exper	Dichotomous	If the appointed person has no experience as board member, including as CEO = 1. Performance of acting CEO function is also treated as no experience. Otherwise = 2
Industry experience	indexp	Dichotomous	If the appointed person has no experience in the sector = 1, otherwise = 2
Founder	foder	Dichotomous	If the appointed person is not the founder or co-founder of the company = 1, otherwise = 2
Circumstances of succession			
Planned vs. sudden succession	plasud	Categorical	If change of CEO was unplanned = 1, planned = 2, the event does not describe change but re-appointment (n/a) = 3. Planned change in a situation when: – acting CEO becomes CEO – the term of office of the existing CEO expired and another person was appointed CEO for the next term office and the name of the person was announced (3 months) earlier (announced changed) – it takes place "shortly" after change of control in the company, e.g. when the company was acquired by another company
Forced vs. voluntary succession	forvol	Categorical	If it was officially stated that previous CEO was withdrawn from the office = 1, resigned = 2, retired = 3, finished the term of office = 4, died = 5. The event does not describe change but re-appointment (n/a) = 6
Medical forced succession	medfor	Categorical	If change of CEO was due to illness or death of current CEO = 1, the change was not forced by health reasons = 2, the event does not describe change but re-appointment (n/a) = 3
Board size	sboard	Quantitative	The board size when the appointed person becomes CEO
Women on management board	wboard	Dichotomous	When the appointed person becomes president of the management board without any women on the management board = 1, otherwise 2

appointment of an acting CEO is not synonymous with the appointment of the same person for the CEO position for the next term of office. Therefore, there are valid doubts to consider such an event as a CEO succession. In principle, such a situation

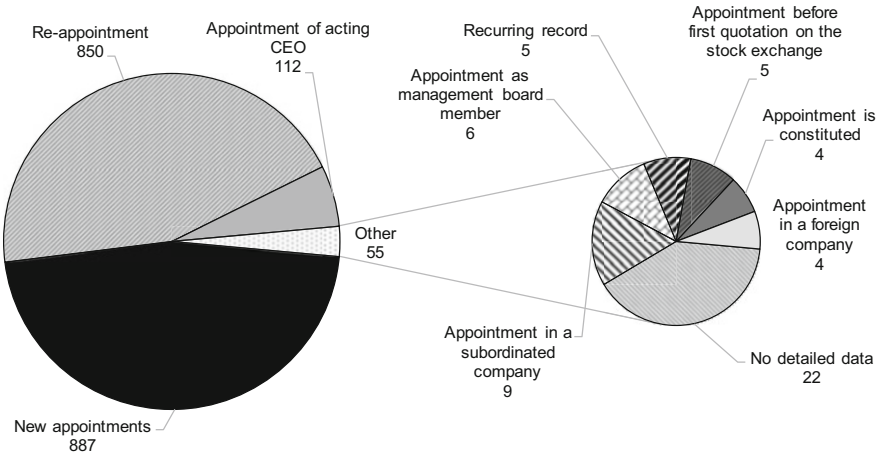

Fig. 2 Structure of CEO appointment database after the third selection of newswires

is temporary and requires the successor to exercise his/her statutory duties with caution and prudence. Such events can be classified as *quasi* successions (Fig. 2).

CEO re-appointments (850—44.64%), i.e. appointments of the same person for a new term of office, are a significant part of the sample. Unlike in the case of the appointment of an acting CEO, re-appointment for the next term of office should not be connected with succession because there is no change in the key position in the company and the necessary condition for succession is not met.

Undoubtedly, re-appointment is an important event from the point of view of company stakeholders since it confirms confidence in supervisory bodies and owners in the work performed by the CEO. Furthermore, on the basis of the data for 2013–2015 we can say that the importance of re-appointments is growing, which definitely stabilizes corporate governance in companies quoted on the Warsaw Stock Exchange. With some simplification we can say that the Polish capital market is moving away from the trends of the so-called one-time CEOs and if somebody is appointed CEO in a public company, it is very likely that that person will be approved by the supervisory board for the next term of office. However, this conclusion should not be treated as fully binding since it must be verified empirically (which requires a separate study); preliminary analysis does suggest existence of this regularity.

However, from the point of view of the research problem, re-appointments are not actual events, which is the case with 46.59% of the observations (887) of a new CEO appointment. Therefore, the subsequent analysis will pertain to the group of observations that are actual successions (Table 3).

Most CEO successions were identified in 2008 (81) and 2012 (85), whereas in the entire period from 2000 to the end of 2004 there were only 130 successions in the sample. This lack of regularity in the distribution in the entire period under analysis is understandable if two objective conditions are taken into account. On the

Table 3 Descriptive statistics of the analyzed variables (only new CEO appointments)

Variable	N	Percentage (%)	Min	Mean	Median	Max
Successor's features						
gen:						
Woman	65	7.34				
Man	821	92.66				
n_age	840		24	45	44	73
y_birth	840		1936	1964	1966	1986
ag_y_birth:						
Born before 1960 r	262	30.01				
Born after 1970 r	263	30.13				
Born between 1960 and 1969	348	39.86				
ag_proedu:						
Social sciences	586	67.05				
Exact sciences	233	26.66				
Other sciences	40	4.58				
No tertiary level education	15	1.72				
study:						
Only in Poland	641	73.51				
In Poland and abroad	191	21.90				
In foreign schools only	40	4.59				
levedu:						
General	680	77.71				
Elite	195	22.29				
inout:						
Insider	395	44.58				
Outsider	491	55.42				
Circumstances of succession						
promo:						
Yes	320	36.12				
No	566	63.88				
funback:						
Marketing and sales	45	5.27				
Finance, accounting and law	96	11.24				
Production, management of operations, R&D and HR	713	83.49				
exper:						
Yes	755	85.21				
No	131	14.79				
indexp:						
Yes	802	90.52				
No	84	9.48				
foder:						
Yes	40	4.51				

(continued)

Table 3 (continued)

Variable	N	Percentage (%)	Min	Mean	Median	Max
No	846	95.49				
plasud:						
Unplanned	784	88.59				
Planned	101	11.41				
forvol:						
Removal	312	35.37				
Resignation	463	52.49				
Retirement	6	0.68				
End of term	97	11.00				
Death	3	0.34				
medfor:						
Yes	15	1.74				
No	846	98.26				
sboard	850		1	3	2	12
wboard:						
Yes	221	24.97				
No	664	75.03				

one hand, we must take into account the number of companies whose shares were quoted on the regulated market of the Warsaw Stock Exchange in individual years, and on the other we must take into account the greater availability of current reports of public companies after 2005, i.e. when the ESPI system was implemented (Fig. 3).

A more difficult access to current reports can be observed if the number of appointments is divided by the number of public companies on the regulated market at the end of each year. From 2005 onwards, the result of the division has been around 20% whereas in previous years it was 12% on average. It is natural that 25 appointments were selected for 2001 and 2004 since at that time only nearly 200 companies were quoted on the Polish regulated capital market. It should be expected that in each of those years about 20 appointments were omitted ($0.2 \times 230 - 25$). In total, about 90 appointments could have been omitted, i.e. 40% of the likely number of all events in the period. In the opinion of the present authors, this result is satisfactory and the research sample can be considered credible and well prepared.

During the analysis of the basic statistics, which characterize the research sample, it is important to notice that a typical CEO is younger than 45 years at the time of appointment. Most often it is a man (92.66%) with general education (77.71%), obtained in Polish educational institutions (73.51%). Furthermore, very often it is a person with experience in a given sector (90.52%) who had acted as a CEO or management board member before (85.21%). Special attention should be paid to the structure of appointments with respect to the attachment of the successor to the company. It was determined that in just under half of the events (44.58%) an *insider* was appointed, i.e. a person who was attached to the company in the earlier period. In just one year, i.e. in 2006, the number of appointed *outsiders* was lower

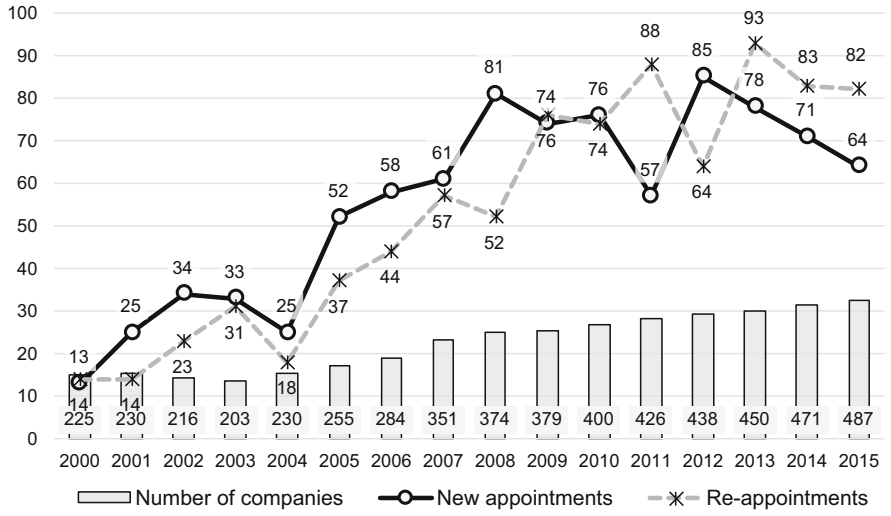

Fig. 3 New CEO appointments and re-appointments in the Polish capital market in 2000–2015

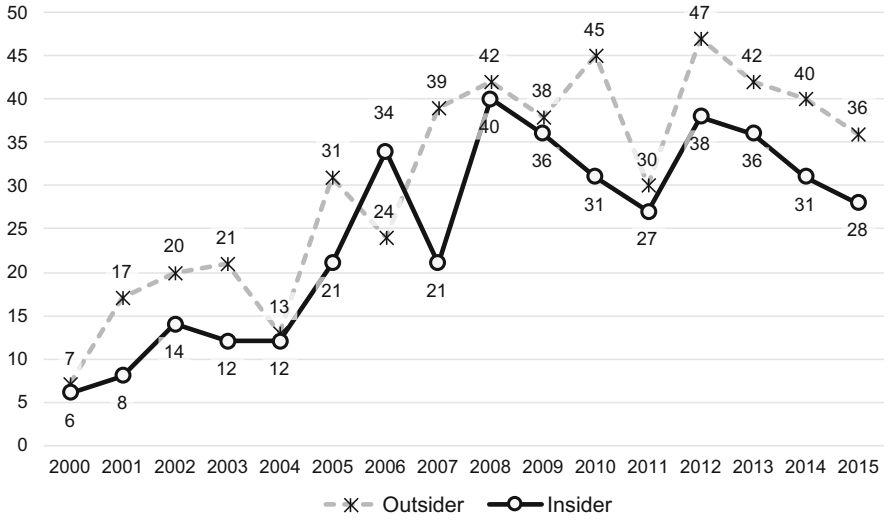

Fig. 4 Number of *insider* and *outsider* CEO successions in 2000–2015 on the Polish capital market

than the number of appointed *insiders*. Thus, despite the fact that the difference between these groups in the entire sample is only 10% points, the preference for *outsiders* is a regularity stable over time, also in recent years in which re-appointments are more frequent. Appointment of *insiders* in turn does not mean that the succession is planned (Fig. 4).

The analysis of CEO succession processes was made on the basis of current reports of companies and other categories of generally available information. This means that the predictability of the change in the CEO position was based without any access to internal documents, decisions or notes made by company authorities. As a result of the adopted criteria, only every tenth (11.41%) succession was considered to be planned. In such cases it was the supervisory boards that announced the person who will become the new CEO, or the CEO was changed because the existing CEO reached retirement age. The officially communicated reasons for the change included resignation (52.49%) and removal (35.37%).

The official number of management board members at the time of succession is another issue worthy of analysis. In half of the cases (57.01%) the management board was composed of not more than two members, and in one case the newly appointed CEO was the only management board member. This is probably due to the fact that although top management teams with many members do not guarantee higher effectiveness of the company, they do allow for greater differentiation of the responsibilities between management board members. Furthermore, if we assume that the management board is a group of persons with key importance for the organization development (Kesner and Sebora 1994), the smaller it is the more difficult it is to plan succession as a continuous process since there is a small set of CEO candidates. Theoretically, management boards with just a few members are cheaper (fewer salaries have to be paid), provided that management support services are not outsourced to external advisory and consulting companies. The biggest management board consisted of 12 persons, which is similar to the solution adopted by English boards of directors (Fig. 5).

Women, although they are rarely appointed as CEOs on the Polish capital market, are elected as members of management boards. In total in one fourth of the cases (24.97%) where a CEO was appointed, the management board consisted of at least one woman. The following conclusions were drawn on the basis of additional calculations:

- no relation between the presence of women on management boards and the number of management board members was confirmed (Spearman's linear correlation matrix was applied); statistically, these two phenomena are independent;
- in the majority of cases (76.93%) the appointment of a woman as CEO meant that all the other persons were men;
- there is no statistical difference between the average (median) age at which a woman or a man is appointed CEO. In both groups it is usually 44–45 years (t-test and U Mann-Whitney two-sample test);
- at a significance level $\alpha = 0.1$ the hypothesis about no relation between the sex of a new CEO and former attachment to the company must be rejected (Table 4). Based on relative quantities (percentage of subgroups) we can notice that women are more often *insiders* while men are more often *outsiders* (the differences between the groups were verified by the chi-square and Tau Kendall tests).

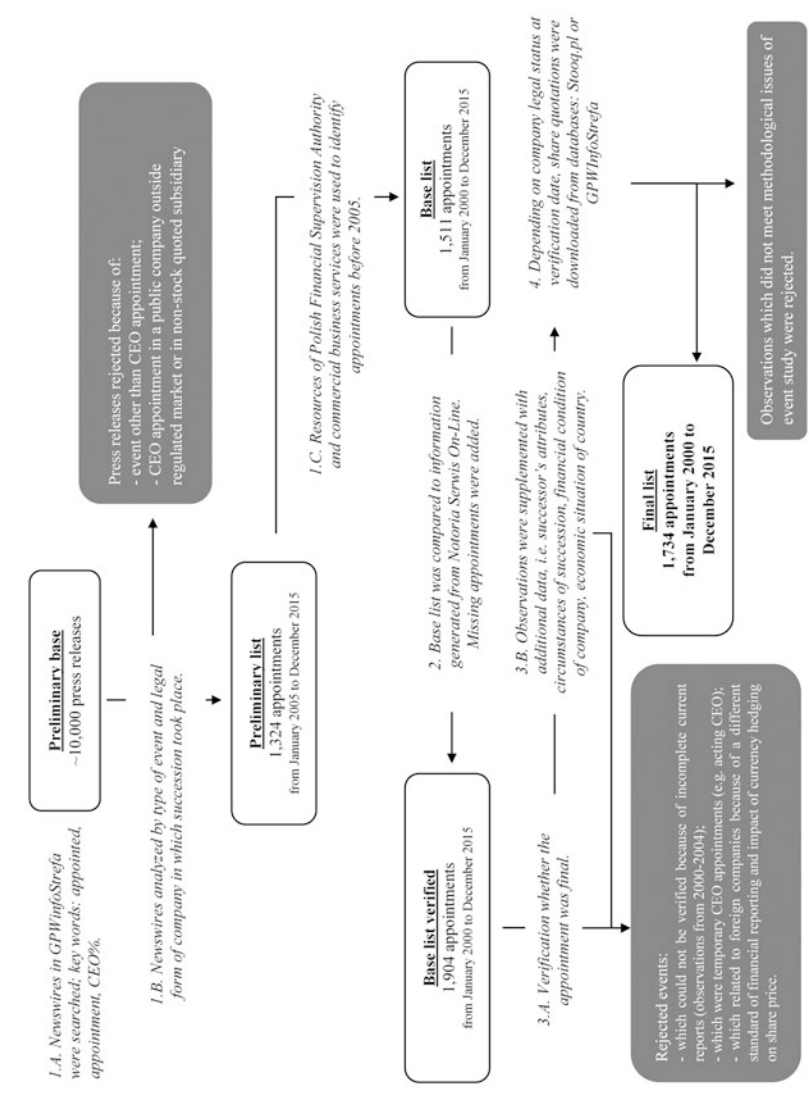

Fig. 5 Sample selection procedure

Table 4 The structure of new CEO appointments according to gender and attachment of the successor to the company

	Inout		
Gen	Insider	Outsider	Total
Woman	36	29	65
	55.38	44.62	100.00
	9.11	5.91	7.34
Man	359	462	821
	43.73	59.27	100.00
	90.89	94.09	92.66
Total	395	491	886
	44.58	55.42	100.00
	100.00	100.00	100.00
Pearson $chi^2(1) = 3.3130$ $p = 0.069$			
Kendall's tau-b $= -0.0611$ ASE $= 0.034$			

The characteristics of successors, circumstances of changes or distribution of CEO appointments over time are not the only aspects worthy of consideration in studies of public companies. The problem of dates appeared at the very beginning of the data collection and selection process—it was necessary to determine the actual date of succession. Three dates were possible—(1) the day on which information about CEO appointment was published, (2) the day on which the resolution on CEO appointment was adopted by the supervisory board and (3) the day on which the decision on CEO appointment became effective. If all these three events take place on the same day, there are no methodological doubts. However, any movement in time between these events is a reason for discussion about their hierarchy (classification).

In most cases information about succession was published on the same day on which the supervisory board made its decision (62.82%) or when the decision became effective (48.19%). However, very frequently information was made available in the ESPI system (previously EMITENT system) on the day following the day on which a relevant resolution was adopted (32.66%) or on the day before it became effective (23.76%). There were 99.43% of cases when information about the appointment was announced either 1 week before or 1 week after the adoption of a relevant resolution and 85.29% of cases when information about the appointment was announced either 1 week before or 1 week after the decision became effective. Polish law does not directly stipulate the time at which the management board has to provide relevant current information to the market, but only says that it should be done immediately. The statistics presented above indicate significant nonchalance exhibited by companies in this respect.

Further research, connected with the complete publication cycle, was conducted using each date category. However, the present authors are of the opinion that in the context of the capital market the day on which the information is published is of key importance. When a decision is made about a specific date, all the events which interfere with the impact of succession on the financial result and company goodwill should be taken into account. Therefore, for each appointment we analyzed the

period of 3 months before and after the event, trying to find significant economic events, e.g. decision about dividend, distribution of shares, information about the conclusion of a significant commercial agreement, etc. Eventually, occurrence of events which could impact on the investor response in the short run was confirmed for 224 observations.

5 Conclusions

The Polish capital market, although being the largest in Central and East European countries, is still in a phase of development and quality transformation. This is proven by the observation of the evolution of the structure of CEO appointments in public companies in 2000–2015. Up until the years of the world financial crisis, supervisory boards, representing the interests of shareholders, more often decided to appoint a new person rather than extend the term of office of the existing CEO. However, the statistics for recent years reveal a change in this trend. It is possible that the period of increased uncertainty in the financial markets, also in the political context, prompted owners to stabilize leadership in companies. If the political environment becomes less predictable, it is irrational to increase business risk with more frequent rotations in the top and key position in the company.

In conclusion it is worth pointing out that generally a CEO succession in the Polish capital market is not as frequent as in markets which were analyzed empirically. Ultimately, we identified 887 cases which can be considered to be actual succession. Furthermore, there is very little differentiation in this sample with respect to sex, education and experience of the appointees, and in the context of the predictability of the entire process. Further research will answer the question whether investors perceive differences between successors or circumstances in which the change was made.

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The Absorptive Capacity of a Finance Company as an Efficiency Factor of Its Pro-technology Innovation Activities

Waldemar Glabiszewski and Maciej Zastempowski

Abstract In today's turbulent and challenging world it is not an organization's internal research and development activity that is the leading source of innovation, but the organizational environment. As a consequence, transfer of innovative technologies is a tool commonly used to enhance a company's development. The effectiveness of this undertaking is determined primarily by the technology recipient's absorptive capacity which is responsible for acquiring strategically valuable technology, its effective assimilation, and using it with desired results in mind. Thus, a company should guarantee the realization of goals it sets for itself when deciding to engage in technology transfer by maintaining a proper perfection level of these specialized abilities.

In this paper, the authors make an attempt to gauge the absorptive potential of finance companies operating in Poland in terms of their efficiency in transferring innovative technologies; all based on a survey. As it turns out, realization of this potential confirmed the assumptions made by the authors, hence it has been concluded that how well developed financial companies' absorptive capacities are has an actual influence both on direct and indirect effects of innovative pro-technology activities based on external sources, which economically justifies making investments in further development of those absorptive abilities.

Keywords Absorptive capacity • Innovation • Technology transfer • Efficiency • Finance company

1 Introduction

A company's efficiency defines its actual capability to carry out a strategy and accomplish planned objectives, and in consequence improve its market position and financial outcomes (Skrzypek 2012). Thus its increase is highly desirable in all

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fields of company activity, both operational and strategic, ongoing and developmental, which also includes fields of innovation.

Innovation is an extremely important factor in the ability of any company to compete effectively, which is why every company should aim at reaching a high level of innovation. A serious obstacle in this respect turns out to be a company's limited potential, resulting from limited access to assets, especially intellectual and organizational ones. In such conditions, it seems more than reasonable to use external sources of innovation, which translates into searching the environment for knowledge and ready-made solutions, and supporting other specialized business entities. According to learning organization theory, the factor responsible for the effectiveness and efficiency of these actions is the company's absorptive capacity, which is meant to acquire, transform and utilize all assets necessary for innovation activity (Zahra and George 2002). Assuming the existence of the presented connection, companies should be extremely interested in the development of their absorptive capacities. What is more, the stronger the dependence, the more effort should be made to develop their capacities in order to ensure long-term success.

Taking into account the significance of the abovementioned assumption, the main goal of this paper is to assess the actual influence of the absorptive capacity of finance companies operating in Poland on their efficiency in the field of innovative technology transfer. The realization of this goal, based on the results of a survey conducted in the Polish finance-company sector is aimed at answering the question of whether how well developed the absorptive capacity of any finance company is, has an actual influence on direct and indirect results of pro-technology undertakings based on external sources. The question arises whether it is thus worth investing in the development of absorptive capacity expecting concrete gains in terms of assets, market position and finances, both in an operational and strategic sense.

2 The Role of Absorptive Capacity in Pro-technology Innovation Activities

Every company—regardless of its size, value or market position—is in possession of strictly defined, and at the same time limited assets, which determine its potential. The value of this potential, resulting from the structure, volume and quality of its constituents, determines the company's capacity, both in terms of its ongoing operations and developmental prospects. However, this capacity can be significantly boosted by the potential of various external entities from the company's environment.

A company thus has two general ways to increase its efficiency and build up its competitive position. Firstly, it can do it by itself, solely on the basis of its own assets or secondly, jointly with other entities, making use of their wealth. At present, the latter option seems undoubtedly more justified, since in this period of environment turbulence even the largest companies are forced to constantly

develop their competitiveness in cooperation with other entities (Stankiewicz 2005). What is more, the demanding conditions of operating in a strongly competitive and global environment make it literally impossible for any company, even one with enormous financial potential, to independently generate within an organization any knowledge which would effectively and efficiently determine its manner of operation (Nizard 1991). It has become customary to assume that an organization, operating in an open system, is unable to single-handedly generate all relevant assets to ensure its survival while at the same time of efficient functioning, is engaging in cooperation with other entities (Pfeffer and Salancik 1978).

The main area of study undertaken in this paper is pro-technology innovation activity. One of the tried and tested ways of boosting the efficiency of innovation activities is cooperating with external entities in order to make use of available and often tested solutions from the company's environment. Results from empirical studies directly indicate that by combining external sources of knowledge and innovation with a company's own assets equates to increasing the efficiency of the process of creating its intellectual property and innovation by reducing costs and achieving higher profits from commercializing these innovations (Bae and Chang 2012). Cooperation with other organizations may provide a company with measurable benefits that would be otherwise unattainable. The most important of these are: increased efficiency by obtaining economies of scale, transfer of technological solutions, raising the innovation level, and at the same time the competitiveness of cooperating companies, as well as the possibility of undertaking investments due to the accumulation of financial assets (Ford et al. 2003; Child and Faulkner 1998).

One of the key objectives within innovation management is shaping the optimum conditions for undertaking innovative activity, while taking into account that creating innovation is a process which goes beyond the borders of an organization (Guinet 1995). As a rule, innovations are created in the course of cooperation and for the purpose of satisfying the needs of other entities functioning in the market environment. Bearing in mind that a company is in possession of particular and at the same time limited assets, it can obtain results beyond its potential by appropriate forms of collaboration and involving external entities in their R&D activities (Freeman 1991). Within the concept of open innovation, it has been directly stated that cooperating with surrounding entities in the process of making innovations should be emphasized. It is considered necessary to re-orient R&D activities based on an organization's internal assets towards developing the ability to acquire knowledge from external entities and aiming to fully utilize already existing intellectual property and innovation (Chesbrough 2006). The foremost advantage resulting from cooperating on innovative activities includes the opportunity to reduce expenses by eliminating the replication of R&D undertaking of individual cooperators (Zander 1999).

It thus seems fully justified to use external sources of innovation. In fact, every company should arm? itself with outside assets, including acquired knowledge, organizational systems, product solutions and innovative technologies, which may come from other companies, R&D institutions, universities, government laboratories etc. (Narayanan 2001).

At present, it seems difficult to even imagine a company which would not make use or not be interested in perfecting its potential by means of knowledge and technology transfer, especially when one takes into account that a necessary condition for survival on a more and more radically changing market is the need for flexibility in terms of technological development strategy, resulting from the necessity to react to and anticipate quickly market changes, in addition to flexibility of technology conditions, flexibility in creating a company's offer, and tailoring it to its customers' needs (Timmor and Rymon 2007). The way a company operates, including technology management, should thus permit this institution enough leeway to make necessary, sometimes even radical modifications when faced by a market's new expectations. In such conditions, the best way to introduce successful technological innovation may be its transfer.

Making use of other companies' scientific and technological achievements is common practice in economy, partly because it is the quickest, the most economical, the least risky, and sometimes even the only possible way to obtain new technological solutions. Even if the practice of technology transfer is not as optimistic, it should nevertheless be assumed that self-developing technology usually carries greater risk, takes longer, and costs more than acquiring and adapting previously developed technology from outside sources (*Course*... 2001).

It is true that the essence of technology transfer concerns the utilization of already existing knowledge, unlike R&D activity, which means further development or creating new (Trott 2008). However, the transfer of already existing and exploited technologies allows a company to prevent the creation of a technological gap developing in relation to its market rivals, especially in situations of limited capabilities. Despite the fact that the change obtained in this manner is considered an innovation only from the point of view of the company which introduces it, it provides the basis for achieving certain economic results and exercising control, in the sense of helping an organization to keep up with its competitors (Griffin 2016). It is also possible, and even desirable, that technology is transferred from its original source, such as from research facilities, which conducted basic, applied and developmental studies. Such technology providers may give a company a competitive or perhaps long-term advantage, offering benefits resulting from developing the technology independently within an organization, provided exclusive rights to the acquired knowledge are secured.

The effectiveness and efficiency of a company's innovation activity based on external sources are determined by its absorptive capacity. As an element of innovation potential (Zastempowski 2010), it determines the company's abilities to assess the value of new knowledge, acquire and use it for commercial purposes, which translates into generating new market value within the company's offer (Cohen and Levinthal 1990). In other words, it conditions an organization's ability to evaluate new knowledge, acquire it, and use it for the purpose of cooperation with its environment (Van den Bosch et al. 1999). The absorptive capacity is thus meant to serve the purpose of acquiring technological knowledge from the environment, and transforming it into innovation, based on an organization's existing knowledge. Its function is not limited to just gaining knowledge, but also to absorb,

process and in particular to use this knowledge for the company's development through introducing innovation and increasing efficiency. It should be remembered that knowledge absorbed from the environment is a valuable asset for a company as long as it constitutes an actual source of generating new value within it, which facilitates the accomplishment of the desired result in the competition process. This means that absorptive potential is viewed also as the ability to learn from other organizations by engaging in interactions with them (Lane and Lubatkin 1998), thus solving an organization's internal problems (Cohen and Levinthal 1990). The concept of absorptive capacity, due to its significance and the interest it raises, is visibly evolving, as a result of which it is being modified and extended. Among others, it has been significantly modified by S.A. Zahra and G. George, who perceived absorptive capacity as a dynamic ability to create knowledge and utilize it, thereby increasing a company's potential to produce innovation and maintain competitive advantage (Zahra and George 2002). The ability's dynamic character means that it is supposed to undergo changes, be adjusted to the organization's functioning conditions and include procedures and processes of operation. A general model of the concept of absorptive potential is briefly presented by Fig. 1.

A special example of using absorption capacity is the acquisition of technology from the environment. In this case, absorptive potential should be understood as a set of specialized assets, especially non-tangible ones, which allow a company to effectively obtain, assimilate and use new and strategically valuable technologies in order to accomplish its desired results (Glabiszewski 2016). It thus defines the structure of direct sources and stimuli of desired activity, aimed at absorbing innovative technologies. It should be assumed that the absorptive potential in relation to technology transfer is expressed by the ability to conduct successful absorption of technology, meaning one in which a relevant technology is acquired, then appropriately applied, with possible adaptations and development considered, and finally utilized in a manner which would allow for the effective gain of competitive advantage (Glabiszewski 2015). It thus determines the extent to which a company is able to recognize the value of a new technology in its environment, and consequently acquire, assimilate, and use it for the realization of its goals, which results in a growth of its innovation and flexibility, and in consequence influences the level of profits gained during a competitive process (Miles 2012).

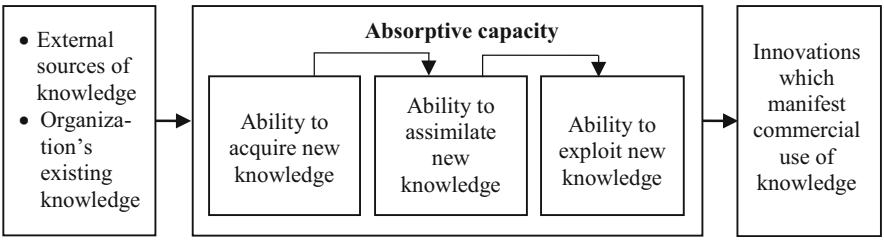

Fig. 1 Absorptive capacity model

It turns out that the extent of using the absorptive potential in the process of innovative technologies transfer is not limited to simply acquiring a new technology, applying, adapting or perfecting it, but also includes such actions that lead to the company's achieving of expected, and at the same time desired, results (Glabiszewski and Zastempowski 2016). Hence, the outcomes obtained as a consequence of technology transfer serve as a basis for evaluating the effectiveness and efficiency of the process and using absorptive capacity as part of it.

3 Methodology and Hypotheses

The empirical part of the article was written on the basis of research findings obtained in 2014–2015 by means of an online survey using a CSAQ-a Computerized Self-Administered Questionnaire (Tourangeau et al. 2013), in which the respondents filled in a digital version of the survey questionnaire available online. It was sent to the heads of 155 commercial financial sector companies registered in Poland, namely all banks, property and life insurance companies, investment funds (TFI) and universal fund management companies (PTE). In total, 108 entities filled in the online survey questionnaire, constituting 70% of the population under study. Analysis is based on the results from 37 TFIs, 26 banks, 19 property insurance companies, 17 life insurance companies and 9 PTEs.

The research conducted was the primary source of data essential for realizing the article's main empirical objective, which was evaluating the influence of absorptive capacity of finance companies operating in Poland on their activities following their transfer of innovative technologies. In order to accomplish the formulated main objective, the authors formulated two specific objectives:

1. To evaluate the impact of the development level of finance companies' in Poland absorptive capacity at the level of direct and indirect results obtained in the process of transferring innovative technologies.
2. To evaluate the impact of the development level of a company's absorptive capacity on changes of the ROA indicator which occurs as a result of transferring innovative technology.

In attempting to accomplish their specific objectives, and at the same time the article's main objective, the authors formulated and empirically verified three research hypotheses:

H1. The level of development of financial companies' absorption capacities operating in Poland has a significant impact on obtaining the anticipated level of the direct results of transferring innovative technologies.

H2. How well developed financial companies operating in Poland absorption capacities are also has a significant impact on how well they accomplish their market and financial goals resulting from the process of transferring innovative technologies.

H3. How well developed financial companies' operating in Poland absorption capacities are, also has a significant impact on increasing efficiency, expressed by the ROA profitability indicator, resulting from the transfer of innovative technology.

The aforementioned hypotheses are a result of academic analyses based on assumptions of a learning organization concept, according to which a company should, as part of its operations, acquire assets of knowledge and technology from its environment in order to obtain tangible benefits. However, these benefits should not be limited merely to the effective application of innovative technologies, or even the introduction to the market of the commercial results of such an application, but should ultimately lead to the obtaining of desired financial results, which would prove the efficiency of undertaking these pro-technology investments.

The desire to revise the assumption of the influence of companies' absorptive capacities on the efficiency of the transfers of innovative technologies made by them in the context of the Polish financial sector encouraged the authors to undertake the research problem expressed by the above hypotheses. In order to verify them, statistical and descriptive analyses of the obtained research findings were conducted, leading to the conclusions and observations presented in the following section.

4 The Influence of the Absorption Capacities of Finance Companies in Poland on the Efficiency of Conducting a Technology Transfer

The need to improve efficiency caused by growing competition encourages companies to constantly pursue new concepts, tools and management methods (Rummler and Brache 1995). Efficiency here means the dependence between the volume of assets used for the purpose of reaching particular goals and the effects achieved as a result of using these assets. The more beneficial the effects-expenses ratio, the higher the level of efficiency is achieved (Karlöf and Lövingsson 2005). In other words, efficiency is the ratio of effects to the costs of obtaining them (Davis and Pett 2002). It is a classic interpretation of efficiency confined to a narrow perception of a strictly economic nature. In order to determine it, financial indicators are used, such as profitability (Skrzypek 2012). The most popular of them include (Dudycz 2005):

- ROI—the return on investment ratio,
- ROA—the return on assets ratio,
- ROE—the return on equity ratio.

Efficiency is also at times defined as the outcome of a certain undertaking within a company's operation, which is a result of a relationship between particular effects and the expenses made in order to achieve them (Skrzypek 2012). In this paper, the

authors refer both to the perceived results of transferring innovative technologies which influence the effects-expenses ratio, as well as changes in efficiency caused by the transfers, measured by means of the ROA indicator.

The direct desired result of transferring innovative technology is introducing it for application, which translates into making an innovation which would increase the current modernity level and at the same time the company's technological potential. It is usually reflected by decreased costs or improved quality of the processes involving it, which should result in a better market offer. This, in turn, provides a means of obtaining indirect effects, mainly manifested by desired market outcomes, predominantly through increased market share and as a consequence other financial consequences, such as higher profits. The desire to achieve such results motivates companies into taking action towards transferring innovative technologies. The extent to which these results are met is a function of how well developed the absorptive capacity used for this purpose is.

In order to evaluate the results of innovative technology transfers made by finance companies operating in Poland, their managing staff were asked to define to what extent within the last 3 years they had been able to accomplish results which had encouraged them to engage in these pro-technology activities in the first place. For this purpose, a percentage scale was used, in which 0% meant that a given effect had not been achieved at all, whereas 100% meant that it had been fully achieved (completely in accordance with the expectations of the technology recipient). The results obtained, which were an arithmetic means of the evaluations made, are presented in Table 1.

It should be noted that the findings have been analyzed on the basis of the subjective replies of the respondents. However, respondents comprised top-rank executives, who were in possession of first-hand information on their companies' results. Subjective evaluations of the efficiency of an action appear to be commonplace and widely accepted in studies on companies (Powell 1995). In addition, evaluations of efficiency in empirical studies may be viewed in the context of scaling, which means that one can speak of higher or lower level (Winkler 2008).

It turns out that the direct results of innovative technology transfer have not been fully accomplished (for more see: Glabiszewski 2016). The highest level of

Table 1 The level of achieving expected results of innovative technology absorption

No.	Effects of technology absorption	Average grade
Direct effects		
1	Increase in the innovativeness of possessed technologies	75.9
2	Increase in the quality of conducted processes	78.9
3	Decrease in operating costs	56.8
4	Increase in the attractiveness of the market offer	73.9
Indirect effects		
5	Increased market share	65.7
6	Improvement in the achieved financial outcome	64.4

Source: Own study based on survey results

accomplishment, 78.9%, was declared by the surveyed managers in terms of improvement in the quality of business processes in the field of operational activities. The result should prove satisfying, since it concerns an especially important aspect of a service company's activity, namely customer service. Only a slightly lower score was achieved in the field of increasing the innovativeness of one's own technological portfolio—75.9%. Similar results arose in relation to the attractiveness of a broadly understood market offer—73.9%. Although the aforementioned factors do not prove the complete effectiveness of the conducted technology transfers, it was the qualitative effects that the managing staff was most satisfied with. The relatively low level of goal accomplishment in terms of costs (56.8%) proves that financial companies put largest emphasis on customer service, around which their attention and resources focus. It is to a large extent a consequence of the direct pressure of market rivals. As is commonly known, a significant jump in quality as a result of new technology is not necessarily accompanied by a decrease in costs, since cost- and quality-oriented competitive strategies are often an alternative to each other (Porter 1985).

The direct results of technology transfer should not be the primary objective of a technological undertaking, which instead should be the company's assumed strategic goals, especially market and financial ones. The level in which these were accomplished as declared by the managers surveyed was almost identical (65.7% and 64.4% respectively) and interestingly, this level is situated between that of cost- and quality-oriented direct objectives.

All the above-mentioned factors clearly define the efficiency of finance companies' operations in terms of technology transfer, yet they refer to figures that define the level of their efficiency, which is the results-expenses ratio. One can thus conclude, on the basis of these values, that the achieved efficiency is not fully satisfactory, which may imply the need for improving absorptive processes as well as absorptive capacities responsible for their realization.

In a further part of the study, an evaluation was made concerning the direction and influence of the studied companies' absorptive capacity on the results of their pro-technology absorptive activities. For this purpose, Pearson's correlation coefficients have been estimated for how well developed absorptive capacity was, as well as for how well the effects expected as a result of a conducted innovative technology transfer were accomplished. These values are presented in Table 2. In evaluating how well developed absorptive capacity was measurements for calculations were estimated on the basis of opinions expressed by the top managers of companies who evaluated the level of development of precisely distinguished abilities responsible for technology transfer (on average 0.73%). In this part of the study, a percentage scale was also used, in which 0% meant that the said abilities had not been improved at all, whereas 100% meant that they had been fully improved (see: Glabiszewski 2016). It should also be added that the correlation with the increase in the ROA profitability indicator was estimated for a smaller sample, namely 82 companies, due to the incompleteness of data obtained in the course of the research.

Table 2 Correlation between the level of development of financial companies' absorption capacities and the results of innovative technology absorption

No.	Effects of technology absorption	The degree of the development of absorptive capacity, *r*
Direct effects		
1	Increased in the innovativeness of possessed technologies	61.2***
2	Increase in the quality of conducted processes	72.1***
3	Decrease in operating costs	56.8**
4	Increase in the attractiveness of market offer	70.8***
Indirect effects		
5	Increased market share	42.7**
6	Improvement in the achieved financial outcome	48.5*
The return of assets		
7	Increase in ROA	40.7**

Source: Own study results and financial data from KNF (Polish Financial Supervision Authority) reports
*$p \leq 0.01$; **$p \leq 0.005$; ***$p \leq 0.001$

The values obtained from Pearson's correlation prove the existence of a positive and strong, or at the least moderate, dependency between the studied variables. It can thus be concluded that finance companies' absorptive capacity actually influences both direct and indirect effects achieved by them as a result of innovative technology transfer. Indirect effects are expressed in a company's strategic objectives. Nevertheless, the force of these correlations is varied. A strong influence of absorptive capacity ($r > 0.6$) has shown up in the case of the direct results of a qualitative nature, whereas in terms of other effects a moderate linear correlation has been observed ($0.4 < r \leq 0.6$).

The more developed absorptive capacity a financial company has, the greater the extent of its satisfaction with the results achieved, which makes it reasonable to develop further the ability to transfer innovative technologies. The phenomenon mostly refers to the improved quality of business processes, the attractiveness of the market offer, and the innovativeness of the possessed technologies, which are the fields where the goals are realized to the largest extent. A slightly lower influence of absorptive potential was noted in relation to the assumed decrease in the costs of operation. An even more moderate effect was observed in the case of the indirect results of strategic significance. One should be aware that a company's market share, as well as other financial outcomes, are influenced by a number of other factors, not only those which arise within an organization but also external ones.

A very similar level of correlation was obtained in relation to the ROA indicator, which undoubtedly confirms the reliability of the results of the survey conducted for the purpose of this paper. Although in the subjective and objective measurements taken obvious differences appear, it is visible that the latter offered a basis for study participants to express their opinions on the broadly understood results of

technology transfer. In the end, the comparison can be treated as a successful test of convergence for subjective and objective measurements of the efficiency of operation in terms of absorbing innovative technologies.

The return on assets ratio (ROA) allowed the authors of this article to check to what extent the total assets possessed by a company, including ones that determine its absorptive capacity, are able to generate profit. A Pearson's correlation coefficient estimated at the level of $r = 40.7$ in relation to the ROA indicator means that increasing the total value of assets resulting from developing absorptive potential should cause an increase in profits obtained.

The relevant force of correlations occurring among the analyzed variables above allows the authors to confirm the validity of all three hypotheses assumed by the paper, namely:

- How well developed the absorption capacities of financial companies operating in Poland are, has a significant impact on obtaining the anticipated level of direct results of transfer ring innovative technologies.
- How well developed the absorption capacities of financial companies operating in Poland are, has also a significant impact on their accomplishing their market and financial goals resulting from the process of transferring innovative technologies.
- How well developed the absorption capacities of financial companies operating in Poland are, has a significant impact on increasing efficiency, expressed by the ROA profitability indicator, resulting from the transfer of innovative technology.

It should be remembered, however, that absorptive potential is one of many factors which influence a company's competitive position. The force of its influence on the level of market and financial indicators is lower that the direct effects of technology transfer, the accomplishment of which—due to its essence—is its direct purpose.

5 Conclusion

Technology transfer has currently become a common source of innovation and company development much desired in times of strong competition. It is, however, a complex and difficult undertaking, which requires cooperation with other entities. However, engaging in it may provide a company with measurable market and financial profits, if the subject of transfer were to be a strategically valuable technological innovation especially if deriving from the originator. In addition, this form of development seems to be the shortest, the most profitable, the least risky, and sometimes also the only available option to a company lacking in technological assets. Undoubtedly, developing a new technology as a part of one's own research and development activities is a much more challenging task.

The efficiency of the innovation activities of a company based on external sources, according to the assumptions of learning organization theory, is defined

by its absorptive potential, since it determines an organization's ability to acquire, assimilate and exploit new assets of knowledge and technology. Managers' firm belief in the existence of actual dependence between how well developed the absorptive capability of a company is and the increase in a company's innovativeness resulting from using it should serve as a strong motivating factor to systematically improve the absorptive capabilities at their disposal, as they should be aware that intensifying innovation activities is an obvious way to build up a company's competitive edge, thus shaping its market and financial position within the sector.

Based on our own research findings, it should be confirmed that how well developed the absorptive capability of finance companies in Poland is, influences their accomplishments in terms of their expected level of direct and indirect results of innovative technology transfer. To a moderate extent, it also influences the strategically important market and financial outcomes of a company's activity. It turns out that it also results in an increase in operational efficiency as expressed by the level of ROA profitability indicator, which makes the research findings presented in this paper more objective.

It should be borne in mind, however, that the efficiency of each organization, including its innovation activities, is determined by various factors, both within an organization itself as well as occurring in its environment. Thus in order to affect a successful increase in the efficiency of innovative technology transfers conducted by finance companies more empirical studies need to be conducted, aimed at identifying their actual determinants, as well as verifying the impact force of these determinants already described by subject literature.

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Financial Microeconometrics as Research Methodology in Corporate Finance and Accounting

Marek Gruszczyński

Abstract This paper presents the main issues of financial microeconometrics. This field can be considered as a part of financial econometrics, while usually not exposed as such. Typical domains of the methodology of financial microeconometrics include research in empirical corporate finance and applied accounting. This survey-like paper argues that financial microeconometrics research shall be also rooted in wider fields like corporate law, management and finance. Various types of research in financial microeconometrics as well as several methodological issues are examined. A major emphasis is placed on questions of endogeneity, sample selection and treatment effects. Observations on financial microeconometrics literature both in Poland and worldwide are also included.

Keywords Financial microeconometrics • Applied corporate finance • Applied accounting • Endogeneity • Sample selection

1 Introduction

This article presents issues of methodology as applied to research in finance, law, management and economics and—moreover—when it comes to considering a sample of cases instead of a single case. This is the domain of financial microeconometrics.

Financial microeconometrics emerges as a natural consequence of applying statistical and econometric methods to corporate finance, accounting and other fields of finance. The *applied* edge of research in accounting and corporate finance is inevitably linked with the use of notions like statistical sample, population, and the operation on sets of microdata.

In such research the sets of microdata on companies substitute for a single company, microdata on transactions substitute for a single transaction, events substitute for event etc. Obviously, this message is not novel in 2017. What might be novel is the structured view on how the domains of finance and the research methodology

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interact, as well as the exposition of how the statistical-econometric methods may help or hurt the results of research in those areas.

The structural view of applied corporate finance and applied accounting is presented in Sect. 2. Section 3 comments on financial microeconometrics literature. Section 4 introduces major methodological issues: sample selection and endogeneity.

2 Financial Microeconometrics and Empirical Corporate Finance

The field of financial microeconometrics emerges on the crossroads of research in finance, mostly corporate finance and statistical-econometric methodology. It is the tools of microeconometrics which are commonly applied in the research on corporate finance, accounting, as well as the research on non-financial managerial subjects, e.g. corporate governance etc.

This is depicted in the diagram shown as Fig. 1.

To sum up—the application of microeconometric methods in corporate finance and accounting research is named financial microeconometrics (FM). This methodology constitutes a major foundation of empirical corporate finance (ECF). For verifying its research questions ECF uses large datasets on companies, their financials, decisions etc. This is where the methods of FM are usually indispensable.

ECF and FM, i.e. the lower right-hand side corner of Fig. 1 are therefore of major interest in this exposition. However, in order to properly execute research in corporate finance and accounting, it is inevitable to simultaneously consider questions relating to law and management, corporate law, corporate governance and,

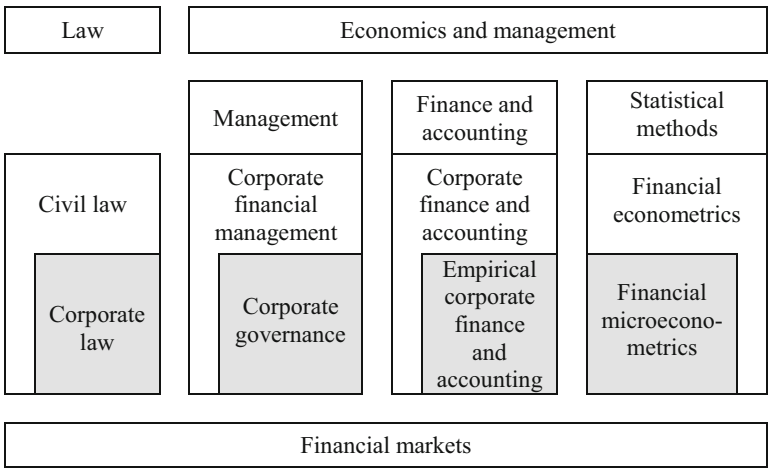

Fig. 1 Empirical corporate finance and financial microeconometrics

finally, financial markets. It is the synergy of expertise from all of those fields which seems to be necessary for meaningful research in corporate finance and accounting.

Thus, a contribution of this paper might be an attempt to coin the term "financial microeconometrics" for labelling the large part of empirical research in corporate finance and accounting. Obviously, it is not that important to give some label to a research field. Rather, the motivation here is exposing econometricians to new areas to use their methodology. "Financial econometrics" is regularly in use elsewhere, therefore "financial microeconometrics" might well be recognized as part of it.

3 Literature on Financial Microeconometrics

The term "financial microeconometrics" has been introduced in the literature by the author (Gruszczyński 2008, 2012). Although some textbooks on financial econometrics rightfully recognize the necessity of including topics on financial microdata analysis (e.g. Wang 2009), the major methodological stream in financial econometrics is devoted to time series, like in recent textbooks by Bofetti and Urga (2016) or Fan and Yao (2017). Also, the latest handbooks on financial econometrics published by Elsevier (Ait-Sahalia and Hansen 2010a, b) or by Springer (Lee and Lee 2015) contain sets of papers with a major edge on time series methodology.

On the other hand, microeconometrics tools are justifiably included in modern classes on empirical corporate finance (e.g. Ph.D. class of prof. Da Rin at Bocconi, 2016–2017) and in some basic textbooks, like Damodaran (2014) or Berk and DeMarzo (2014, chapter "Financial Distress, Managerial Incentives, and Information").

Although not specifically named like this, the literature on financial econometrics in abundant. The numerous papers can be found in multiple journals. To name a few: "Abacus", "Advances in International Accounting", "Accounting and Finance", "Accounting Review", "Corporate Governance: An International Review", "Financial Analysts Journal", "International Journal of Accounting", "International Review of Financial Analysis", "Journal of Accounting and Economics", "Journal of Accounting and Public Policy", "Journal of Accounting Research", "Journal of Applied Corporate Finance", "Journal of Banking and Finance", "Journal of Business, Finance and Accounting", "Journal of Corporate Finance", "Journal of Economics and Business", "Journal of Empirical Finance", "Journal of Finance", "Journal of Financial Economics", "Journal of Financial and Quantitative Analysis", "Journal of Law and Economics", "Quarterly Journal of Finance and Accounting", "Review of Economic Studies", "Review of Financial Economics", "Review of Financial Studies".

This subjective list contains 25 journal names and does not include many other good quality journals with financial microeconometrics articles pertaining to financial law, corporate law, management etc. Moreover, financial microeconometrics papers are also available in many serious internet journals, like those from SSRN

sub-networks: Accounting Research Network eJournals, Corporate Governance eJournals and Econometrics and Financial Economics eJournals.

It should also be noted that sets of articles on those topics have been topically grouped and included into "handbooks on empirical corporate finance", e.g. Eckbo (2007, 2008, 2010) or Brennan (2001).

In addition to the above remarks, Sect. 5 provides the selected evidence on financial microeconometrics research in Poland.

4 Major Methodological Concerns

4.1 Models of Financial Microeconometrics

Methodological maturity of research in corporate finance and applied accounting is growing. Understandably, the highest level of research quality is attained by top journals.

Financial microeconometrics encompasses topics of both methodological and applied nature. The examples, with the list that is far from comprehensive, are as follows:

1. Financial management and corporate strategy:
   - diversification and the company value,
   - choice of financing and owners of the equity,
   - financial distress and bankruptcy models,
   - firm survival.
2. Valuation:
   - regression models for comparative valuation,
   - event studies: market reaction to companies' announcements,
   - event studies for IPO,
   - earnings forecasts,
   - analysts following.
3. Financial decisions of companies:
   - choice models: debt financing, bonds,
   - dividend policy: vs. company valuation, vs. equity owners.
4. Corporate governance (owners' decisions):
   - association of corporate governance items with earnings (ownership structure, institutional investors, board structure, CEO change),
   - managerial incentives,
   - corporate governance indices.

5. Applied accounting:
   - auditor: change, independence, pay,
   - accounting standards: influence of changes,
   - disclosure and performance, disclosure indices,
   - value relevance of financial statements.

The journals, books and repositories cited above in Sect. 3 contain specific examples of research results covering all of those topics and many more. There are also several survey articles that are concentrated either on specific topics from empirical corporate finance and applied accounting or on methodological issues.

Modelling microdata in corporate finance and accounting calls for all possible approaches of microeconometrics and advanced data analysis. As mentioned earlier, good applications should utilize not only methodological knowledge but also lessons from wider fields like corporate law, management and finance. This broader view may sometimes result in proposing novel methodologies.

Some methodological problems recently gained more attention. They are explained in the next two subsections.

4.2 Endogeneity

Mostly discussed by researchers, the problem of endogeneity is present in almost all research in corporate finance. In their survey paper entitled "Endogeneity in empirical corporate finance" Roberts and Whited (2011) present some structured view on the topic which will be covered below in two paragraphs.

Endogeneity means a situation when explanatory variables correlate with an error term in a regression-like equation. A typical situation is the omitted variable—not included in the set of explanatory ones. If the omitted variable is correlated with any explanatory variable then we have endogeneity (error term is correlated with explanatory variable). The sign of the bias of parameter estimate for the variable in question might somehow be guessed, but the estimator itself remains inconsistent.

Roberts and Whited (2011) mention the CEO compensation studies for which the firm size is a common explanatory variable. The CEOs in larger companies are supposedly more skilled because larger firms are more difficult to manage than smaller ones (Gabaix and Landier 2008). Managerial ability, as unobservable, is included in error term. Therefore, we have an endogeneity situation: the firm size as the explanatory variable is correlated with the error term (the firm size appears to be endogenous). In this situation, the bias in the estimated firm size coefficient will likely be positive [if we assume that regression coefficient of compensation on ability is positive and also regression coefficient of ability on firm size is positive].

According to a presentation by Roberts and Whited (2011), the techniques addressing the endogeneity in empirical corporate finance might be classified into two groups. One includes techniques that use the known source of exogenous variation for identifying the coefficients of interest: instrumental variables,

difference–in–differences estimators and regression discontinuity design. The second group includes techniques that rely on modelling assumptions: panel data, matching methods and measurement methods.

The techniques quoted and presented by Roberts and Whited (2011) are in growing use in applied finance today. This trend follows the turn toward "quasi-experimental" methods in applied microeconomics as shown in Angrist and Pischke (2010). Similarly, Panhans and Singleton (2016), show how quickly the "quasi-experimental terms" grow bibliometrically in top economics journals. In 1990 there were no articles including such terms—as compared with 7–8% of articles in 2014. Those terms are: difference-in-differences, regression discontinuity, natural experiment, and randomized control trial (data was drawn from the Web of Science).

Thus, the "new" approaches gain importance in empirical corporate finance. On the warning side, one should agree with the conclusion of Roberts and Whited (2011) survey paper where they state that the statistical technique itself is not the blessed remedy for all shortcomings of traditional approaches. It should be carefully placed within the composite world of good empirical design, high-quality data, thorough testing in various settings and also well researched arguments e.g. for a specific solution to the problem of endogeneity etc. In their final advice the authors say that the very first step towards ultimately finding the causal relationship is the simple analysis of correlation coefficients and the descriptive analysis of data. This message will obviously encourage methodological newcomers to the field.

4.3 Selection Bias and Treatment Effects

The experimental or quasi-experimental mood gaining attention in economics and financial research is inevitably associated with questions of selection bias and treatment effects. These are also issues connected with endogeneity problems in research.

Suppose that a single company, at a particular point of time, contemplates whether or not to decide on an IPO (initial public offering). In the language of "treatments" there are two treatment levels, deciding on an IPO or not deciding on an IPO. If company decides on an IPO then its financial result (say, ROE), after a while, attains the level Y_1. If a company does not decide on an IPO, then the ROE level reaches Y_0. Question: does IPO influence ROE?

Our single company (i-th company in a sample) may be observed only after it takes the decision on an IPO, i.e. either the decision is "yes" or "no". Therefore we observe only one result from the possible two: Y_0 or Y_1. This second result is called *counterfactual* (hypothetical, potential). Thus, what we observe is:

$$Y_i = D_i Y_{1i} + (1 - D_i) Y_{0i} \tag{1}$$

where $D_i = 1$ if IPO and $D_i = 0$ if not-IPO.

The average observed difference in ROE values (between companies with and without an IPO) is called ATE (*average treatment effect*) and is equal:

$$ATE = E(Y_i|D_i = 1) - E(Y_i|D_i = 0) = E(Y_{1i}|D_i = 1) - E(Y_{0i}|D_i = 0) \quad (2)$$

Thus, the value of *ATE* may be quickly calculated. But what we would like to know is the treatment effect "on the treated" (*ATT*), i.e. change in ROE for companies deciding on an IPO as compared to the same companies not deciding on an IPO. It may be shown that:

$$ATE = ATT + E(Y_{0i}|D_i = 1) - E(Y_{0i}|D_i = 0) = ATT + selection\ bias \quad (3)$$

So, the question is: when can the selection bias be equal to zero? Firstly, it happens when the variables D_i and Y_i are independent. This is only possible for randomized experiments or simple random sample. In our case this would mean that companies are randomly selected and administered the IPO or not. Obviously, such a scenario is not valid here.

Another possibility to significantly lower the selection bias occurs when one can adopt the assumption of conditional independence (CIA) i.e. independence of variables D_i and Y_i, conditionally on explanatory variables ("covariates") X_i. Such X_i's are like "control variables" in relationship between D_i and Y_i. The CIA is also called the assumption of "selecting on observables". This means that if, conditionally X_i's, both groups of companies (IPO and not-IPO) choose an IPO then their results (ROE) have the same distribution. Rosenbaum and Rubin (1983) have shown that in such case the treatment effect is equal to ATE, i.e. the difference between results of companies "with the treatment" and companies "without the treatment" provided that they have the same probability of treatment. This probability is called propensity score.

The method of propensity score matching (PSM) creates the comparison group by matching observations (companies) with IPO to not-IPO observations for similar values of propensity scores. The general idea is matching "treated" to "non-treated" companies that are as similar as possible. Instead of matching on all X_i variables, the match is performed with a single measure called propensity score.

Matched-comparison evaluation, like PSM, belongs to quasi-experimental design techniques and becomes more and more standard, not only in labour economics but also in corporate finance and applied accounting.

PSM is the method for diminishing selection bias in Eq. (3). In the survey entitled "Selection bias and econometric remedies in accounting and finance research" Tucker (2010) presents the division of selection bias into two types: (A) due to observables and (B) due to unobservables. The remedies she describes are: PSM for case (A) and Heckman inverse Mills ratio (IMR) for case (B). The latter case i.e. "selection bias due to unobservables" results from a "failure to control for the differences researchers cannot observe", usually due to smaller information sets accessible to researchers than to managers and market participants.

Tucker (2010) interestingly exposes different uses of the popular notion "selection bias". Selection bias has the meaning in both cases (A) and (B), like in Eq. (3) for case (A) but originally and more frequently this term is used for problems of selection on observables, i.e. case (B). The author's advice for researchers using PSM in finance and accounting are as follows:

- PSM does not address selection bias due to unobservables,
- PSM does not guarantee that treated and non-treated companies are well matched by X variables (companies' characteristics); thus, it is advisable to test the differences in distributions of explanatory variables between treated and non-treated companies matched by propensity scores and to restrict the inference to companies whose characteristics can be found in both groups of companies.

The author's survey presented in her paper shows a growing number of articles addressing selection bias in two leading journals: "Journal of Accounting and Economics" and "Journal of Financial Economics". Unfortunately, most articles using this methodology have various flaws. This creates a risk of drawing improper conclusions from otherwise interesting research.

A rising number of accounting research with the use of PSM has also been confirmed in recent article by Shipman et al. (2017).

5 Financial Microeconometrics Research in Poland

Modern research in empirical corporate finance in Poland has been present since the 1990s. Published papers and books appear regularly, with growing numbers and, perhaps, with rising methodological maturity. There are many periodic conferences held all over Poland, conferences dedicated either to financial/accounting topics or to applied methodology. The examples of such conferences are: WROFIN (Wrocław University of Economics), FindEcon (University of Łódź), Financial Management (University of Szczecin). Papers presented at these conferences are usually published in the proceedings monographs.

Publications belonging to the stream of financial microeconometrics in Poland appear in journals specializing in economics, management and finance. According to recent ministerial list, there are more than 200 journals attached to those disciplines in Poland. The most important journals are ranked highly in ministerial ranking.

The subjective choice for the purpose of this paper includes five top journals: "Ekonomista", "Finanse", Bank i Kredyt", "Przegląd Statystyczny", "Gospodarka Narodowa". According to the Bazekon repository, in 2011–2016 there were following numbers of articles published with main topics connected to the field of financial microeconometrics:

- "Ekonomista": four articles,
- "Finanse" (Polish Academy of Sciences): zero articles,
- "Bank i Kredyt": eight articles,

– "Przegląd Statystyczny" (Polish Academy of Sciences): one article,
– "Gospodarka Narodowa": five articles.

Hence, the good reports from financial microeconometrics projects still wait for publication in leading journals in Poland. A closer, subjective closer look into the sample of other journals shows much larger numbers of publications in this area. Most of them are of applied nature and of variable methodological quality.

6 Conclusion

Financial microeconometrics represents the methodology dedicated to research in (empirical) corporate finance. It encompasses knowledge from many scientific fields surrounding the corporation, its purpose, its management and its finances.

The framework for financial microeconometrics is composed by corporate law, corporate governance, accounting principles and corporate finance. Financial microeconometrics is also a part of financial econometrics which nowadays is mostly associated with time series methodologies.

This paper indicates this structural understanding of financial microeconometrics, shows its underpinning for models of empirical corporate finance, presents some methodological constraints and describes the literature streams, both worldwide and in Poland.

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The Empirical Study of the Efficiency of the Impact of Macroeconomic Variables on National Currency

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Abstract This paper studies the efficiency of the impact of oil price, key interest rate and inflation on the exchange rates in the Russian Federation. The authors researched the effect of oil prices and other economic variables on the currency rate of dollar to ruble. The regression model has accurately shown this interrelation. The impact of macroeconomic variables and close interrelation between the exchange rate of dollar to ruble and oil prices is revealed. Oil price is a dominating factor in a exchange rate mechanism in Russia. When world oil prices are stabilized and sanctions are cancelled, currency fluctuations and uncertainty will be minimized. The monetary policy of Russian Central bank is to become less rigid, but focused on decrease of the inflation rate and on stabilization of national currency rate.

Keywords Impact on national currency • Macroeconomic variables • Exchange rate • Oil prices • Inflation

1 Introduction

Currency declines typically follow a series of political, economic and market forces that combine to pressure the national currency. A strong influence of these macroeconomic variables on the Russian economy considerably changes the settles tendencies in its development. First of all, feedback between ruble/dollar exchange rate and the prices of raw assets is broken. If earlier growth of ruble/dollar exchange rate was followed by fall of an oil price and other leading goods, nowadays there is a relation of opposite nature between oil prices and ruble/dollar exchange rate. This relation isn't so obvious as it has the late effect and is implemented through inflation.

Dependence of an oil price and the rate of inflation is caused by the fact that oil and its products occupy rather essential share in a consumer goods basket. This influence on inflation is wide, because many goods include transport costs.

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The decrease in oil price by 10% leads to decrease of the inflation rate for 0.2–0.3% after a while. Any other goods don't play such important role in inflation. Inflation becomes a subject of the Russian Central bank monetary policy which targets its regulation by a key interest rate. A key interest rate increase promotes decrease of the inflation rate, providing thereby strengthening of the national currency rate.

Fall of an oil price in 2014 to $98.7 led to the growth of a key interest rate of the Central Bank to 17%. It was caused by growth of inflation to 11.36%. In 2015 the key interest rate was reduced to 11%, but continuation of the lowering trend of an oil price and growth ruble/dollar exchange rate provoked growth of inflation to 12.9%.

In 2016 the economy adapted to the low prices of oil due to decrease in a share of oil products in the budget that promoted decrease of the inflation rate to 6.4% (for September). At the same time the key interest rate of the Central Bank was slightly reduced—to the level of 10% while ruble/dollar exchange rate continued to be at the high level—65.09.

Thus, the fall of an oil price, which is observed now, is followed by growth of ruble/dollar exchange rate while this influence can be seen 1–2 months later due change of inflation rate. Therefore, dependence of an oil price and the rate of inflation in pursuing Central bank's policy of targeting has an identical focus towards lowering.

2 Literature Review

Many other countries faced similar problems. Currency crises, which many economics define as a swift decline of more than 20% of a local currency against the dollar, have hit dozens of emerging markets over the past three decades.

That is why the issue of currency regulations is carefully studied by different economists. The issue of market regulation and interbank monetary using a key rate were analyzed in works of Ho and Saunders (1985), Bhattacharya and Gale (1987). But we have to emphasize, that these researches had a weak point regarding the only one index verified.

In works of other scientists, the problems of the monetary market acceleration by inflationary processes control are raised. It was investigated in the works by Acharya and Yorulmazer (2008), Blavarg and Nimander (2002). These scientists had a good approach to the essence of inflation and its influence but unfortunately didn't verify other indexes.

The complex analysis of world financial crisis of 2007–2009 problems and its consequences for economies of the countries and regions are reflected in the works by Freixas and Jorge (2008). However those researches analyzed only Western European countries but have no ideas about the countries of Eastern Europe and Russia.

Acharya and Merrouche (2013) researched the similar problems in British market. They investigated only one market with some territories and sectors but they didn't mention Asian and East European markets.

Several researches were devoted to asymmetric processes in the analysis of information on sizes of inflationary expectations and other parameters for decision-making on regulation of the monetary market, in particular by Ashcraft et al. (2011). They studied only inflation but did not produced the model with relevant indexes which would be closely connected with the kinds of inflation process.

Beaupain and Durre (2013), Finger et al. (2012), Jun et al. (2011) took part in the researches on development of models of factors of influence on national currency rate and of the liquidity of the banking market. They provided the model but it is useful when parameters are not changing during the sensible period of times.

Blokhina et al. (2016) made researches about interrelation between oil prices and national currency rate. They also made a correlation and regression analyses for the situation at the end of 2015 year in Russia.

But all these scientific approaches are in most cases connected with a particular country or region. At the same time, we see that every model contains only one or two factors with the different frames of time, and due to this we have also the problem of comparing one model with another. That is why in our research we will try to analyze the system of factors and we will try to make it more comparable with other researches in this field.

3 Methodology

In this study we used the econometric analysis to reveal the major factors influencing the currency rate of ruble. We would like to revel the correlation between national currency and macroeconomic variables. We took the monthly data from January, 2000 to January, 2016. We made a hypothesis that the currency rate of ruble depends on different macroeconomic variables. We constructed the model showing interrelation between the exchange rate of dollar to ruble and the prices of Brent crude oil, inflation and key interest rate.

The regression model in Table 1 shows that there is a strong correlation between exchange rate USD/RUR and inflation, but the oil prices and exchange rate showed a fable negative correlation. The R-squared statistic measures the success of the regression in predicting the values of the dependent variable within the sample. The R-squared is near 1, it means that regression fits very good. The Durbin-Watson statistic measures the serial correlation in the residuals. In our case DW is less than 2, there is evidence of positive serial correlation. The p-value is the marginal significance level of the F-test. It is zero, so we reject the null hypothesis that all of the regression coefficients are zero. The Akaike Information Criterion is used in model selection for non-nested alternatives, the AIC values in this model are very

Table 1 Convergence of dependent variable USD/RUR and oil prices, inflation after six iterations using the least squares method

Variable	Correlation coefficient	Std. error	t-Statistics	Probability
Oil price	−0.097583	0.017906	−5.449756	0.0000
Inflation	0.722982	0.194189	3.723092	0.0003
R-squared	0.971570	Akaike info criteria	3.778813	
Adjusted R-squared	0.971116	Shwarz criterion	3.846677	
F-statistics	2141.567	Hannan-Quinn criterion	3.806298	
Mean dependent VAR	32.11367	Durbin-Watson criterion	1.814535	
SD dependent VAR	9.322195	p-value	0.000000	

Table 2 Convergence of dependent variable USD/RUR and independent variables-oil prices, inflation, sanctions after seven iterations using the least squares method

Variable	Correlation coefficient	Std. error	t-Statistics	Probability
Oil price	−0.094292	0.017749	−5.312698	0.0000
Inflation	0.647322	0.194189	3.723092	0.0010
Sanctions	4.175028	1.581995	2.639089	0.0000
R-squared	0.972589	Akaike info criteria	3.752736	
Adjusted R-squared	0.972002	Shwarz criterion	3.937567	
F-statistics	1658.749	Hannan-Quinn criterion	3.787093	
Mean dependent VAR	32.11367	Durbin-Watson criterion	2.035556	
SD dependent VAR	9.322195	p-value	0.000000	

big, that it is not good. The Schwarz Criterion (SC) and Hannan-Quinn Criterion are alternatives to the AIC that imposes a larger penalty for additional coefficients.

In Table 2 the equation in general is significant because Prob (F-statistic) is equal 0.000000, that is, the hypothesis of insignificance of the equation is rejected. All variables are significant because Prob (t-statistic) doesn't exceed 1% level, that is, all hypotheses of insignificance of independent variables are rejected. The standard error decreased, that is a good index for this model. But sharp falling of residuals in May, 2015 remained not explained. To solve this task we will enter one more dummy variable which is connected to a policy of interest rates of the Central Bank of the Russian Federation, namely to introduction of a key interest rate. Independent variable is Key rate (Table 3).

The model (Table 3) improved again, the equation in general is significant because Prob(F-statistic) is equal 0.000000, that is, the hypothesis of insignificance of the equation is rejected. All variables are significant because Prob(t-statistic) doesn't exceed 1% significance value, that is, all hypotheses of insignificance of

Table 3 Convergence of dependent variable USD/RUR and independent variables-oil prices, inflation, sanctions, key rate after eight iterations using the least squares method

Variable	Correlation coefficient	Std. error	t-Statistics	Probability
Oil price	−0.088800	0.017431	−5.094250	0.0000
Inflation	0.624019	0.189564	3.291856	0.0012
Sanctions	4.245960	1.548025	2.742824	0.0031
Key rate	−3.211956	0.13756	74.94955	0.0000
R-squared	0.973853	Akaike info criteria	3.715939	
Adjusted R-squared	0.973150	Shwarz criterion	3.817736	
F-statistics	1385.513	Hannan-Quinn criterion	3.757167	
Mean dependent VAR	32.11367	Durbin-Watson criterion	2.064188	
SD dependent VAR	9.322195	p-value	0.000000	

independent variables are rejected. The standard error decreased about 1.53 rubles that is a good index for this model. Let's check model for seasonality.

The equation in general is significant because Prob(F-statistic) is equal 0.000000, that is, the hypothesis of insignificance of the equation is rejected. All variables are significant because Prob(t-statistic) doesn't exceed 1% significance value, that is, all hypotheses of insignificance of independent variables are rejected. The standard error decreased about 1.49 rubles that is a good index for this model.

The conducted correlation regression analyses illustrated an undoubtful efficiency of the impact of macroeconomic variables on national currency. Oil price is a major factor of influence on Russian ruble.

4 Conclusion

Rather complete idea of interrelations between the exchange rate of dollar to ruble, the prices of Brent crude oil, inflation, economic sanctions and change of a key interest rate of the Central Bank was gained. The currency rate of ruble strongly de-pends on the prices of Brent crude oil, inflation and key interest rate. The impact of macroeconomic variables on national currency is very strong. That is why national currency is very sensitive to macroeconomic variables.

High coherency between currency rate and macroeconomic indicators is witnessed across all the countries during financial crisis. The nominal exchange rates have negative relationship with the benchmark oil prices except exchange rate almost in all countries. Despite the fact that the Russian ruble is often called as oil currency, today the movement of the oil price doesn't have such influence on the exchange rate, as before.

Probably, it is connected with many other economic and political variables, which are observed at the global level.

Ruble exchange rate is determined by a ratio of demand for foreign currency and its supply in the foreign exchange market. Any factors (not only dynamics of the world prices for energy carriers) attracting change of a ratio between demand for foreign currency and its supply.

During different periods of time the factors leading to depreciation of ruble were very strong. So, at the end of 2013—the beginning of 2014 interest of the international investors in assets of the countries with the emergent markets, including the Russian assets, considerably decreased. Decisions of the Federal Reserve System of the USA on decrease in purchasing amounts of assets within the program of "quantitative mitigation" (that brings to slower, than earlier, growth of the foreign currency supply), and also signs of delay of economic growth of the countries with the emergent markets became the reasons of it (that led to decline in yield of financial investments to these countries).

Specified factors that reduced the demand for ruble turned out to be more significant in comparison with preserving high prices of oil during this period that caused depreciation of ruble along with depreciation of currencies of other countries with the emergent markets. Additional impact on dynamics of ruble exchange rate in 2014 was exerted by political events. Concerns of investors related to consequences of the geopolitical conflict for the Russian economy led to strengthening of capital outflow, further decrease in demand for ruble and its easing.

Certainly, maintenance of stable ruble exchange rate is a main target of the Central Bank of the Russian Federation, its discharge from problems of regulation of an exchange rate is inefficient now. In May, 2016 despite small world prices for oil the ruble became slightly stronger. It means, the ruble is very sensitive to the oil price and other macroeconomic indicators. Since the beginning of 2016 it has become more and more obvious that Central Bank of the Russian Federation should change the methods of monetary regulation. Monetary policy has to become less rigid, but focused on de-crease of the inflation rate and on stabilization of rate of national currency.

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How Can Firms Appropriate Their Investments in Innovation Activities?

Tomasz Kijek

Abstract The present article tries to explain how firms appropriate their investments in innovation activities. Thereby, not only intellectual property rights, but also different informal appropriation mechanisms are analysed. The special attention is paid to interactions among various appropriation methods. For the empirical testing, a large dataset is employed. The sample of innovation active firms used in this analysis includes 2960 entities that were engaged in developing and/or implementing a product or process innovation in the years 2010–2012. The results show that firms in the sample indicate high effectiveness of informal appropriation methods while at the same time assessing formal appropriation methods as being of low effectiveness. Moreover, it appears that formal methods vary together. A similar situation holds for informal methods. The findings give evidence that the choice and effectiveness of the appropriation strategies were affected by the firm's size, the type of innovation and the sector to which firms belonged.

Keywords Innovation • Appropriability mechanisms • Intellectual property • Effectiveness

1 Introduction

Innovation is often a results of a time-consuming and expensive process of research and creativity. Firms are willing to engage in this process providing that their investments will produce economic returns. On the one hand, economic returns on innovations depend on the market acceptance of new products and the efficiency of new processes. On the other hand, the benefits from innovations are higher if the rivals cannot imitate them easily. The second condition is closely related to the concept of appropriability. In the economic literature the appropriability problem was formulated by Arrow (1962), who stated that monopoly power might be desirable to induce innovation. Arrow's arguments are often used to justify the introduction of legally imposed property rights which guarantee the appropriation

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of benefits from innovations. Apart from intellectual property rights (IPRs) there are other appropriability mechanisms that may be used by innovators (Swann 2009). These mechanisms are classified as informal/strategic methods and include: complexity, secrecy, lead time, etc. Although many empirical studies address the issue of the use and/or effectiveness of appropriability mechanisms (López 2009), there is the dearth of knowledge about the relationships among particular instruments. A few empirical papers suggest that firms often use more than one appropriability method (Cohen et al. 2000). However, the debate on the different appropriation strategies of innovative firms is still pending.

Bridging the gap in the literature the aim of this paper is twofold. First, the paper tries to find how firms perceive the effectiveness of different appropriation mechanisms. Second, the study attempts to reveal if the relationships among particular appropriation methods have a complementary or substitutive character. The aim of the article determines its structure. In the first part of the paper, there is a concise review of literature on formal and informal appropriation methods. This culminates in the formulation of research questions. The next section presents the methods and data used in the study. The results of research concerning how firms use the appropriation methods are described in the Sect. 4. The final section offers concluding remarks and provides possible directions for future research.

2 Literature Review

2.1 Formal Appropriation Methods

As mentioned previously, firms may employ the formal appropriation methods in the form of intellectual property rights in order to capture the rent produced by innovations. The main formal method of intellectual property protection is patent. It gives a firm monopoly rights to the commercial use of particular invention for a given period. In turn, the patent holder must reveal in the patent documentation all the details of the invention. A patent system in this form is regarded as a mean to promote the diffusion of innovative knowledge. A similar institution to patent is utility model which is sometimes referred to as "petty patent". It is worth noting that the requirements for acquiring utility model are less strict than for patents. In the case of industrial design it provides exclusive rights for the visual appearance of products, i.e. shape, configuration, pattern or ornamentation. Another means of intellectual property protection are trademarks and copyrights. The former relate to any sign which distinguishes goods and services of one firm from those of another. The latter apply to widely defined literary and artistic works.

Christie (2006) points out that intellectual property rights have certain common characteristics. First of all, they relate only to a sub-set of all innovative emanations from the human intellect and apply to those defined subject matters that fulfil a specific innovation/creativity threshold. Moreover, the rights are not absolute and

generally have limited duration. Finally, the rights are usually freely transferable and created under statute.

As Teece (2008) thought, efficacy of legal protection mechanisms is one of the two most important environmental factors that condition functioning the appropriability regime. Another factor is the nature of technology, i.e. the type of knowledge embodied in the technology. As argued by the author, codified knowledge is easier to protect using the intellectual property rights. On the other hand, it is more exposed to industrial espionage and has some characteristics of public good, just as natural capital (Kasztelan 2015). By its nature, tacit knowledge is hard to protect using intellectual property rights. If the knowledge embedded in an invention is tacit, secrecy may be sufficient to protect the invention.

Empirical studies show that IPRs rarely confer perfect appropriability, although they provide innovators with a considerable advantage in some industries. For example, Cohen et al. (2000) find that patents are perceived as effective protection mechanism in medical equipment, drugs and special purpose machinery industries. In their study the most important reasons for not-patenting are the lack of novelty of some inventions, ease of inventing-around and costs of applying and defending patents (for small firms). More recently, Castellacci (2008) reveals that different forms of intellectual property protection are important in electronics and machinery industries. As shown by Rammer (2007), patents and trademarks are the most important formal appropriation methods for firms from the manufacturing industry, while industry designs, utility models and copyrights are regarded as less important. In turn, Suh and Hwang (2010) prove that copyrights play an important role as an appropriation mechanism in software industry.

Besides the sector in which a firm operates, the firm's size exerts the influence on the decision about the use of a specific appropriation method. In general, large firms are supposed to have more resources (intellectual and financial) at their disposal and consequently possess more power to apply for IPRs than smaller firms. This argument is supported by many empirical studies. For example, Byma and Leiponen (2007) find that as the firm's size increases the relevance attributed to patents also increases. Similarly, Arundel (2001) points out that large firms are more likely to patent than small firms, probably because of the patent application costs.

As regards the innovation type, Arundel and Kabla (1998) suggest that patent propensities for product innovations are higher than for process innovations. Similar conclusions are drawn by Harabi (1995) and Hanel (2005). This can be explained by the fact that in the case of process innovation where reverse engineering cannot be applied, it is easier to use secrecy than patent. Taking into account the definition of trademark, it is quite obvious that this kind of IPRs is only limited to product innovation.

2.2 Informal Appropriation Methods

The second category of mechanisms to prevent competitors from imitating technological knowledge embedded in innovation is referred to as informal appropriation

methods. As suggested by Rammer (2002), they are not accompanied by an enforcement mechanism in contrary to most formal methods. One of those informal mechanisms is secrecy. The secrecy strategy involves keeping the firm's intellectual property secret from all rivals. The most famous examples of trade secret is the Coca-Cola formula. A second informal mechanism is the lead-time strategy which allows the first firm to make commercial use of an invention to earn a lead-time advantage. It is worth noticing that the first mover advantage of lead-time has a temporal character. Last but not least, complexity is one of informal appropriation methods. The complex design of a product or process impedes competitors from engaging in reverse engineering or invent-around strategies.

The use of informal appropriation methods depends on the sector in which firms operate, as it is in the case of IPRs. For example, Hanel (2005) shows that the highest number of trade secrets users is in semi-conductors and other electronic equipment industries, whereas in the computer industry confidentiality agreement is the preferred method. It is not surprising that the firm's size affects the innovator's decision on the use of a specific informal appropriation instrument. According to Arundel (2001), small firms deem secrecy more effective than large firms. The author explains this referring to the fact that small firms may suffer from the lack of financial resources necessary for formal protection of their inventions. In the case of process innovation Cohen et al. (2000) suggest that secrecy is much more important than lead time, since it is easier to keep a new process secret than a new product.

Table 1 summarises empirical studies on the perceived effectiveness of different appropriability mechanisms. The results of these studies show that the most relevant appropriability devices are informal ones. The fact that patent is not regarded as the most effective method for protecting innovations does not mean that the patent intensity has decreased. According to Blind et al. (2006), since the mid 1990s, a massive increase in the European and international patent applications has been observed. One of the explanations for the patent intensity increase is the fact that firms treat patent not only as a mean to protect innovation, but also as an instrument for achieving various strategic objectives, i.e. patent blocking, licensing, etc.

Interpreting the results of studies on the perceived effectiveness of different appropriability mechanisms it should be noted that they rarely address the issue of the interaction among different appropriability mechanisms. Although a few papers suggest that some of protection mechanisms may be positively associated (López 2009), this issue deserves further attention. It is worth mentioning that the simultaneous use of different mechanisms is probable in the case of some IPRs. For example, legislation allows innovator to use patent and trademark for a given innovation at the same time. On the other hand, it is not possible to obtain both patent and utility model for the same invention. With regard to informal mechanisms they may be employed at different stage of innovation process. For instance, innovators may use secrecy at a development phase of a new product or process and employ lead-time strategy at a commercialization phase.

Table 1 Results of studies on the perceived effectiveness of different appropriability mechanisms

Author(s)	Sample	Main findings
Levin et al. (1987)	US manufacturing firms	Secrecy, lead times or complementary sales, services and manufacturing facilities are more valued than patents in most sectors
Sattler (2002)	German industrial firms	The ranking of effectiveness is as follows: long-term employment relationships, lead time, design complexity, secrecy, patents and design registrations
Neuhausler (2012)	German manufacturing firms	A large share of firms evaluates informal appropriation methods as being highly important, while formal instruments are of low importance
González-Álvarez and Nieto-Antolín (2007)	Spanish manufacturing firms	The ranking of mechanisms that were mostly used is as follows: lead time, complexity of innovation (time and cost for imitation), secrecy and patents
Hurmelinna and Puumalainen (2007)	Finnish R&D performing manufacturing firms	The ranking of effectiveness is as follows: lead time, technical/practical means, tacitness, contracts, IPRs, labor legislation and human resource management
Mairesse and Mohnen (2004)	French manufacturing and service firms	The most widely used appropriation methods in the service sector are: trademarks, complexity, lead time, patents along with secrecy

All prior presented arguments allow for putting forward the following research questions:

1. How do innovative firms perceive the effectiveness of appropriation mechanisms?
2. What are the relationships among appropriation mechanisms?
3. What are the factors that affect the choice and effectiveness of an appropriation strategy?

3 Data and Methods

The study uses anonymized micro-data from the survey of innovation activities of Polish manufacturing enterprises in the years 2010–2012. The data were provided by the Statistical Office in Szczecin. The enterprises were selected on the basis of the Polish Classification of Activities which is consistent with the statistical classification of economic activities in the European Community (NACE Rev. 2). The types of questions used in this survey were based on the Community Innovation Survey—CIS. The sample of innovation active firms used in this analysis includes 2960 entities that were engaged in developing and/or implementing a product or process innovation in the years 2010–2012.

To assess the perceived effectiveness of appropriation mechanisms, means of firms' responses to the question about the effectiveness of patents, industrial

designs, copyrights, trademarks, lead time, complexity of products and processes and trade secret for increasing the competitiveness of product and process innovations were calculated. Each firm was asked to indicate on a 1–4 scale the effectiveness of each appropriation mechanism (where 4-not used, 3-low, 2-medium, 1-high).

In order to identify the relationships among different appropriability mechanisms a principal component analysis (PCA) was employed. The PCA is a statistical technique used for data reduction while keeping as much of the original variance as possible. In this technique, the eigen or spectral decomposition of the covariance or correlation matrix of the variables leads to the extraction of a set of principal components (uncorrelated linear combinations of the variables).

4 Results and Discussion

Table 2 presents the ranking of the effectiveness of different appropriability mechanisms in the sample firms. The results show that the Polish manufacturing firms perceived complexity as the highest effective instrument of innovation appropriation. This confirms the arguments that firms may be better able to protect their innovations if they introduce complex products and processes that competitors cannot imitate. In such situation even if the piece of information became accessible to rivals, its use would require the access to the other details on new products or processes. According to the ranking the second most effective mechanism is lead time. This mechanism appears as the most valuable in many empirical studies (see Table 1). The lead time strategy may be effective, since the process of an imitation of new products and processes takes time. The length of lead time depends primary on the nature of innovation. For example, it would be easier to imitate a new delivery process than a new complex manufacturing process. It is interesting to see that the four formal appropriation mechanisms, i.e. patents, industrial designs, copyrights and trademarks, take the last positions in the ranking. The possible explanation of this fact is that the use of formal methods is relatively expensive and there may be a problem with defending IPRs in courts. Moreover, the eligibility requirements for some IPRs may be difficult to attain.

Table 2 Perceived effectiveness of appropriation mechanisms

Appropriation mechanism	Rank
Patents	5
Industrial designs	6
Copyrights	7
Trademarks	4
Lead time	2
Complexity	1
Trade secret	3

Table 3 PCA results

	Principal components	
Appropriation mechanism	1	2
Patents	0.50	−0.02
Industrial designs	0.54	−0.04
Copyrights	0.50	0.03
Trademarks	0.45	0.06
Lead time	−0.03	0.60
Complexity	−0.06	0.63
Trade secret	0.01	0.49

Table 4 Use and effectiveness of appropriation strategies

	Appropriation strategy	
Determinants of appropriation strategy	Formal	Informal
Firm's size		
Small	0.24	0.08
Medium	0.10	0.09
Large	−0.35	−0.24
Innovation type		
Product	−0.02	0.14
Process	0.43	0.49
Product and process	−0.25	−0.41
Sector		
Low technology	0.03	0.15
Medium-low technology	0.08	0.00
High and medium-high technology	−0.10	−0.13

Table 3 contains the results of the PCA analysis with the varimax rotation. There are the first two components with eigenvalues higher than one. The findings show that the first component is strongly correlated with the formal mechanisms (i.e. patents, industrial designs, copyrights and trademarks). This suggests that formal methods vary together. If the effectiveness of one method increases, then the remaining ones tend to as well. As such, this component can be viewed as a measure of the formal appropriation strategy. The second principal component increases with only informal mechanisms (lead time, complexity, trade secrets). So, this component may be regarded as a proxy of the use and effectiveness of the informal appropriation strategy.

In order to measure the use and effectiveness of the identified appropriation strategies the scores of the two components were computed. Table 4 shows how the firm's size, the innovation type and the sector that firms operate in affect the choice of the particular appropriation strategy.

As can be noticed, the use and effectiveness of the formal appropriation strategy increased with the firm's size. This finding is intuitively understandable, since the use of formal instruments of appropriation requires the intensive engagement of

financial and human resources. With regard to the innovation type, the results reveal that the formal and informal appropriation strategies were perceived as being the most effective in the group of product and process innovators.

Finally, it appears that firms operating in high and medium-high technology sectors were more effective in employing the formal and informal appropriation strategies than low and medium low technology firms. When considering the fact that low-tech firms are supposed to have no or low R&D expenditures, the appropriation mechanisms within the formal appropriation strategy employed by these firms probably pertained to trademarks and industrial designs. These IPRs are often used in low-tech industries, since there is the prevalence of a competition pattern more based on product differentiation than on radical innovations.

5 Conclusion

In this paper, there is presented a theoretical framework for the use of various methods to protect innovation. These methods can be divided into two groups: formal methods and informal methods. According to the literature review, firms face with a fundamental dilemma, which of appropriation mechanisms should be employed to gain benefits from innovation. The answer to this question is provided by the results of empirical research. The study is based on the large sample of Polish manufacturing firms.

The findings of the study suggest that the sample firms preferred informal appropriation methods to formal ones. As revealed, complexity and lead time were deemed to be the most effective protection mechanisms. In turn, copyrights and industrial designs ranked very low. What is interesting, formal methods were strongly correlated and varied together. A similar situation holds for informal methods. The factors that affected the choice and effectiveness of the appropriation strategy were the firm's size, the type of innovation and the sector to which firms belonged.

Finally, the limitations of this paper should be mentioned. According to the methodology of the Community Innovation Survey, it is not possible to link the use and effectiveness of each appropriability method to specific innovations. Moreover, the effectiveness of appropriability methods in the CIS is measured on an ordinal scale. This could lead to a distorted picture when trying to assess the effectiveness of the particular protection instrument. In order to overcome these limitations future research should focus on the purpose of the use of each appropriation method. In addition, other indicators for the effectiveness of using appropriation mechanisms should be employed.

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Interdependence Between Value Drivers and Value Migration Processes: Evidence from Warsaw Stock Exchange

Michał J. Kowalski and Łukasz Biliński

Abstract The impact of enterprise value drivers on value migration processes has not been subjected to extensive and detailed empirical analysis, though the literature strongly indicates connections between them. The article presents the relationships between value migration phases and value drivers, using financial data for the Polish capital market in the years 2001–2014. The aim of the article is to verify whether changes in value drivers are behind value migration processes. The paper shows that companies located in different value migration phases have different value levels of value drivers and that value migration processes are accompanied by changes in the companies' value factors. Companies' transition from build-to-destroy or destroy-to-build value migration phases are accompanied by a significant change in value drivers, such as sales dynamics, profitability and fixed assets profitability.

Keywords Determinants of value based growth • Value drivers • Enterprise value • Value migration

1 Present State of Knowledge and Research Hypothesis

1.1 Enterprise Value and Value Drivers

The first definition of a value market and factors which should be taken into the valuation of a company was provided by Modigliani and Miller (1959). Published in 1961, *Dividend Policy, Growth and the Valuation* was among the first texts to describe the role of cash flows. In 1964, William Sharpe provided a convincing explanation related to the valuation of securities in times of financial uncertainty. The theory developed by Sharpe became the foundation of modern finance, especially in portfolio management, which includes value and value drivers as parent categories for achieving investment objectives (Ellis and Vertin 1989). In 1976,

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Roger Ibbotson and Rex Sinquefield tried to demonstrate the superiority of shares over other securities as long-term investments.

Important references regarding the concept of value and value drivers are courtesy of Shannon Pratt, Valuing a Business (1981), and Ray Miles (1984). For the first time, authors presented an innovative approach in the field of portfolio analyses (construction of portfolios of business), which in the following years became the inspiration for one of the greatest creators of the concept of value based management and value for shareholders, Alfred Rappaport.

The value drivers model created by Rappaport (1986) indicates seven factors affecting the enterprise value (seven drivers of shareholder value): sales growth, operating profit margin, incremental fixed capital investment, incremental working capital investment, cash tax rate, cost of capital and value growth duration.

Earlier, Rappaport's factor consideration showed the complexity of the decision-making process concerning the creation and growth of the company. To consciously estimate the potential of the business and its impact on the company's value requires appropriate analytical tools. Rappaport introduced the concept of the threshold margin[1] and the additional threshold margin (Rappaport 1986), suitable both for current valuation and future financial company performance. An extension of this definition is that the operating profit margin is the minimum rate of return achieved during the activity. The development threshold margin was presented by Dudycz, who proposed corrections to Rappaport's formulas "ahead of investments compared to those obtained with the cash flows" (Dudycz 2005). Balachandran et al. (1986) examine three market situations. The first model applies to the overall development and growth of the company, the second considers the effect of inflation, and the third considers price fluctuations that affect the whole process of creating shareholder value. Modification considerations presented by Rappaport, Dudycz and Balachandran about threshold margin led to Kowalski's concept based on the minimum value creation rate (Kowalski and Świderski 2012).

The Rappaport model has been modified many times and verified by other researchers. It has also become a framework for academic discussion about value drivers. Mills and Print (1995), Akalu (2002), Losbichler et al. (2008) and Tallau (2009) have used the shareholder value method of business valuation founded by Rappaport to build subsequent approaches. Kazlauskienė and Christauskas (2008) developed value drivers' selection into three groups: operational, investment and financial. In 2001, Scarlet added a fourth category, intangible drivers, to complement Rappaport's concept.

Kaplan and Norton (1996), like previous economists, developed the value drivers concept based on general categories. They divided them into financial, purchasers, internal and innovations. Ittner and Larcker (2001) included much more detailed value drivers classification, divided into financial, purchasers, employees, operational, quality, alliances, supply, environment, innovations and

[1]Threshold margin is defined as a minimum operating profit margin which a company must achieve in any period to preserve shareholder value during this period (Rappaport 1986).

society. In literature, there are also references to nonfinancial value drivers, which can create company value. An example is research by Lev (2001), which showed this relationship. Nonfinancial drivers such as patents, copyrights and other forms of intellectual property can also be identified with building value and the value based management concept.

Damodaran (1999) depended on enterprise value, calculated by DCF technique, on free operational cash, cost of equity and cost of debt. Like Rappaport, he developed a model based on value drivers. According to his convictions, operational decisions directly affect the amount of free cash in the company, and expected revenues in the growth period create value. Black, Wright and Bachman divided value drivers into three categories: financial, operational and strategic (Black et al. 2000). Similar classification was presented by Ross, Westerfield and Jordan. Their approach has been enhanced by classified assets into balance assets and those that are not included in the balance sheet (Ross et al. 1999).

Some research studies show value drivers to be based on strategy choice. Slee (2004) points to two very important factors which can have a direct impact on value and which can be useful in selling a business unit: access to capital and liquidity of the market. Marks, Robbins, Fernandez and Funkhouser indicated that the availability of capital from a supply and demand perspective can affect the creation of value (Marks et al. 2005). They suggested that finding a real financial strategy is to find a way for the company to self-finance. The same factor was highlighted by Hawawini and Viallet (1998), who analysed SBU's capacity for self-sustainable growth; in their matrix of financial strategy, they introduce the self-sustainable growth rate (SGR), by means of which they determine the financial feasibility of the strategy.

The conditions surrounding the functioning of the modern economy and the ongoing changes in the financial environment mean that the development of enterprises depends on different management processes. Increasingly, the main strategic objective of multi-business becomes the maximizing of value in the long-term period. The above literature review proves that the company's value depends on many different factors. Effective value increase is possible only when it is known what determines the value. The literature does not indicate a uniform classification of value drivers. Current knowledge and research relating to the influence of value drivers on the company's value, as well as their classification, show gaps and a need to conduct detailed additional research in this area. The contemporary business environment presents opinions in this field. As Kazlauskienė and Christauskas (2008) noted, the aspect of establishing the impact of value drivers on business value is complex, little investigated and demands more detailed research. Additionally, Pratt et al. (1998) commented on the general lack of empirical study documenting the factors that affect the private valuation of companies.

1.2 Value Migration Processes, Value Migration Phases and Measures of Value Migration

Strategy formulation is one of the most significant processes used in different management fields. Properly developed and implemented in accordance with key strategic objectives, it creates additional company value. On the other hand, incorrectly formulated, it induces value depreciation. The currently available literature underlines the importance of value migration Billington (1997), Donol (1997), Griffiths (1997), Slywotzky and Linthicum (1997), Baptista (1999), Brabazon (1999), Siudak (2000, 2013a, b, c), Strikwerda et al. (2000), Campbell (2001), Moser and Moukanas (2001), Herman and Szablewski (1999), Sharma et al. (2001), Klincewicz (2005), Owen and Griffiths (2006), Slywotzky et al. (2006), Wiatr (2006), Woodard (2006), Szablewski (2008, 2009), Woźniak-Sobczak (2011), Jabłoński and Jabłoński (2013), Skowron (2014).

The concept of value migration is not very often described. Only a few authors state its definition. The situation when a company's value decreases is called a value migration process (Slywotzki et al. 1999). It can be defined as a situation when risk and the resulting cost of capital are higher than a company's financial results. It means that the business unit becomes unprofitable for investors. Moreover, decreasing enterprise value follows. Capital which was invested is relocated to other business units which are more attractive and which give the chance of creating stronger market positions. According to Slywotzki (1996), the value migration process gives directions for creating shareholder value.

According to Brabazon (1999), the value migration process is the flow of opportunity to growth, making a profit and increasing shareholder value added from one company or sector to other. Based on this, it is hard to say, using financial terms, how should we measure the flow of opportunity. Phillips (2012) defined value migration as shareholder assets return on profits, which moves between business units of low attractiveness for investors (value outflow) to companies with the highest growth potential (value inflow) and with the highest possible return. Siudak (2000) pointed out effectiveness allocation as the result of value migration and understood value migration as a process based on outflow of the amount of value from one businesses to another as the result of searching for effective possibilities of capital allocation. According to Siudak (2013a, b, c), value migration means the flow of value between companies as the result of searching for effective business models which can create shareholder value, including the highest returns and the lowest risk.

To measure and analyse the value migration process, Slywotzki (1996) proposed a three-phase model, the main idea of which was to classify an enterprise into one of three phases: outflow value, inflow value and value stability. His concept was developed by Siudak and his linear ordering method based on calculating synthetic variables, the Synthetic Index of Valuation (Siudak 2013a, b, c), which enables quantitative classification of sectors and companies for the phases specified. Proposed measures are based on measuring the market value added (MVA).

The index construction proposed by Siudak (2013a, b, c) is based on three diagnostic variables: share in the migration balance of the economy, share in the

sector's migration balance, and change of market value added to market capitalization. In the context of factors determining the value of enterprises and sectors as well as the value migration, they can be identified with value drivers.

One of the characteristic features of the migration phenomenon is its instability, which perfectly illustrates the search for the most effective investment opportunities. Our sectoral analysis in the years 2010–2014 for the Polish capital market has shown that the value migration to Main Market and NewConnect demonstrates a strong fluctuation of enterprises and sectors between the outflow, stabilization and inflow (Kowalski and Biliński 2016). Our research has also shown that the process of value migration is unstable in 2010–2014, thus confirming the thesis put forward by Siudak. His research covered the period from 2003 to 2006.

In the growing body of literature devoted to the migration phenomenon, only a few alternative tools for measuring value migration are mentioned, such as cumulative value migration balance (Siudak 2016), first common factor method (Panfil and Szablewskiego 2005), relative level development factor (Walesiak 2011) and generalized distance method (Walesiak 2011). However, there is a strong need to develop areas connected with value migration processes, especially in the present time of dynamically changing economy and capital market conditions. In the literature review, many authors pointed out the importance of this phenomenon and highlighted the lack of knowledge on this matter.

1.3 Research Hypothesis

The aim of the paper is to verify the belief that a change in value drivers causes a change in the valuation of the company, which will be reflected in its perception on the capital market. Changing value drivers bring about a value migration process. Based on the above discussion, we formulate the following two hypotheses:

- H1: Companies located in different value migration phases have different value levels of value drivers.
- H2: Value migration processes are accompanied by a change in the company's value factors. The company's transition from one migration phase to another is accompanied by a significant change in the value of value drivers.

2 Empirical Data and Research Findings

2.1 Description of Database Structure

Empirical research was conducted on companies listed on the Warsaw Stock Exchange. The research sample includes companies listed on Main Market and on NewConnect. We used the companies' financial statements (singular and

consolidated) published at the end of the year for the years 2001–2014 as the initial research material.

Firstly, we separated companies with complete and standardized financial statements. Then, based on the data available on the Warsaw Stock Exchange and the data published on Damodaran's science web site, we classified the companies into 29 separate economic sectors. To investigate the process of value migration on the Polish capital market and the allocation of companies to one of the three migration phases, we used the linear ordering method proposed by Siudak (2013a, b, c). Additionally, we used the proposed modification (Kowalski and Biliński 2016). To classify companies and sectors to value migration phases, we identified three diagnostic variables that were normalized and then used to calculate the synthetic variable. We extracted the input data, including revenues from sales, depreciation, inventories, trade receivable, net profit/loss, operating profit/loss, trade payables, employee benefits, current tax liabilities, accruals, property, plant and equipment, intangible assets, current assets, equity shareholders of the parent, assets, current liabilities, non-current liabilities, and market capitalization (MCAP). Based on input data, we calculated the following financial measures. In the last step, we assigned the appropriate quartile to each variable and we excluded extreme values that did not match the following procedure using the method of variance between quintiles.

In the final stage, we built two matrices, both containing 324,032 research observations, which were used in statistic research tests.

2.2 Research Procedure

In our study, we analysed migration phases based on the model by Siudak (2013a, b, c). Firstly, we calculated the synthetic index of value migration for each company in a sample and assigned companies into three migration phases: destroy (D), stability (S) and build (B). We classified companies separately for each year using Siudak's approach. The Siudak method is based on market value added, and therefore we also analysed the following measurers: MVA, dMVA, MVA/IC. According to the measures, we classified companies into quartiles for each year.

To verify hypothesis one, we collected financial data for each company and calculated the financial ratio and value drivers. Than we analysed the value of ratio and drivers in each value migration phase and each quartile for assumed MVA measures. For detailed investigation, we chose six value drivers: sales dynamics Y/Y (dSales), return on equity (ROE), return on assets (ROA), return on sales (ROS), cash conversion cycle (CCC) and fixed assets productivity (FAP). Detailed formulas used to calculate these drivers are mentioned in Table 1.

We checked if the chosen drivers differed for companies in different value migration phases. We used a parametric one-way ANOVA and non-parametric Kruskal-Wallis test to investigate differences in value drivers between phases and

Table 1 Variable definitions

Variable	Definition
ROS	Return on sales defined as profit/loss on operating activities divided by net revenue from sales
ROA (TTM)	Return on assets defined as income after taxes for the trailing 12 months (TTM) divided by the average total assets (total assets for the five most recent quarters and divided by five)
ROE (TTM)	Return on equity defined as net income for the trailing 12 months (TTM) divided by shareholders' equity calculated as the difference between total assets and total liabilities
CCC	Cash conversion cycle defined as a difference between sum of days sales of inventory (DSI), days sales outstanding (DSO) and payable turnover (PT)
FAP	Fixed assets productivity defined as sum of property plant and equipment and intangible assets divided by revenue from sales
dSales (Y/Y)	Sales dynamic year by year defined as relationship between sales dynamic in year n and n−1
dSales (3Y)	Sales dynamic for 3 years calculated by using compound annual growth rate (CAGR)
MVA	Market value added defined as number of company's shares multiply by price per share
dMVA	Delta market value added defined as difference between MVA in t period and MVA in t−1
CR	Current ratio defined as sum of current liabilities and non-current liabilities divided by assets
D/E	Debt to equity ratio calculated by dividing company's total liabilities by its stockholders' equity
MVA/IC	Market value added divided by invested capital calculated as a sum of fixed assets and net working capital

quartiles; then we used range tests, a parametric Tukey's test, and post-hoc test for the Kruskal-Wallis test to compare the average value drivers in each group.

To verify hypothesis two, we analysed changes in value drivers during companies' movement from build-to-destroy (BtD) and destroy-to-build (DtB) value phases. We assumed that the BtD process takes place when the company is classified first in the build value phase for a minimum of two consecutive years and then to the destroy value phase, also for another minimum 2 years. The DtB process takes place when the opposite situation is observed. Considering MVA, dMVA, MVA/IC and dMVA/IC, we assumed that migration processes occur when companies change classification between extreme quartiles—i.e. the first and the fourth. We singled out from our sample those companies for which BtD and DtB processes occur. Next, we compared the change of value drivers during value migration processes to the average annual change of drivers for the whole sample.

To investigate the change, we use a measure defined as $\frac{x_{t-1}-x_t}{|x_t|}$, where x_t is a value driver in year t and x_{t-1} is a value driver in the previous year. We used the absolute value in the denominator to adjust the formula to be consistent with the common sense interpretation, because we had to deal with negative numbers in several cases.

To verify the statistical significance of the obtained results, we used the same procedure as in hypothesis one—i.e. a parametric one-way ANOVA and non-parametric Kruskal-Wallis and range tests, a Tukey's test, and post-hoc test for the Kruskal-Wallis.

3 The Interdependence Between Value Drivers and Value Migration Processes

3.1 Value Migration Phases and Value Drivers

In Table 2, we present financial ratios for companies classified into value migration phases and quartiles of value migration measures. Both Siudak's approach and MVA measures classified large companies with high values of sales, earnings and assets into extreme phases (D and B, as well as the first and the fourth quartile). In the case of the relative measure (MVA/IC), the distribution of the scale of business moves closer to discrete. The delta market value added for companies in the destroy phase (D) is negative, which is consistent with Siudak's model.

It is worth mentioning that relationships between the measure of value migration and sales dynamics, and measure of value migration and profitability are visible. Both year to year and 3 years' sales dynamics increase when the value migration measures raise. The same relationship is observed for return on equity and return on assets. These measures of profitability increase in subsequent phases and quartiles. Admittedly, return on sales in D phase is higher than in S phase, but a positive relationship between ROS and MVA, and ROS and dMVA can be observed. The introductory observations do not indicate interdependence between value migration measures and CCC, FAP and liquidity or leverage. However, a decrease in CCC with growth of MVA/IC is noticeable.

To confirm statistical significance, we conducted tests, including range tests. Results are presented in Tables 3, 4, 5, and 6 for Siudak's value migration phases, quartiles of MVA, quartiles of MVA, and quartiles of dMVA/IC, respectively.

In Table 3, the increase in Siudak's synthetic index of value migration is connected to the rise in both sales and profitability. With the movement to the consecutive phase, growth in sales dynamics, ROE and ROA is observed. The range tests confirm that sales dynamics and profitability achieved by companies in the build value phase are higher than in the destroy value phase. However, for profitability ratios, the differences between the destroy and stability phases are small and statistically insignificant. This may indicate that other finance or non-finance drivers cause the outflow of value and assign companies to destroy value phases. It is worth noting that companies in D phase obtain quite similar characteristics compared to companies in B phase considering ROS, CCC in days and FAP. Both groups (D and B) obtain higher return on sales and higher efficiency in managing working capital and fixed assets. Based on these drivers, we can assume that

Table 2 Value drivers and financial ratio in value migration phase

	Value migration phase			MVA				dMVA				MVA/IC			
Value drivers mean	D	S	B	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Sales [mPLN]	3138	367	1977	2171	205	379	3091	3181	322	335	2016	1746	1664	1622	852
EBIT [mPLN]	275	19	215	129	9	24	364	277	18	17	214	87	146	201	96
Net Profit/Loss [mPLN]	205	12	163	98	6	18	270	207	12	11	162	73	107	147	68
Assets [mPLN]	3884	279	2039	2368	148	296	3669	3941	257	248	2045	1702	2044	1965	819
MCap [mPLN]	2228	177	1788	962	78	207	3113	2254	147	184	1784	674	1172	1427	1119
MVA [mPLN]	317	53	765	−336	10	73	1430	316	27	71	767	−235	116	517	788
dMVA [mPLN]	−492	2	391	−130	−9	1	34	−485	−27	19	387	−70	−104	0	68
Sales Dynamic Y/Y [n/d]	1.09	1.12	1.16	1.09	1.11	1.14	1.15	1.09	1.12	1.12	1.16	1.08	1.10	1.12	1.19
Sales Dynamic 3Y [n/d]	1.13	1.13	1.16	1.09	1.12	1.17	1.17	1.12	1.13	1.14	1.17	1.08	1.12	1.15	1.20
ROS [%]	8.5	7.0	9.8	6.6	6.6	8.1	10.8	8.4	6.9	7.2	9.8	6.1	7.6	8.5	10.0
ROE (TTM) [%]	10.1	10.2	14.7	6.1	9.8	13.8	15.4	9.3	10.1	11.1	14.6	6.0	9.2	12.0	18.1
ROA (TTM) [%]	5.1	5.2	7.6	3.4	5.0	7.1	7.7	4.7	5.0	5.8	7.5	3.3	4.6	6.0	9.3
CCC [days]	56	70	56	67	64	62	60	62	70	62	58	72	72	64	45
FAP [n/d]	13.80	11.48	14.15	13.04	14.02	15.95	7.86	10.04	15.22	12.17	13.42	12.70	9.80	12.24	15.95
CR [n/d]	1.90	2.18	1.96	1.81	2.10	2.47	1.84	1.81	1.96	2.44	2.01	1.85	1.94	1.92	2.50
D/E [n/d]	1.17	1.10	1.10	0.97	1.10	1.14	1.26	1.17	1.11	1.06	1.13	0.93	1.21	1.20	1.15

Table presents means for financial ratio in whole sample. The units in which drivers are presented are listed in column one. Financial data are presented in millions Polish zloty [mPLN]; n/d means that the unit of ratio is not determined. The value migration phase column concerns Siudak's model, with destroy (D), stability (S) and build (B) migration phases. Q1, Q2, Q3 and Q4 indicate companies in quartiles of measure MVA, MVA/IC and dMVA/IC

Table 3 Value drivers in migration phases according to Siudak's model

	dSales [n/d]		ROE [%]		ROA [%]		ROS [%]		CCC [n/d]		FAP [n/d]	
Phase	AVG	Me	AVG	Me	AVG	Me	AVG	Me	AVG	Me	AVG	Me
Panel A: Value drivers												
D	1.09	1.06	10.06	8.00	5.11	4.06	8.52	5.75	56.39	40.71	13.80	3.21
S	1.12	1.09	10.20	8.09	5.21	3.99	6.96	5.01	69.51	52.77	11.48	3.85
B	1.16	1.13	14.66	12.76	7.55	6.30	9.82	8.42	56.47	42.02	14.15	3.36
Total	1.12	1.09	0.11	0.09	0.06	0.04	0.08	0.06	63.04	46.87	12.72	3.53
Panel B: Range tests for migration phases												
F	10.39***		37.51***		40.43***		38.15***		4.62***		0.48	
K-W	32.80***		83.88***		86.03***		82.47***		22.17***		26.17***	
D vs B	***/***		***/***		***/***		***/***		/		/	
D vs S	***/*		/		/		***/***		***/***		/*	
S vs B	***/***		***/***		***/***		***/***		***/***		/*	

Panel A presents means (AVG) and medians (Me) for value drivers. Companies are grouped according to phases based on Siudak's model—i.e. destroy (D), stability (S) and build (B). The one-way ANOVA and Kruskal-Wallis tests (K-W test) were used to compare results. (*), (**) and (***) indicate that the differences are significant at 10%, 5% and 1% levels of significance, respectively. Panel B presents the results of range tests. Value drivers for each phase pair are compared. The results of post-hoc Tukey's test (the first indicator before the slash) and non-parametric Kruskal-Wallis test (the second indicator after the slash) are presented. Statistical significance is identified by (*), (**) and (***) in the same way

Table 4 Value drivers in quartiles of MVA

	dSales [n/d]		ROE [%]		ROA [%]		ROS [%]		CCC [n/d]		FAP [n/d]	
Phase	AVG	Me	AVG	Me	AVG	Me	AVG	Me	AVG	Me	AVG	Me
Panel A: MVA												
Q1	1.09	1.05	6.07	5.17	3.36	2.87	6.65	4.75	66.56	55.26	13.04	2.98
Q2	1.11	1.08	9.81	7.68	4.96	3.79	6.60	4.57	64.09	48.70	14.02	3.88
Q3	1.14	1.11	14.84	12.08	7.06	5.91	8.14	6.37	62.05	45.75	15.95	4.15
Q4	1.15	1.12	15.42	14.12	7.69	6.70	10.83	9.10	59.62	40.67	7.86	3.14
Panel B: Range tests for quartiles of MVA												
F	8.67***		95.32***		80.35***		54.09***		0.46***		1.86***	
K-W	37.67***		344.13***		264.11***		162.47***		20.29***		53.21***	
Q1 vs Q2	/*		***/***		***/***		/		/		/***	
Q1 vs Q3	***/***		***/***		***/***		***/***		/		/***	
Q1 vs Q4	***/***		***/***		***/***		***/***		**/**		/	
Q2 vs Q3	/*		***/***		***/***		***/***		/		/	
Q2 vs Q4	**/**		***/***		***/***		***/***		/**		/***	
Q3 vs Q4	/		**/**		/		***/***		/		/***	

Explanations of abbreviations, data and structure of the chart as in Table 3. Companies are grouped into quartiles of MVA

Table 5 Value drivers in quartiles of dMVA

	dSales [n/d]		ROE [%]		ROA [%]		ROS [%]		CCC [n/d]		FAP [n/d]	
Phase	AVG	Me	AVG	Me	AVG	Me	AVG	Me	AVG	Me	AVG	Me
Panel A: dMVA												
Q1	1.09	1.06	9.34	7.35	4.68	3.65	8.35	5.59	61.62	42.19	10.04	2.88
Q2	1.12	1.08	10.06	7.88	5.03	3.77	6.87	4.99	69.91	53.89	15.22	3.88
Q3	1.12	1.10	11.09	9.66	5.79	4.66	7.16	5.28	62.38	48.88	12.17	3.90
Q4	1.16	1.13	14.56	12.78	7.53	6.21	9.84	8.15	58.23	42.22	13.42	3.39
Panel B: Range tests for quartiles of dMVA												
F	8.90***		26.69***		31.21***		24.25***		1.32		0.72	
K-W	43.61***		94.73***		93.96***		67.81***		11.00**		38.25***	
Q1 vs Q2	/*		/		/		/*		/		/***	
Q1 vs Q3	/***		**/***		***/***		/		/		/***	
Q1 vs Q4	***/***		***/***		***/***		***/***		/		/**	
Q2 vs Q3	/		/		/**		/		/		/	
Q2 vs Q4	***/***		***/***		***/***		***/***		/**		/*	
Q3 vs Q4	***/***		***/***		***/***		***/***		/		/	

Explanations of abbreviations, data and structure of the chart as in Table 3. Companies are grouped into quartiles of delta MVA

Table 6 Value drivers in quartiles of MVA/IC

	dSales [n/d]		ROE [%]		ROA [%]		ROS [%]		CCC [n/d]		FAP [n/d]	
Phase	AVG	Me	AVG	Me	AVG	Me	AVG	Me	AVG	Me	AVG	Me
Panel A: MVA/IC												
Q1	1.08	1.05	5.96	4.86	3.28	2.70	6.10	4.36	72.25	61.38	12.70	3.20
Q2	1.10	1.07	9.22	7.98	4.56	3.92	7.59	5.41	71.62	48.21	9.80	3.33
Q3	1.12	1.10	11.99	10.99	5.95	5.09	8.46	6.22	63.72	44.58	12.24	3.64
Q4	1.19	1.15	18.06	17.92	9.31	8.83	10.01	8.30	45.45	36.58	15.95	4.05
Panel B: Range tests for quartiles of MVA/IC												
F	18.54***		148.43***		145.55***		36.23***		8.61***		1.00	
K-W	57.65***		446.12***		380.32***		127.39***		53.91***		33.96***	
Q1 vs Q2	/		***/***		***/***		*/***		/		/	
Q1 vs Q3	/***		***/***		***/***		***/***		***/***		/	
Q1 vs Q4	***/***		***/***		***/***		***/***		***/***		/***	
Q2 vs Q3	/*		***/***		***/***		**/		/		/	
Q2 vs Q4	***/***		***/***		***/***		***/***		***/***		/***	
Q3 vs Q4	***/***		***/***		***/***		***/***		/*		/**	

Explanations of abbreviations, data and structure of the chart as in Table 3. Companies are grouped into quartiles of MVA/IC

companies in D and B phases realize quite similar business models, but another drivers, financial or non-financial, may cause diverse value creation position.

The interdependence between sales dynamics, profitability and measures based on MVA is visible and strong. As indicated in Tables 3–6, sales dynamics, ROE, ROA and ROS rise in subsequent phases. A slight departure from this rule is observed only for ROS, which is smaller in the second than in the first quartile for MVA and delta MVA.

Range tests confirm that profitability and growth rate strongly determine measures of value migration based on MVA. In the case of CCC, a weak negative relationship with MVA measures is observed. For higher MVA measures, the cash conversion cycles in days decreases. Shorter working capital cycles stand for more operational efficiency and value creation potential. However, this dependence is not strong, it is shown by Kruskal-Wallis tests, but the F-statistic does not confirm its significance. Fixed assets productivity does not identify an explicit relationship with MVA measures.

3.2 Change in Value Migration Phases and Value Drivers

In Table 7 we present how the value drivers change when migration processes occur. As we can see in Panel A of Table 7, if a BtD process takes place, a relevant decrease in sales dynamics is observed. Next, the DtB process accompanies a rise in the sales dynamics index. Sales dynamics observed for companies during both value migration processes significantly differs from the average year change in the whole sample. Therefore, one can assume that the change in sales strongly determines value migration processes.

Similar results are observed for the change of profitability during value migration processes. Panels B, C, and D indicate that an especially huge fall in profitability attends the BtD process. This rule is observed for return on equity, assets and sales for Siudak's model and each of the MVA measures. The t-statistic confirms that the change in profitability is significantly lower during the BtD process than the average in the whole sample and the DtB process. Therefore, impairing the performance seems to have significant influence on value migration processes in the direction of destroy value. When migration in the opposite direction is observed, companies obtain a positive change in profitability; however, tests do not confirm in all cases that differences between results for BtD and the average of whole sample are significant. Especially, the movement from the destroy to build phase does not accompany a positive change in return on sales. These results are consistent with the well-known DuPont's model and confirm that an improvement in the profit margin ratio is not sufficient to build value.

The results in panel E indicate that there is no clear relationship between value migration processes and change in CCC. There is no doubt that working capital efficiency affects value creation, but in the existing business model its significant change is difficult to implement and rarely occurs.

Table 7 Interdependence between change of value drivers and value migration processes

		Siudak's model	MVA	dMVA	MVA/IC
Panel A: Results for sales dynamics Y/Y					
A	Average change	−1.50			
B	From build to destroy phase	−16.73	−21.08	−10.41	−14.32
C	From destroy to build phase	19.43	13.08	4.59	11.43
t-statistic					
B vs C		−6.99***	−5.22***	−4.27***	−4.29***
B vs A		9.50***	6.54***	4.28***	5.45***
C vs A		−9.02***	−10.42***	−5.88***	−8.17***
Panel B: Results for ROE					
A	Average change	−0.73			
B	From build to destroy phase	−51.39	−54.77	−27.14	−48.32
C	From destroy to build phase	40.85	11.28	18.53	12.57
t-statistic					
B vs C		−5.88***	5.33***	−6.74***	−3.58***
B vs A		2.89***	0.75	2.27**	0.91
C vs A		−5.06***	−5.33***	−3.84***	−5.77***
Panel C: Results for ROA					
A	Average change	−6.02			
B	From build to destroy phase	−51.91	−51.66	−24.71	−33.97
C	From destroy to build phase	59.40	37.83	12.04	7.27
t-statistic					
B vs C		−7.00***	−4.94***	−5.10***	−3.89***
B vs A		5.00***	3.46***	2.28***	1.38
C vs A		−4.86***	−4.89***	−2.85***	−4.07***
Panel D: Results for ROS					
A	Average change	3.08			
B	From build to destroy phase	−31.73	−53.81	−14.37	−17.91
C	From destroy to build phase	19.76	4.84	0.98	4.20
t-statistic					
B vs C		−6.06***	−8.83***	−3.76***	−3.41***
B vs A		2.61***	0.31	−0.65	0.29
C vs A		−7.96***	−11.47***	−5.81***	−6.54***
Panel E: Results for CCC					
A	Average change	3.89			
B	From build to destroy phase	−15.68	−6.08	−3.55	−5.86
C	From destroy to build phase	−14.68	−6.76	−4.00	−7.59
t-statistic					
B vs C		0.07	0.08	0.07	0.22
B vs A		−1.96*	−1.10	−1.43	−1.68*
C vs A		−2.13**	−1.19	−1.28	−1.54

(continued)

Table 7 (continued)

		Siudak's model	MVA	dMVA	MVA/IC
Panel F: Results for FAP					
A	Average change	1.34			
B	From build to destroy phase	−12.81	−9.10	−12.61	−13.54
C	From destroy to build phase	8.09	3.44	10.96	30.17
t-statistic					
B vs C		−2.29**	−1.33	−6.25***	−3.61***
B vs A		5.01***	3.54***	4.55***	5.64***
C vs A		−1.97**	−0.64	−3.97***	−6.53***

Table presents the change of value drivers for (A) average annual change in the whole sample, (B) BtD value migration process and (C) DtB value migration process. The changes are presented in percentages. The results of t-statistics are presented for each pair of changes. (*), (**) and (***) indicate that the differences are significant at 10%, 5% and 1% levels of significance

Panel F indicates results for fixed assets productivity. The DtB process is related to improvement of FAP, whereas during the BtD process, FAP significantly falls. These results can be explained by the direct influence of change in sales on FAP.

4 Conclusion

Our studies prove that there are significant influences of financial value drivers on value migration processes on the Polish stock market.

Companies in build value phases are characterized by higher sales dynamics ratio and profitability compared to companies classified in the destroy value phase. Sales growth ratio and profitability strongly determine both Siudak's synthetic index of value migration and measures based on market value added. The relationship is especially observed for return on equity and return on assets.

However, for profitability ratios, there are weak differences between the destroy and stability phases which are statistically insignificant. Similarly, considering ROS, CCC in days and FAP, companies in destroy phase and those in build phase are characterized by higher return on sales and higher efficiency in managing working capital and fixed assets. These observations indicate that other financial drivers (risk, leverage) or non-financial drivers may influence value migration, especially outflow of the value and assigning companies to destroy value phases.

Both Siudak's approach and MVA measures classify large companies with high value of sales, earnings and assets into extreme phases (D and B, as well as the first and the fourth quartiles of MVA). Small and middle sized companies are mostly classified to the stable phase or to the middle quartiles of MVA and dMVA. These observations are worth further investigation in terms of measures' robustness against company size. In the case of relative measures—i.e. MVA/IC—the distribution of the scale of business moves closer to discrete.

The study indicates that processes of value migration are strongly determined by changes in value drivers. Movement from the build to destroy phase accompanies a

decrease in sales dynamics and a huge fall in profitability. This rule is observed for return on equity, assets and sales for both Siudak's model and each of the MVA measures. Value migration in the opposite direction relates to a rise in the sales dynamics index and a positive change in profitability; however, the tests do not confirm that the differences between the obtained results and the average of the whole sample are significant in all cases.

There is no clear relationship between value migration processes and change in CCC and FAP. However, a weak negative relationship between CCC and MVA measures is observed.

The research makes several contributions to knowledge. First of all, obtained results are important for research into value migration processes. The research confirms empirically the intuitive relationship between value drivers and value migration processes, and demonstrates that changes in value of value drivers are related to value inflow as well as value outflow processes. Similar studies using Siudak's value migration phases have not yet been conducted. Obtained results confirm the usefulness of SIMW (synthetic index of value migration) in the value migration analysis. They can be important in explaining the lifecycle of businesses and sectors. They may be also important to analyse the causes of phase changes in the lifecycle model. Due to the fact that findings mostly concern MV surplus over BV, the study also complements existing research on value drivers and what determines the market value of a company.

Our research has many potential practical applications. First of all, it may be useful for investment decision making and formulating investment strategies. Obtained results may be the starting point for researches aimed at identifying the signals of value changes on the capital market. This can be important for investors and managers in any decision making based on market value. In addition, the results of the study may be relevant in predicting the lifecycle of a business and making portfolio decisions regarding the involvement or withdrawal of capital in a business segment. The conducted study indicates directions for further analyses of the value migration processes. Research areas for further investigation may include:

- Exploring the impact of other value drivers, especially non-financial ones, on value migration processes. Companies' value and their valuation depend on their material and non-material resources, such as talented managers, effective advertising, highly evaluated corporate image, technological knowhow, strategic geographical location, favourable tax conditions and legal regulations (Martyniuk and Stańczak-Strumiłło 2012).
- Researching the relationship between drivers and the impact of drivers' changes on value migration processes. Our analysis focused on the impact of individual factors. We investigated the impact of sales dynamics and the efficiency of asset management independently. Additional conclusions could be provided by analysis of simultaneous changes in multiple drivers. The threshold margin concept assumes a change in company value by the influence of several different value drivers at the same time.
- Exploring companies' lifecycle; the transition between value migration phases and recognizing determinants behind the movement of companies and whole

sectors between value migration phases (destroy, stability, build) in terms of business lifecycles.

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Remodeling of FLIEM: The Cash Management in Polish Small and Medium Firms with Full Operating Cycle in Various Business Environments

Grzegorz Michalski, Małgorzata Rutkowska-Podołowska, and Adam Sulich

Abstract The Financial Liquidity Investment Efficiency Model (FLIEM) was presented and discussed by Michalski (Value-based working capital management: determining liquid asset levels in entrepreneurial environments. Palgrave Macmillan, 2014). Here the Cash Levels in Full Operating Cycle (CLFOC) is proposed as a FLIEM remodelling. Some external factors resulting from the economic situation surrounding the enterprise were pointed out in this paper. These factors interact with the operating cycle of the overall firm operational risk which is reflected in the level of cash held. These are so called environmental conditions we should take into account during considering a model of cash holdings in the full operating cycle firm. The aim of the study was to determine the rules governing the modern cash management in small and medium firms with a full operating cycle with a particular emphasis on environmental conditions influencing firms. At the core of the research hypothesis is the belief that the level of cash and cash management policies in the firm in an integrated manner with other elements resulting from the operating cycle, contribute to moderating the risk of the firm and it can be shown using empirical data from enterprises operating effectively in practical business.

Keywords Cash management • Operational risk • Business environments

1 Introduction

The business environment consists such factors as tax rate, cost of capital in the economy, and all other conditions which are faced by the firm, but rather these are a result of the decisions of others than decisions of the firm managing team

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(Michalski 2016a). Boileau and Moyen (2016) investigates the factors driving the unprecedented rise in corporate liquidity. Boileau and Moyen (2016) finds that an economy-wide reduction in the cost of holding liquidities and an increase in risk best explain the rise in cash holdings and the widespread use of credit lines (Boileau and Moyen 2016). Bates et al. (2009) finds that the average cash-to-assets ratio for U.S. full operating cycle entities more than doubles from 1980 to 2006 and that findings are in agreement with Cash Levels in Full Operating Cycle (CLFOC) model presented in that paper. Bates et al. (2009) claims that the economic importance of cash levels increase is that at the end of the sample period, and the average entity can retire all debt obligations with its cash holdings.

Lozano and Duran (2017) claims that the predominance of entities family control can influence cash holding policy and this is also part of our findings of a survey reported in this paper. Lozano and Duran (2017) outlines a way to model how family entities define their cash policy and in which they adjust their cash holding to an optimal level what was done also in CLFOC model reported here. Wu et al. (2017) suggests that Chinese multinational entities have more exploitation of cash because globalization, risk and that is in one accord with CLFOC model presented in that paper. Wu et al. (2017) shows that Chinese multinational corporations do not hold significantly more cash relative to domestic entities unless these multinationals heavily relay on the foreign sales and that is a similar result to result of a survey reported in that paper.

Chen and Yang (2017) examines whether and how democracy and the rule of law—two overarching country-level governance variables—influence corporate governance what is also in a field of CLFOC model presented in this paper. Chen and Yang (2017) points that cash holdings are a good channel for examining the quality of corporate governance and that demonstrates that agency costs are lower and interests of managers and shareholders are more aligned under such circumstances. In addition, the negative effect of debt issuance and dividend payment in cash is more pronounced when the level of democracy is higher or rule of law is stronger, suggesting that these two approaches become more effective in reducing agency costs and transitively cash holdings influence by reducing agency costs what also is backed by survey results of this paper. Anderson and Hamadi (2016) reassesses the notion that high liquid asset holding by entities faced with weak investor protection, what is an evidence of managerial rent extraction what is in one accord with results of CLFOC model presented in that paper. Anderson and Hamadi (2016) shows that entities facing agency problems may establish tight controls over management through concentrated ownership what is similar to results of a survey presented here in that paper.

In results of our survey, which was made among Polish full operating entities, we have found that in small entities 20% of responders declared that their intention was to have no cash at all. Among the most pointed reasons for keeping cash in full operating cycle entities in small entities, were: risk of raw material prices changes (45% of responders) and a need for keeping money for current activity (35%).

In micro entities, cash was maintained mainly because of raw material price change risk (50%) and to cover current cash needs (56%). In the middle-sized full operating cycle firms, cash is maintained because of speculative reasons for change

in raw materials prices (62%) and because of changes in time of collecting of accounts receivables (38%) with a need of covering current cash needs of entities (29%). We have found that in large and full operating cycle entities, cash is maintained because of two kinds of risk. First is caused by changes in prices of raw materials (70%). Second is risk due to possible payment failure of counterparties (50%).

The aim of the study is to determine the rules governing the modern cash management in small and medium entities with a full operating cycle. We have stressed a particular emphasis on environmental conditions influencing firms. Having a full operating cycle is defined as a situation in which the small or medium firm has a stock of materials or raw materials. Then, as a result of the technological process semi-products are converted to the finished products, offers them for sale through both cash sales and sales on the basis of the use of trade credit receivables. Used in this definition, full operating cycle consists of the inventories conversion (including the time required to collect the materials and/or raw materials, processing them, and the time required storage of finished products before transfer) and the full period of collection of receivables. Research hypothesis is the belief that the currently observed in many enterprises operating in industries using full operating cycle. Some of them have been assessed by investigators as "excessive" cash reserves, are dependent on factors that allow them to describe the relationship between risk and uncertainty and the expected and realized under conditions of risk and uncertainty in the value added generated by firms with a full operating cycle. Internal factors depend not only what is the core business of the firm, but also how that core business results are sold. In our survey, we have found that among 306 Polish full operating cycle entities, sale realized as stationary distribution is declared by the similar part of all responses, only large firms differ in the mail order sale realized with internet support (Fig. 1).

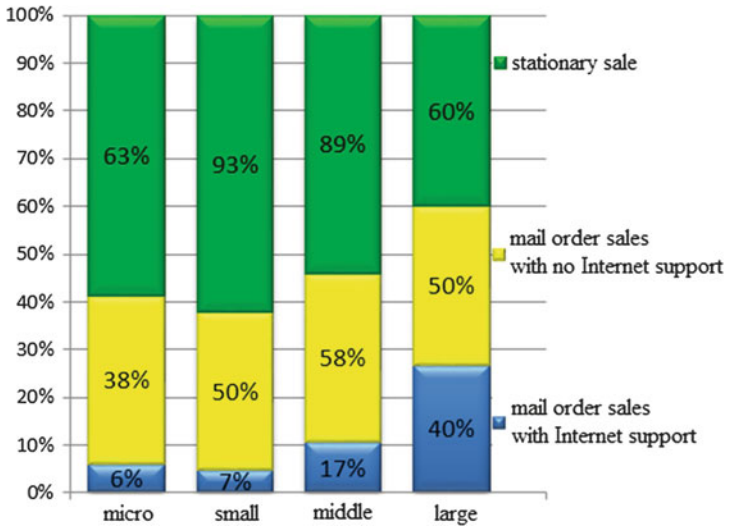

Fig. 1 Structure of sale in relationship to size of full operating cycle entity. Source: Michalski (2016b) and survey among 306 Polish full operating cycle firms

Table 1 Full operating cycle firms and their decisions about type of sale

		Micro firm	Small firm	Middle firm	Large firm	Total
Mail order sale with no internet support	Number of answers	6	61	91	5	163
	% from size	37.5	49.6	58.0	50.0	53.3
	% from whole firms	2.0	19.9	29.7	1.6	53.3
Internet sale	Number of answers	1	9	27	4	41
	% from size	6.3	7.3	17.2	40.0	13.4
	% from whole firms	0.3	2.9	8.8	1.3	13.4
Stationary sale	Number of answers	2	118	139	6	275
	% from size	62.5	93.5	88.5	60.0	88.2
	% from whole firms	3.3	37.6	45.4	2.0	88.2
Total	Number of answers	16	123	157	10	306
	% from size	100.0	100.0	100.0	100.0	100.0
	% of total	5.2	40.2	51.3	3.3	100.0

Source: Michalski (2016a) and survey among 306 Polish full operating cycle firms

The way the sale is realized, influence a need for cash tied in inventories. There is a presumption, that internet sale can decrease the need for holding larger levels of inventories, but that is not a presumption which is shared by us during creating remodeling of FLIEM which is presented here (Table 1).

External factors can be seen as a result from the economic situation surrounding the enterprise. This environment interacts with the operating cycle of the overall firm operational risk which is reflected in the level of cash held. At the core of the research hypothesis is the belief that the level of cash and cash management policies (in the firm in an integrated manner with other elements resulting from the operating cycle) contribute to moderating the risk of the firm. Moreover, that can be proven using empirical data from enterprises operating effectively in practical business.

Deb et al. (2017) claims that cash can create shareholder value and that is also here presented by CLFOC model. Deb et al. (2017) synthesizes arguments from the behavioural theory of the entity. He claims that, economic perspectives like agency theory and the value-creation versus value-appropriation literatures are arguable. Moreover, that the implications of cash for entity performance are context-specific and that is in accordance with results of CLFOC model and with survey answers reported in that paper. Additionally, Deb et al. (2017) claims that cash is more beneficial for entities operating in highly competitive, research-intensive, or growth-focused industries. Koussis et al. (2017) examines optimal cash levels and dividend choice incorporating debt financing with risk of default and bankruptcy costs. The same author (Koussis et al. 2017) revisits the conditions for dividend policy irrelevancy and the broader role of retained earnings and dividends. Koussis

et al. (2017) claims directional effects of cash balances on equity and debt create a U-shaped relation with the entity value what is also found in CLFOC model from that paper. Huang-Meier et al. (2016) examines the happiness of chief executive officer (CEO) effect on managerial motives for cash holdings. Huang-Meier et al. (2016) finds that optimistic and non-optimistic managers have significantly dissimilar purposes for holding more cash. These findings of Huang-Meier et al. (2016) are consistent with both theory and evidence that optimistic managers are reluctant to use external funds. Huang-Meier et al. (2016) claims that optimistic managers hoard cash for growth opportunities that is speculative motive, happy managers also keep relatively more cash for capital expenditure and acquisitions (in our group of surveyed entities that was not confirmed). Huang-Meier et al. (2016) work highlights the crucial role that CEO characteristics play in shaping corporate cash holding policy and that is in accordance with the CLFOC model (Michalski 2016b, 2017).

Chen and Mahajan (2010) investigate the effects of macroeconomic conditions on cash holdings in over 30 countries in the period between 1994 and 2005. Chen and Mahajan (2010) show that macroeconomic variables like inflation, GDP growth, interest rates, and corporate tax rate have an impact on corporate cash holdings and that is in one accord with the CLFOC model (see Figs. 2, 3, 4 and

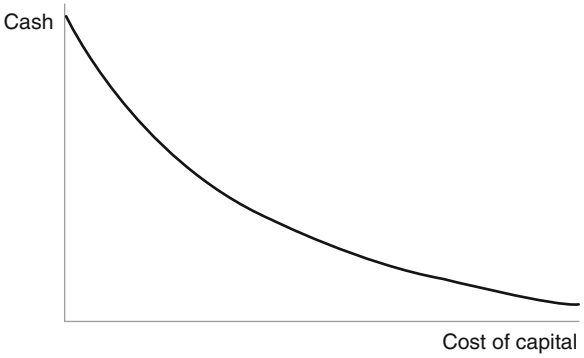

Fig. 2 Relationship between cash levels and cost of capital, according to CLFOC model. An example: Own calculations of relationship of cash levels and cost of capital according to CLFOC model. Source: Michalski (2017)

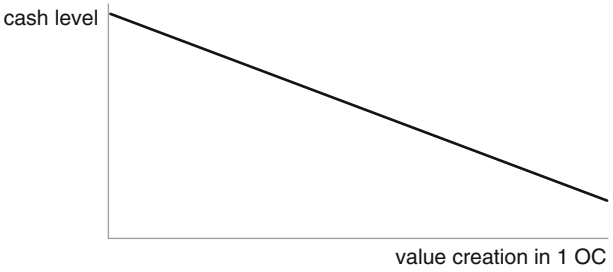

Fig. 3 Relationship between cash levels (CSH) and value creation in one full operational cycle (m). Example: Own calculations of relation CSH and m according to CLFOC model. Source: Michalski (2017)

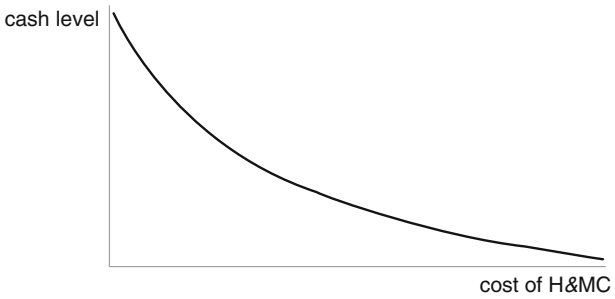

Fig. 4 Relation between cash levels (CSH) and cost of holding and managing cash levels (KG). Example: Own calculations of relation CSH and KG according to CLFOC model. Source: Michalski (2017)

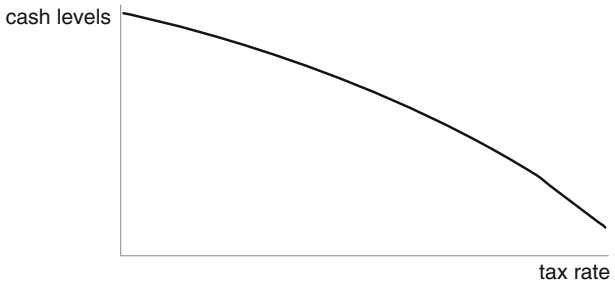

Fig. 5 Relation between cash levels (CSH) and tax rate (T). Example: Own calculations of relation CSH and T according to CLFOC model. Source: Michalski (2017)

5). Chen and Mahajan (2010) reveal that macro variables have an indirect impact on corporate cash holdings because the effects of entity-specific variables on corporate liquidity can be influenced by macroeconomic conditions what was also presented by Michalski (2016a, b, 2017). Shah and Shah (2016) investigates the relationship between a nation's judicial efficiency and its corporations' cash holdings. Shah and Shah (2016) finds that improved judicial efficiency is associated with higher levels of corporate cash holdings what is similar result in CLFOC model presented in that paper. Shah and Shah (2016) finding supports the managerial-fear hypothesis, where managers consider improvements in judicial efficiency as increasing the probability of bankruptcy and loss of their jobs.

Graham and Harvey (2001) surveyed over 390 CFO's about the cost of capital and capital structure. Graham and Harvey (2001) found that larger entities rely heavily on present value techniques, while smaller entities are relatively likely not to use such criteria and in the findings presented in that paper there is similar conclusion. Graham and Harvey (2001) inform that entities use entity risk rather than project risk in evaluating new investments and that is also in agreement

with CLFOC model findings compare: Soltes (2012) and Soltes and Gavurova (2015). Dudley and Zhang (2016) examines the relation between the level of trust and corporate cash holdings and Dudley and Zhang (2016) finds that similar to results the CLFOC model presented in that paper, precautionary savings motive predicts that entities located in countries with less trusting society will hoard more cash in order to compensate for reduced access to capital markets (Dudley and Zhang 2016). The negative relation between trust and corporate cash holdings is also in agreement with results of survey reported here.

Opler et al. (1999) examines the determinants and implications of holdings of cash by publicly traded U.S. entities in the 1971–1994 period. Opler et al. (1999) finds evidence supportive of a static trade off model of cash holdings what is also in one accord with the CLFOC model from that paper and Bem and Michalski (2015). Opler et al. (1999) shows that entities with strong growth opportunities and riskier cash flows hold relatively high ratios of cash to total non-cash assets what also is presented by this paper in CLFOC model. Lin et al. (2016) examines the effect of ownership structure on the value of corporate excess cash holdings. Lin et al. (2016) indicates that the presence of MLS increases the value of excess cash holdings and that is a similar result to result presented by the CLFOC model.

Almeida et al. (2004) models an entity's demand for cash levels to develop a new test of the effect of financial constraints on corporate policies what is also included in CLFOC model presented in that paper. Almeida et al. (2004) informs that entities try to save cash out of cash flows (the cash flow sensitivity of cash). Almeida et al. (2004) hypothesizes that constrained entities should have a positive cash flow sensitivity of cash, while unconstrained entities' cash savings should not be systematically related to cash flows. Almeida et al. (2004) empirically estimates the cash flow sensitivity of cash using a large sample of manufacturing entities what is similar to empirical data used to illustrate of that paper where is used surveyed material harvested from 306 full operating cycle Polish entities.

2 CLFOC Model

Full operating cycle is a source of operational risk. Cash Levels in Full Operating Cycle (CLFOC) entities model is concentrated on entity value maximization. That CLFOC model derives from typical full operating cycle situation in entities and after inclusion data about costs and value created in next steps of typical full operating cycle business recommend optimal cash levels that answer on risk sensitivity.

He and Wintoki (2016) shows that R&D investment explains a significant portion of the increase cash levels and that is the same result as in CLFOC model. He and Wintoki (2016) claims that intensified competition appears to be an important explanation for the increased propensity of R&D-intensive entities to hoard cash and that is the same as observation from the survey reported in that

paper. Coles et al. (2006) provides empirical evidence of a strong causal relation between managerial compensation and investment policy (what includes investment in maintaining cash levels reported by CLFOC model presented in that paper) and entity risk. Coles et al. (2006) finds that higher sensitivity of CEO wealth to stock volatility implements riskier policy choices and that is in one accord with survey results reported in that paper.

Ben-Nasr (2016) examines whether state and foreign ownership affect the shape of the value-net cash levels. Ben-Nasr (2016) claims the value of cash levels is higher in entities that are less financially constrained that is the same result as result in a survey presented in that paper. Harford (1999) shows that cash-rich entities are more likely than other entities to attempt acquisitions and in the survey presented in that paper is a result that informs that cash-poor surveyed entities didn't experienced acquisitions. Harford (1999) claims that the acquisitions performed by cash-rich entities are value decreasing what is in one accord with the CLFOC model presented in that paper.

La Rocca et al. (2017) analyses the relationship between cash holdings and performance, including the moderating effect of corruption. La Rocca et al. (2017) shows the importance of corruption in shaping the sign and the intensity of the value of cash holdings what is also in agreement with CLFOC model presented here. Dittmar and Mahrt-Smith (2007) investigates how corporate governance impacts entity value by comparing the value and use of cash holdings in poorly and well-governed entities and that is also an object of a survey reported in that paper. Dittmar and Mahrt-Smith (2007) shows that governance has a substantial impact on value through its impact on cash: $1.00 of cash in a poorly governed entity is valued at only $0.42–0.88. According to Dittmar and Mahrt-Smith (2007) good governance approximately doubles this value and that results are in one accord with CLFOC model presented here. Banos-Caballero indicates that the cash levels financing-performance relation changes during a financial crisis. Banos-Caballero finds, that relation between performance and cash levels depends on an entity's financial flexibility.

CLFOC model is based on the entity value creation approach. We can present it as an equation (Michalski 2017):

$$\begin{aligned}\Delta V = & -KSC - IP \times DCR \times (1-m) - ARP \times DCR \times (1-m) - CSH \\ & \times DCR + APP \times DCR \times (1-m) \\ & + \frac{DCR \times 360 \times (1-m) \times (1-T)}{CoC} \\ & + \frac{(1-T) \times DCR \times (-CSH \times KG - IP \times KZ - ARP \times KN)}{CoC} \end{aligned} \quad (1)$$

Where: ΔV—entity value creation (in money), KSC—cost of too short levels of cash, IP—inventory period (in days), DCR—daily cash revenues (in money), m—value creation in one full operational cycle (in %), ARP—accounts receivable

period (in days), CSH—cash buffer (in days), APP—accounts payable period (in days), T—tax rate (in %), CoC—cost of capital rate (in %), KG—cost of holding and managing cash levels (in %), KN—cost of managing and maintaining of accounts receivables (in %), KZ—cost of holding and managing inventories (in %).

Next, we will calculate DCR derivative of the function ΔV and compare it with 0 to find level of cash that maximize entity value level ΔV (Michalski 2017):

$$CSH = \frac{[360 \times (1-m) - IP \times KZ - ARP \times KN] \times (1-T)}{CoC + KG \times (1-T)} + \frac{(1-m) \times (APP - IP - ARP) \times CoC}{CoC + KG \times (1-T)} \quad (2)$$

According to CLFOC model is possible to observe some relations between cash levels and cost of capital. As we can see in Fig. 2, together with increasing cost of capital rate we should expect decreasing of cash levels CSH.

The CLFOC model expects that entity value creation will be maximized when cash levels CSH decrease with increasing value creation portion in each operating cycle (m).

According to a CLFOC model we can observe relation between cash levels and cost of holding and managing cash levels. As we can see in Fig. 4, with increasing cost of holding and managing cash levels we should expect decreasing of cash levels CSH.

The CLFOC model expects that entity value creation will be maximized when cash levels CSH decrease with increasing tax rate (T) as is presented in Fig. 5.

3 Empirical Data from Polish Full Operating Cycle SME's

We have included in our research survey results obtained from 306 full operating cycle entities. In our research, we have used CATI procedure, which is a telephone survey supported by use of microcomputers. Among surveyed entities participated in the poll, were: agricultural full operating cycle entities, service entities, agricultural production associations. Surveyed entities were from production branches known as full operating branches and majority of them were profit businesses. Among them there were no not-for-profit entities. The easiest was collecting information from micro and small entities, if the owner was open to cooperate.

We have found that there were no links between voivodeships and investigated variables. In our research about 51% were the middle full operating cycle entities. Moreover, we have found that in entities with one owner usually that owners decide personally about strategical points of management, whereas in larger entities with more owner's majority of them usually is involved in decision making and current management. Only one owner occurs a case in over 50% surveyed entities.

According to our results the cash levels are maintained at 88% surveyed entities. Only 12% of entities pointed that do not have intention to maintain operating cash

levels. The main basis for holding cash levels is a risk of changing costs of raw materials that are needed for realization of the production and sale. For surveyed entities the most important current asset was production in progress and inventories of raw materials and inventories of finished products. Entities that believed in their high competitiveness more often signalized lack of possibilities for development as supplier for and reaching clients from the public sector. However, about 42% surveyed entities believe that they are high competitive entities. In medium entities, the most often was signalized fear of high competitiveness from competitors. Although, 29% of surveyed entities never have had any buyer client from public sector and do not care about reaching such buyer clients from the public sector. There is an observation that smaller entities do not want to have clients from the public sector at all.

Cooperation with public sector as supplier for full operating cycle entities is similar like with such sector as a buyer. Some of surveyed entities (31%) do not buy anything from the public sector. The larger entity is, the higher is probable that such entity will have any cooperation with the public sector. Among surveyed entities any of them was connected with a merger or acquisition during last 5 years. The main form of distribution of the products is 90% surveyed entities traditional stationary distribution. Only 13% of surveyed entities have any internet based distribution.

Among surveyed entities in micro and small entities almost no one has internet distribution of the products. Use of internet based distribution is used among surveyed entities mainly by medium entities. About 43% entities are not using Just in Time philosophy during distribution.

Full operating cycle Polish entities, as presented in Fig. 6, decide to keep cash levels in entities mainly for speculative motives reflected by risk aversion to prices of

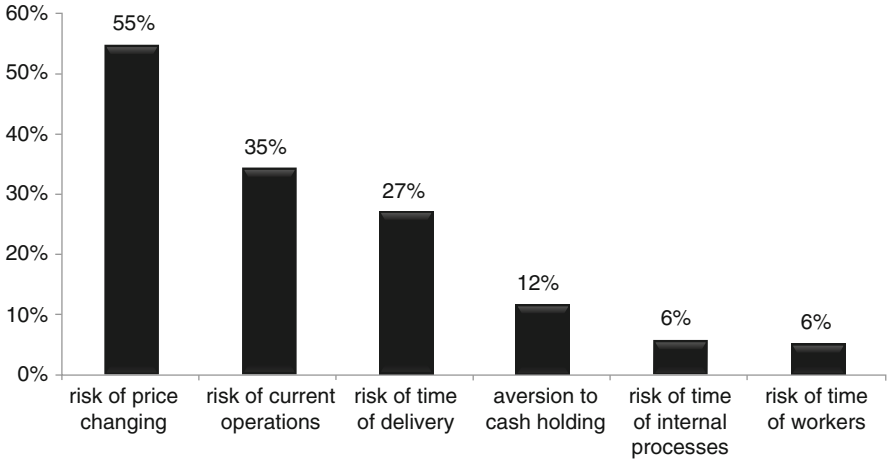

Fig. 6 The reasons for maintaining cash levels (CSH) in a full operating cycle entity. Source: Results of the survey of 306 full operating cycle Polish entities

raw material changes (55% answers) and precautionary motives reflected by aversion to risk of fluent realization of processes in full operating cycle (35% answers) and transaction motive reflected by aversion to risk of delivery time (27%).

4 Conclusions

Filbeck et al. (2017) explores the question whether cash levels management practices serve as a basis for investor-based strategies for superior return generation. Filbeck et al. (2017) examines and finds that in one accord with the CLFOC model from that paper, entities with superior cash levels management outperformed their counterparts (Bem and Michalski 2015; Gavurová et al. 2014). Al-Najjar and Clark (2017) explores the impact of internal and external corporate governance practices on the decision to hold cash. Moreover, Al-Najjar and Clark (2017) finds a negative relationship between board size and cash holdings (Michalski 2016a, 2017), what was backed by results of survey of Polish 306 full operating cycle entities presented in that paper and with CLFOC model.

Arouri and Pijourlet (2017) examines whether corporate social responsibility (CSR) performance has an impact on the value of cash holdings and that is also a concern CLFOC model presented here. Arouri and Pijourlet (2017) finds that investors assign a higher value to cash held by entities (Michalski 2008, 2017) and that is consistent with the idea that CSR policies are a means for managers to act in the shareholders' interests what is in one accord with survey results among 306 Polish full operating cycle small and medium entities presented in this paper. Lyandres and Palazzo (2016) demonstrates theoretically and empirically that strategic considerations are important in shaping the cash policies of innovative entities what is also present in that paper in CLFOC model, compare: Gavurova and Korony (2016), Michalski (2008), Siedlecki and Bem (2016), Soltes (2004), Svidronova et al. (2016).

Presented in this paper CLFOC model can be a useful tool for companies from green economy, which want to thrive in a turbulent business environment. The research examined 306 full operating cycle entities which belong to so called green employment sector, this means that people employed have a decent job. Therefore the risk of time of workers was the smallest (6%) reason for maintaining cash levels in a full operating entities. The survey results backed also characteristic of the green jobs sector (Rutkowska-Podołowska et al. 2016; Bem et al. 2016; Simo et al. 2016; Soltes and Gavurova 2016; Sinicakova et al. 2017; Sulikova et al. 2015; Toth et al. 2015; Svidronova et al. 2016), which is related to the sustainable development concept and mentioned CSR.

The empirical results are in one accord with expectations of the CLFOC model because they confirm that entities with the intention of avoiding destruction of **value creation in one full operating cycle (m)** maintain cash levels in entities as a buffer against the risk (compare Fig. 2 with Fig. 5). Decreasing of risk has an impact

on decreasing Cost of Capital (CoC) and as presented by CLFOC model (Fig. 1) smaller cost of capital is an impulse for higher levels of cash in the entity.

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Tender Bids Evaluation in the Context of Value-Based Management

Paweł Mielcarz, Dmytro Osiichuk, and Ryszard Owczarkowski

Abstract The paper aims at presenting a coherent algorithm allowing to evaluate tender bids in accordance with the principles of value-based management. The evaluation of tender results in many cases lacks rigorous methodology and often involves an inherent element of subjectivity. The mathematical models, used to assign weighs to the bid evaluation criteria, may not accurately reflect the outcomes of the valuation prepared as part of the capital budgeting process, which as a consequence, may impair the credibility and objectivity of the company's procurement policy. The problem is further complicated by the difficulties related to operationalisation of the qualitative evaluation criteria. The paper elaborates on the idea that tender bids should be evaluated based on a unique objective function, i.e., the company value. The algorithm presented in the paper supplemented with an elaborated numerical example, gives a step-by-step guidance in the process of the tender results evaluation and presentation, thereby allowing to minimise possible errors and biases. The model may be of considerable interest to the practicing financial managers, as it accords perfectly with the process and concepts of value-based management, and assures the transparency of the tender procedures.

Keywords Tender • Capital budgeting • value-based management

1 Introduction

Tenders constitute a sound market instrument of decision making in the capital budgeting process. Liu et al. (2016) identified key factors influencing the performance of the tendering processes. Among other determinants the authors particularly emphasise the importance of robustness of business case development, effectiveness of communication between the participants of the procedure, and level of transparency of the tendering processes. The transparency factor is particularly crucial in case of transitional economies where the probity of the tender results may sometimes be questioned. The problem of elaboration of an objective

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and unbiased algorithm of tender results determination and communication to the bidders constitutes an important practical issue of probity management. The paper offers a simple and coherent method of evaluation of tender results accompanied with a transparent algorithm of outcome communication to the vendors.

Generally, we argue that in order to assure the objectivity of the tender procedures, offers should be evaluated based on a set of quantitative criteria incorporated into a valuation model, which underlies the capital budgeting process. Value for the shareholders represented by NPV of the project constitutes the objective function, thereby making the proposed algorithm consistent with the postulates of value-based management (VBM). Following the evaluation process, the results of the tender should be clearly communicated to the bidders without compromising the integrity and transparency of the tendering process. In certain cases, due to regulatory requirements or company policy, a need may arise to communicate the tender results without disclosing the bottom line of the valuation model. We propose a solution for such situations. The analysed model of tender results communication allows to guarantee transparency of the tender procedures and assure value maximisation for the organiser.

The paper is structured as follows: first, we analyse the problem in the context of regulatory requirements with respect to the tender procedures; secondly, we define the evaluation criteria and present the model for the bids appraisal; thirdly, we propose an approach to communicating the outcomes to the bidders in the eventuality of regulatory disclosure limitations; the discussion is followed with an elaborated numerical example.

2 Choice of Criteria for Bid Evaluation: Description of the Problem

Choice of criteria for bid evaluation constitutes the foundation of the decision making process. The evaluation committee is expected to exercise sound judgement and apply relevant knowledge to determine the set of selection criteria. Watt et al. (2009) identified eight principal categories of criteria used to evaluate the bids and concluded that the preferred criteria are those which quantify contractor's management and technical capabilities, past experience and performance record, reputation and proposed method of delivery of technical solution. Wong et al. (2000) studied the decision making process based on a unique 'price' criterion, and concluded that clients prefer to evaluate bids with a broader set of criteria. Moreover, using the critical review of empirical literature Watt et al. (2009) found that 'price' and 'cost' were among the least frequently cited criteria for bid evaluation.

Hatush and Skitmore (1998) advocate the application of Multi-Criteria Selection method (MCS), and propose the following general evaluation criteria: technical and management ability, health and safety, reputation, and price. Although we agree that the bid evaluation process should be based on a set of criteria instead of a

unique indicator, e.g., cost, the above mentioned approaches possess an inherent element of subjectivity, which entails an increased risk of suboptimal decision taking. Hensher et al. (2000) studied the influence of the number of evaluating criteria on the bidding process and concluded, that an insufficient number of criteria caused the objectivity of the outcomes to be questionable, while an excessive number overly complicated the evaluation procedure.

Directive 2014/24/EU of the European Parliament and of the Council (the Directive) on Public Procurement specifies the regulatory requirement and terms governing the process of tender bids evaluation and communication of outcomes of tender procedures, putting an emphasis on principles of equal treatment and transparency. The selection process is expected to be based on a set of verifiable, but not exclusively quantitative award criteria, which should be published beforehand in order to assure equal treatment for the bidders and transparency of the tender proceedings. The award criteria include the minimum requirements set forth by the contracting party for participation in the tender, as well as contract performance conditions, which set the framework for the project realisation and are non-negotiable. In accordance with the 2014/24/EU Directive, the bids should be assessed based on the price-quality ratio with the cost element being an integral part of the evaluation. However, the contracting party is free to pre-specify contract performance conditions and award criteria tailored to its specific needs and project requirements, which potentially opens wide opportunities for manipulation. The contracting party has a legal obligation to inform the bidders of the award criteria and weightings assigned to each of them in order to guarantee the transparency of the selection process. This provision of the Directive increases the complexity of the bid evaluation process, and requires an introduction of a tool facilitating the calculation of the weighing coefficients prior to the call for bids.

The Directive states that information provided by the bidder cannot be shared with other participants of the process without explicit consent of the former. At their sole discretion, contracting parties may refuse to provide information regarding the advantages of the successful tenderer or reasons for rejection of particular bids, if provision of such information is deemed to compromise commercial interests of other bidders. Thereby tender procedures may manifest the problems of information asymmetry, which make the issue of criteria selection more acute and create a challenge for the company's financial managers.

The regulatory requirements pose several problems to the Evaluation Committee: (1) establishing the evaluation criteria, i.e., the evaluation committee must decide upon the number of criteria, their priority and relative importance; (2) assigning weights to each of the criteria; (3) communicating tender results in case of disclosure limitations. Each phase of decision making process possesses an element of subjectivity and probity risk. The most important issue arising in the process of weights calculation is the determination of 'exchange' rates between different criteria. Experts comprising the evaluation committee are expected to use their expertise to set priorities, which partially deprives the process of impartiality and makes it dependent upon subjective opinions.

3 Bids Evaluation Criteria in the Context of Value-Based Management

As demonstrated in the previous section, the criteria selection methods may be prone to misrepresentation and bias, thereby threatening to compromise the probity of the tender proceedings. The problem resides in the fact, that the selection process is taken out of the general framework of corporate decision taking, which is based on the notion of shareholder value. Contrary to the Multi-Criteria Selection, which inevitably leads to trade-offs between the proposed evaluation criteria and, as a result, may engender suboptimal solutions, decisions taken in the framework of value based management assure consistency with the principal goal of the entity—shareholder wealth maximisation.

Jensen (2002) proposed a theory of enlightened value maximisation, which accepts the long-run value of the company as the corporate objective function. The theory is supposed to address controversies between multiple objectives pursued by different organisation's stakeholders and management. In particular, Jensen (2002) criticises the balanced scorecard (Kaplan and Norton 1992) as a controlling instrument, since it provides no single measure of performance, and may yield multiple results, forcing management to look for trade-offs between evaluation criteria and hindering decision making process. The value maximisation is proposed as an alternative to the stakeholder-oriented mode of corporate management (Sternberg 1996), which is based upon the idea of satisfying the interests of all the parties concerned. Jensen (2002) summarises the theoretical divergences between VBM and stakeholder oriented approach in the following saying: 'Multiple objectives is no objective'.

The same problem of multiple goals appears in case of criteria selection for tender bids evaluation. MCS method resembles the balanced scorecard: it proposes multiple dimensions with no strict and quantifiable performance measures, leaving the decisions regarding the importance of each of the evaluation criteria at the discretion of the evaluation committee. Neither the classical stakeholder theory (Freeman 1984), nor the regulatory requirements posed to the bids evaluation criteria selection, propose a coherent and unambiguous solution to the problem of trade-offs between the pursued goals. The solution resides in setting the value maximisation as a key decision making criterion. McTaggart et al. (1994) and Copeland et al. (2000) argue that the pursuit of the goal of shareholder value maximisation entails optimal outcomes for other corporate stakeholders as well.

To conclude, the easiest way to deal with the problem of bid criteria selection is to adopt value as a single decision criterion. Thereby, the selection process will be in line with the postulates of VBM (Copeland et al. 2000). In practice, the evaluation committee will be expected to elaborate a valuation model allowing to quantify the consequences of tender decisions for the company's value.

4 Specification of the Evaluation Criteria

Following the approach advocated in the paper, the evaluation committee must go through several phases of the decision making process. These phases are: (1) definition of the contracting party's expectations and preparation of the contract performance conditions, which will set forth the sequence of project realisation; (2) analysis of the existing regulatory framework and description of the entry criteria for the tender; (3) definition of the selection criteria from the standpoint of company value maximisation; (4) preparation of the valuation model; (5) calculation of weights assigned to each of the selection criteria based on the valuation bottom line; (6) sensitivity and scenario analysis aimed at in-depth feasibility and profitability study; (7) preparation of a bid evaluation report and communication of the tender outcome to the bidders bearing in mind possible regulatory disclosure limitations.

To the possible extent, definition of the entry criteria should derive from the existing regulatory framework in order to guarantee equal treatment to all bidders. These criteria may include environmental regulations, issues of social significance, compliance with law, ethical codes, standards of professional conduct, health and safety regulations, availability of special certifications and authorisations entitling the bidder to participate in the tender, technical specification and requirements, e.g., deadlines deriving from the contract performance conditions. The contracting party should avoid interfering with the admissibility criteria in order to assure consistency of the tender procedures with VBM.

The list of selection criteria must be concise yet exhaustive. Special care must be taken to avoid redundant criteria, which are highly interrelated and represent the same evaluation standard. All approved criteria have to be quantifiable, as they will be subsequently incorporated into the valuation model underlying the capital budgeting decisions. The evaluation committee should exclude the criteria which are difficult or impossible to operationalise, for it may impede the evaluation process and render the results questionable.

For the purposes of criteria list preparation we recur to the methodology of Multi-Attribute Value Theory (MAVT) (Belton 1999). We start by defining the objective value function, however, include only quantifiable criteria of evaluation.

Bana e Costa et al. (2002) suggest preparing the tree of evaluation criteria comprising several specification levels, which are expected to be sufficiently detailed to reflect the complexity of the analysed project. The drawback of the approach resides in the fact that most of the proposed criteria along with accompanying indicators and characteristics are difficult to operationalise, which makes the authors recur to multi-criteria decision aid (MCDA). In particular, Bana e Costa et al. (2002) include among others the following characteristics into the criteria tree: suitability of organisation and control systems, quality of process to achieve final configuration, team organisation, information flow, cost and deadline credibility, environmental disruptions etc. In our opinion, this approach to criteria tree building resembles the balanced score card and, as a consequences, possesses the same

weaknesses. Multiple goals may hinder purposeful decision making, for the objective function is not well-defined and has a dominant subjectivity aspect.

We adopt the criteria tree methodology (Bana e Costa et al. 2002), however, we regroup the criteria into admissibility and evaluation criteria. The group of entry criteria incorporates all the factors which are impossible to operationalise, but which may have considerable influence on project realisation.

Evaluation criteria comprise only quantitative factors which will subsequently be introduced into the valuation model. This solution allows to avoid a highly subjective procedure of determination of proxy and constructed descriptor of impacts (Bana e Costa et al. 2002), which is in fact the way to find the trade-offs between evaluation criteria and which introduces an element of arbitrariness. The introduction of constructed descriptors does not eliminate the problem of ordinal prioritisation of the qualitative criteria. The specification of reference levels allowing to label the bid 'Good' or 'Neutral' based on a particular criterion requires a great effort on the part of the evaluation committee, adds even more to the confusion and complicates the objective function.

We propose an approach which has a clearly defined objective function—Net Present Value (NPV) of the project, which is derived from a valuation model based on a set of quantitative evaluation criteria without neglecting the qualitative factors which are regrouped into admissibility criteria.

5 Specification of the Valuation Model and Calculation of Weights of Evaluation Criteria

The next step in the bid evaluation process consists in a careful specification of a valuation model incorporating the proposed evaluation criteria. Fernandez (2007) summarises ten approaches to free cash flow and discount rate calculation, which if applied correctly should yield the same NPV. However, the valuation toolkit is often applied incorrectly: Fernandez and Bilan (2007) detected 110 most frequently encountered valuation errors. Mielcarz and Mlinarič (2014) suggest using Free Cash Flow for Firm (FCFF) and make an argument for its superiority over Free Cash Flow for Equity (FCFE) and Economic Value Added (EVA) approaches to NPV calculation.

Specification of the valuation model requires a detailed analysis of all the relevant incremental cash flows, which appear due to tender proceedings. The evaluation criteria will serve as exogenous variables for the valuation model, while NPV will be the endogenous one, representing the objective function.

The next step consists in assigning weights to the evaluation criteria. We shall assume that the evaluation committee defined a set of n criteria, which were subsequently incorporated into the valuation model. The committee may as well define the range of values for the criteria, so that there is a finite number of possible combinations of criteria values. Each of m possible combinations of n evaluation

criteria (making up an n × m matrix) yields a value for the objective function NPV. We can write in the matrix form:

$$\begin{bmatrix} NPV_1 \\ NPV_2 \\ \dots \\ \dots \\ NPV_m \end{bmatrix} = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1m} \\ x_{21} & x_{22} & \dots & x_{2m} \\ \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots \\ x_{n1} & x_{n2} & \dots & x_{nm} \end{bmatrix} x \begin{bmatrix} \beta_1 \\ \beta_2 \\ \dots \\ \dots \\ \beta_m \end{bmatrix} \quad (1)$$

or in a simplified form:

$$\mathrm{NPV} = \mathrm{X}\,\beta, \quad (2)$$

where NPV is an m × 1 vector of endogenous variable values; β is a m × 1 vector of criteria weights. We use an ordinary least squares (OLS) method to obtain the weights for the evaluation criteria:

$$\hat{\beta} = \left(X^T X\right)^{-1} X^T NPV \quad (3)$$

In most cases, taking into consideration the deterministic nature of the studied relationships, the model gives a highly accurate estimate of the criteria weights. The calculated criteria weights are based on quantitative inputs and the calculation of rate of substitution between them has logical economic interpretation. The approximation need not be linear: power, exponential or any other functions can be used for presenting the relationship. Linear approximation was chosen for simplicity of presentation. The proposed algorithm has a clear advantage over the compensatory additive aggregation procedure advocated by Bana e Costa et al. (2002). Based on the determined set of criteria and their weights the contracting party can easily make the value-maximising decision bounded by a set of admissibility criteria. Results appear to be impartial and free from subjectivity element. What is more, the valuation model and criteria with their respective weights can be specified prior to the publication of the call for bids which is a considerable advantage over the traditional MCS method.

6 Calculation of Criteria Weights: Case Study

In this section, we present the application of the proposed algorithm of bid evaluation based on a simple case study (based on the original case presented in Mielcarz and Paszczyk 2013) given below.

Case study. ABC Co. is a manufacturing company with a global customer base. At present, the company's board is analising the rationality of implementation of an investment project involving a purchase of a new production line. The new line will replace the one currently used by ABC, which due to its technical wear and tear

does not guarantee the desired quality of the output. The production line used to-date is fully depreciated and its market value is currently estimated at EUR 100,000. The price of a new line with technical specifications similar to those of the one currently in use is EUR 2,000,000. The market also offers production lines of superior specifications, which allow to reduce the hourly operational costs and to cater for more technically-demanding clients. The hourly operating costs of a standard production line is EUR 200. The yearly operating time of the line is planned at the level of 6240 h. Market analysis shows that if the company purchases a more advanced production line, the additional revenue for delivering more technically-complex products should amount to EUR 180,000 per year. Unfortunately, ABC does not currently employ any fully-qualified staff having the skills to operate the more advanced equipment. Hence, the potential purchase of a new line will also require the company to employ an additional process engineer for an annual salary of EUR 90,000. The useful life of the line is 6 years. The estimated residual value of an ordinary production line similar to the current one is EUR 100,000, while for a more advanced line it is EUR 180,000. ABC pays a 25% income tax. The average weighted cost of capital of the company is 12%. In order to pick the best production line from those currently offered on the market, ABC organises a tender.

The first step in the evaluation process is the specification of the admissibility requirements. The bidders are expected to provide the necessary documentation confirming that the offered equipment meets the technical specification expected by ABC; possesses necessary certificates regarding the environmental and health and safety regulations. Next, we define the evaluation criteria which will further be incorporated into the valuation model. For simplicity of presentation, we assume that the evaluation committee determined only three evaluation criteria: (1) the purchase price of a new production line (Price); (2) the hourly costs of servicing (Servicing Costs); (3) the maximum number of hours of operation per year (Number of Hours). Addition of criteria increases the number of possible combinations of exogenous variables, however, the algorithm remains unaltered.

It is worth noting, that the envisaged investment project includes a replacement and expansion parts, since the more advanced production lines do not only replace the one currently exploited by ABC but also decrease the operational costs and increase the revenues of the company. Hence, the expansionary part of the project is evaluated separately from the replacement part based on the appropriate incremental free cash flows (Mielcarz and Paszczyk 2013).

Several companies decide to participate in the tender. Company A offers a production line for EUR 2,800,000 with an hourly servicing costs of EUR 180 and expected operating time of 6100 h/year. Exemplary valuation for a 6-year period using FCFF methodology for the bid of company A is presented in Table 1.

The evaluation panel can quite easily estimate the range of values for the evaluation criteria by analysing the offers of all the potential bidders: currently, several companies may offer similar equipment for a price ranging between EUR 1,900,000 and EUR 2,800,000 with the hourly servicing costs ranging between

Table 1 FCFF valuation model for company A's bid

	Year		1	2	3	4	5	6
+	Sales		180	180	180	180	180	180
−	Operational costs (excluding depreciation)		−32	−32	−32	−32	−32	−32
−	Depreciation		133	133	133	133	133	133
=	EBIT		79	79	79	79	79	79
−	Tax		20	20	20	20	20	20
=	Net operating profit after tax (NOPAT)		59	59	59	59	59	59
+	Depreciation		133	133	133	133	133	133
−	WCI							
−	Investment in fixed assets	800						
+	Residual value							80
=	FCFF	−800	192	192	192	192	192	272
	WACC	12%						
	Discounted FCFF	−800	172	153	137	122	109	138
	NPV	31						
	IRR	13.31%						

Source: Based on the original case study by Mielcarz and Paszczyk (2013)

EUR 80 and EUR 205. The maximum number of operating hours per year ranges between 5240 and 6240. For each possible combination of evaluation criteria we calculate NPV using the valuation model from Table 1. Adding more evaluation criteria creates a technical problem at this stage and may require a spreadsheet add-in or any other aid in order to recalculate NPV for all possible combinations of the evaluation criteria.

The next step is the calculation of the weighting coefficients for the evaluation criteria using the OLS method. The results of the regression analysis are presented in Table 2. The NPV of any tender bid can now be calculated using the following equation:

$$\begin{aligned}\text{NPV} = {} & 901.17 + 12.42^{*}\text{Number of Hours} - 0.34^{*}\text{Servicing Costs} \\ & - 1.01^{*}\text{Price},\end{aligned} \tag{4}$$

Because of the deterministic nature of the studied valuation model, the model has a very high coefficient of determination. Now that the weighting coefficients are calculated, the company can make a rational decision and select the bid which maximises NPV without ignoring qualitative selection factors which are included as admissibility criteria. The decision can be communicated to the interested parties without raising any questions regarding objectivity or transparency of the tender procedures. For this particular case, linear approximation works perfectly, However, more complicated cases involving more criteria and various interrelations

Table 2 Weightings for the evaluation criteria

	Coefficient	Std. error	t-Ratio	p-Value
Const	901.172	20.3067	44.3781	<0.0001***
Number of hours	12.4152	1.42738	8.6979	<0.0001***
Servicing costs	−0.339533	0.113548	−2.9902	0.0028***
Price	−1.01259	0.0174817	−57.9229	<0.0001***

Source: Own elaboration

between them may require non-linear approximation (logarithmic, exponential, and trigonometric functions usually suffice to solve the problem).

7 Communication of Tender Results

In certain circumstances, company policy may impose limitations on the disclosure of the bottom line of the valuation model. Most often, for the purposes of results communication the contracting parties elaborate a marking system allowing the bidder to evaluate its positioning with respect to the competitors. In case of MCS, this task may be very challenging, since the evaluation committee determines the trade-offs between evaluation criteria at its sole discretion. Hence, it may be difficult to explain, why the bidder which offered a lower price and a longer delivery period lost to one, which offered a higher price and a shorter delivery period, ceteris paribus.

In case of a unique objective function represented by NPV, the task can be solved by transforming the NPV records into marks with the winning bid receiving the maximum marking (e.g., 100), and the worst one receiving the minimum one (e.g., zero). Afterwards, we perform a linear interpolation to get the equation, which translates the results of the valuation model into markings. The result is presented in Table 3. Using the model, the bidder can easily determine its relative positioning in the tender. This model is deterministic and provides accurate scoring estimates. Infrequent problems may arise in case of multiple criteria and non-linear approximation function, namely, the equation translating NPVs into scores may yield erroneous results and rank the bids incorrectly. This mostly happens if the differences between two bids in terms of evaluation criteria are very small and are contained within the range of the error of estimate. Under such circumstances, a careful case-by-case analysis followed by a clear communication addressed to the bidders is necessary to avoid any possibility of misinterpretation of the results.

Table 3 Linear function approximating the valuation model results in 0–100 points marking system

	Coefficient	Std. error	t-Ratio	p-Value
Const	122.394	0.156793	780.6067	<0.0001***
Number of hours	0.556999	0.0110211	50.5392	<0.0001***
Servicing costs	−0.576764	0.000876729	−657.8591	<0.0001***
Price	−0.0270303	0.000134981	−200.2533	<0.0001***

Source: Own elaboration

8 Limitations of the Model and Its Scope of Application

The presented model can be successfully applied to evaluate tender bids of bounded complexity. It perfectly works for appraisal of minor industrial investment projects and purchase of manufacturing equipment. In certain cases, however, qualitative evaluation criteria may play a crucial role in choosing the proper contractor. The degree of complexity of some projects calls for evaluation of the contractor's experience, reliability and standards of professional conduct. Hence, a problem of proper incorporation of the qualitative criteria may be solved by splitting the final score into quantitative and qualitative parts. The former would be evaluated based on the algorithm presented above, while the qualitative criteria may be operationalised using MCDA or other methods described in the existing literature. The final score should be a weighted average of the quantitative and qualitative scores. In this case, however, the problem of determining the tradeoffs between criteria has to be addressed, possibly at the expense of the objective function.

9 Conclusions

The paper presents a simple and coherent algorithm of tender bids evaluation in the context of value-based management. We argue that a value-oriented objective function allows to solve the problems inherent in the multiple-criteria selection (MCS) method. Introduction of an excessive number of qualitative selection criteria inevitably poses the problem of deciding upon the trade-offs between them, thereby, increasing the subjectivity of the evaluation process. MCS resembles the balanced score card, which does not provide managers with unambiguous guidance in the decision making process. On the contrary, the approach advocated in the paper perfectly accords with the overall corporate goal of shareholder value maximisation, being at the same time based on a set of objectively identified quantifiable criteria, which are incorporated into a sound valuation model. The presented approach to bid evaluation may be of interest to practicing financial managers, since it facilitates capital budgeting process and assures transparency of the tendering procedures.

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Raw Material as a Resource Implying Effectiveness of Product Innovations: Attempt to Assess the Selected Implementation

Bogdan Nogalski and Przemysław Niewiadomski

Abstract The experience supported by the analysis of balance sheets and statements shows that the implementation of the effective product portfolio management programme significantly affects the company's financial effects. Therefore, the research was initiated, and its main objective is an attempt to answer the following question: is there a relationship between a type of the raw material used in the production process of spare parts for agricultural machinery, and—resulting from their implementation—effectiveness? The information obtained as a result of the research implementation—according to the authors' beliefs—will allow to determine, in which of individual product categories the manufacturer should look for implementation opportunities that constitute product innovations. By carrying out the research, a conceptual thesis model was adopted, namely: The product innovation effectiveness is a derivative of the raw material used in the production process of spare parts for agricultural machinery. In other words, it is possible to categorise products in the relationship between a raw material and implementation effectiveness.

Keywords Product innovations • Raw material • Technological process • Implementation

1 Introduction

This paper refers to the selected manufacturing company associated with the production of spare parts for agricultural machinery. According to the authors' opinion, the studied company—through its structure and management process—in the conditions of occurring market opportunities—in order to generate values for a

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client—can quickly and smoothly activate their resources (Eisenhardt and Martin 2000; Teece 2012; Christensen 1995; Garrouste and Saussier 2005). It is characterised by high implementation flexibility, which is a guarantee of the development understood as a natural purpose of the organisation (Osbert-Pociecha 2012, p. 277). The pressure related to maintaining a competitive advantage and efficiency improvement results in constant call for broadly understood innovativeness in the organisation (Osbert-Pociecha 2014, p. 527). The title concept of the product innovation—referring to the theory of a multi-product company D. Teece (1982)—slightly narrows the subject of considerations, limiting it to new implementation related to the changes implied by the market. Wherever reference is made to the product innovation, the authors refer to the development of new products, which meet new needs of a client (opportunities) or current (known) needs in a new (more effective) way (Mansfield 1968, p. 83; Freeman 1982, p. 7; Rogers 1983, p. 11; Reichert et al. 2011, pp. 15–25; Peng et al. 2008, pp. 730–748). On the basis of the literature analysis and as a result of the carried-out discussion, the relationship between product innovativeness and broadly understood organisation efficiency is observed. This relationship manifests itself, inter alia, in strategic action aimed at the product portfolio rational management.

In spite of a widespread interest among researchers, the issue concerning effectiveness and rationality of the product portfolio management is still not sufficiently described and specified; according to the authors of this paper, it still leaves some unresolved issues. In the subject literature, it is mainly characterised in the ideological scope, and even if a description of the tools possible to be used appears, there is a clear need to develop the methodology for managing the product portfolio development in practical applications. Each company, which wants to be innovative and strives to operate successfully in a constantly changing economic space, must effectively provoke and use the emerging opportunities implying above-average efficiency.

By implementing an imperative of being innovative, the companies mainly focus on the introduction of product innovations, which—accurately integrated with making changes in the technology (Teece 1986) and in the operating activities within the framework of the manufacturing process—become an essential element of creating a relatively sustainable competitive advantage in the market (Osbert-Pociecha 2016, p. 193).

The above considerations lead to the conclusions that the dynamic capabilities (Krzakiewicz and Cyfert 2016), which are attractive for manufacturers looking for flexible specialisation and niche technology (Amin 1994; Autio 1997; Carnabuci and Bruggeman 2009; Hirst and Zeitlin 2006), are fundamental for the provision of a competitive advantage in the today's volatile environment.

Especially, since in the global economy, including the Polish market, a phenomenon of addressing the business offer to a specific group, which determines specific market segments, is observed more and more often. The creation of market niches is often associated with striving for the provision of high profitability of the company activity, among others, by obtaining the above-average margins on sales of a given product. A good product innovation ensures success and creates an added value

thorough the effective application of new ideas. It is a change in the product, its parts, manufacturing processes, methods of distribution, sale, advertisement, its function or application (Antoszkiewicz 2008, p. 9).

Since the company capability to quickly deliver the product—fully adapted to the client's needs and expectations—is an element of the organisation strategy, the following question arises: what criteria must be met by the product in order to make it attractive from the manufacturer's point of view?

The inherent feature of the implementation projects is the need for prior incurring of expenditure in the form of funds. It is commonly recognised that the best assessment criterion of invested funds includes a profit. Therefore, the implementation of products, which guarantee high efficiency, is profitable, because as it is rightly observed by T. Dudycz (2013, p. 30), the requirement for obtaining high rates of return includes the capital investment in the assets generating the above-average rates of return.

Therefore, the research was initiated, and its main objective is to determine whether there is any relationship between a type of the raw material used in the production process of spare parts for agricultural machinery, and—resulting from their implementation—effectiveness. The information obtained as a result of the research implementation—according to the authors' beliefs—will allow to determine, in which of individual product categories the manufacturer should look for implementation opportunities that constitute product innovations. By initiating the research, it was assumed that effectiveness of the product innovation is a derivative of the raw material used in the production process of spare parts for agricultural machinery. In other words, it is possible to categorise products in the relationship between a raw material and implementation effectiveness.

In the context of such a set objective, the authors intend to conduct a detailed analysis of each—intentionally selected—tested product. Such action is aimed at estimating and determining the relationship between the raw material and implementation effectiveness.

The research results presented in the paper were to constitute an incentive to implement products, which will largely determine effectiveness of the product portfolio.

2 Product Calculation Method by the Raw Material

The main company activity form involves the production process, which is subject to the raw material processing into a finished product.[1] Therefore—while defining the objective implementation measures—a decision maker is aware of the fact that the organisation efficient functioning requires having and using various raw material resources, which are subject to processing to certain goods. According to the

[1]Raw material is any material processed and produced in the modified form as a finished product.

authors of this paper, the raw material—and more specifically, the possibility of its acquisition and processing in accordance with the adopted specifications—significantly determines effectiveness of the implementation of parts in the agricultural machinery market.

The development of science and technology, reflected in production processes and technical equipment of production workshops, contributes not only to the quantitative and qualitative growth of the manufactured products, to enrich their product range, but also to the use of increasingly diverse and economically efficient processes, which result in the production of finished products from raw materials in the organisation. According to the authors, the longer the time horizon is, the more issues related to acquisition and use of raw materials are included in the strategy.

The formulation process of the development strategy of a new product consists of three essential parts: analysis, strategy selection and implementation. The stage, which directly determines the development strategy content, includes a strategic choice that involves identification of available options, their assessment according to the adopted criteria, and the selection of the best variant and taking action. In accordance with E. Urbanowska-Sojkin (2011, p. 23), the basic choices made in the companies include those which affect the company as being economic, social, organisational and legal. These are the choices referred to as strategic, because they constitute, in fact, a response in the form of a decision to strategic issues. In this paper, the categories in the form of a profit will occur as a criterion for making decisions.

One of the philosophies related to the approach to the issues of the production management and organisation is the so-called productivity. It involves the implementation of a permanent and comprehensive way of evaluating the manufacturing plant activity for the best technical and economic results, elimination of unnecessary and unsold production of stocks in progress, etc. Thus, it leads to the increase in efficiency and reduction of the production costs. In view of the above, planning on the basis of the full cost accounting and the accounting of margins for covering fixed costs and profits is important. Therefore, the harmonisation of management objectives and contractors with the company objectives is the manager's indispensable activity, which makes it possible to take specified implementation decisions (Nogalski and Niewiadomski 2015, p. 256).

The manufacturer reaches maximum benefits while incurring the implementation expenditure, which constitutes a guarantee of a fast and high rate of return on sales of a new product. If the production capacities of a given company do not allow for the implementation of a specific product (resource barriers), then, the manufacturer has two variants: acquisition of appropriate resources (knowledge, technology, working resources and objects), which involves incurring additional costs or using cooperation opportunities (purchase). Of course, in extreme cases, there is a possibility of refraining from the product implementation, but—according to the authors of the paper—the manufacturer's task is to look for solutions within the framework of variants providing the implementation opportunities; they constitute "a creator" of development and affect the increase in the company's market value.

Depending on the time for preparing the calculation and data, which are accepted for its statement, the calculation, which is prepared before the production

commencement and is based on projected costs, is mentioned in the paper. The basis of this calculation includes standards, as well as technical and economic indicators, tables of tariffs, average prices of raw materials, and costs considered average for a given sector or product. The effected calculation is indicative. It is, indeed, made at the time, when there are no precise structural and technological developments. It has fundamental, decisive significance, because it makes it possible to take a decision, if the manufacturer should undertake the production of a given part.

An important issue related to determination of costs includes the specification of the cost objects, which are the subjects of a reference of costs. These objects should be defined in terms of an objective scope and measurement units. According to the authors of the paper, it is crucial to distinguish product and process criteria on separate identification of costs. Having regard to the product criterion, the reference objects include implemented products, however, in case of the process approach, it is the technological process as a whole or its elements, such process operations or other activities.

Since a method of determining the costs depends on the specifics of a given company, the complexity of the product and applied manufacturing methods, in determination of production costs in a given product, in this paper, a simplified method for estimating costs, including costs of acquiring a relevant raw material (sheet metal, cast iron, steel bar) and labour costs based on performed process operations implying the execution of a given product, is applied.

By offering a tool for estimating the product manufacturing costs with the use of a specific raw material, the authors assume that the tools and technologies, applied in the analytical processing layer, should meet the needs of various user groups, including both people individually designing reports and analyses, and those using the already drawn up ones.

In order to illustrate the calculation method of products, the production process of which is implied by consumption of a given raw material, in the further part of the paper, the following cases for each of three categories, i.e. parts made of a rolled bar, cast iron or sheet metal, were presented. Since each of the above mentioned raw materials is characterised by different specificity in terms of costing, it was indispensable to develop the procedures that allow to acquire information for each individually.

The carried-out observations showed that in order to execute drive transmission machine assemblies, a method, as a result of which, through specific process operations (e.g. machining), the shape of a semi-finished product is obtained by cutting it from the solid. This technology can be used e.g. in the production process of 0200159560 screw shaft (Fig. 1).

Thanks to good strength properties, ease of machining, high resistance to abrasion and temperature, a steel bar of C45 grade is a raw material for producing the wheel.

Within the framework of the calculation carried out with the use of a weight calculator (Fig. 2), the raw material weight and purchase cost, i.e. a round steel bar of C45 grade per one piece of the product, i.e. 9.37 kg, were determined. In the

Fig. 1 Screw shaft—a method of valuation in terms of the raw material

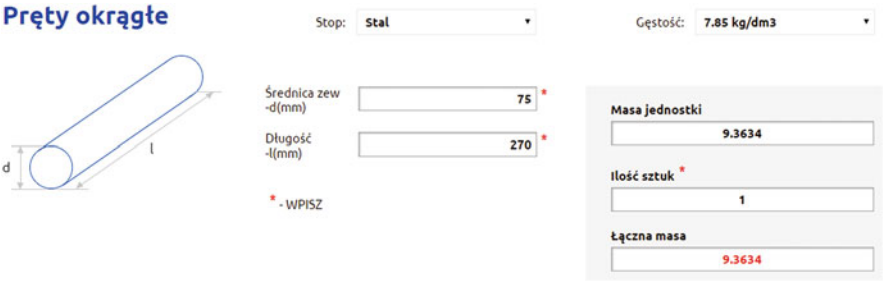

Fig. 2 Weight calculator (round bars)—source of data. Pręty okrągłe—Round bars, Stop—Alloy, Stal—Steel, Gęstość—Density, Średnica zew—Outer diameter, WPISZ—ENTER, Masa jednostki—Unit weight, Ilość sztuk—Number of pieces, Łączna masa—Total weight

context of the above, it was calculated that for its production, it is necessary to purchase the raw material with a total amount of PLN 21.60. Having regard to the labour costs[2] and available manufacturing technology, it was finally found that the implementation of the product is within the amount of PLN 43.60.

In order to execute the machine components, the thickness of which is significantly less than the length and width, the sheet metals are used. Their thickness is within the limits from tenths of a millimetre to a few dozen millimetres. The product shape is obtained by cutting it from the full sheet (e.g. laser cutting), bending in accordance with the guidelines included in the specifications of the product and welding of appropriately selected elements. This technology can be used e.g. in the production process of 0204022910 cover (Fig. 3).

Within the framework of the calculation carried out with the use of a weight calculator (Fig. 4), the sheet metal weight and purchase cost per one piece of the product, i.e. 25 kg, were determined. In the context of the above, it was calculated that for its production, it is necessary to purchase the raw material with a total amount of PLN 57.87. Having regard to the labour costs[3] and available manufacturing technology, it was finally found that the implementation of the product is within the amount of PLN 68.67.

[2]The labour costs were estimated for PLN 22.00; including: turning—PLN 15, milling—PLN 2.00, cutting—PLN 2.00, hardening—PLN 1.00, grinding—PLN 2.00.

[3]The labour costs were estimated for PLN 10.80; including: cutting and bending—PLN 7.20, welding—PLN 1.60, painting—PLN 2.00.

Fig. 3 Cover—a method of valuation in terms of the raw material

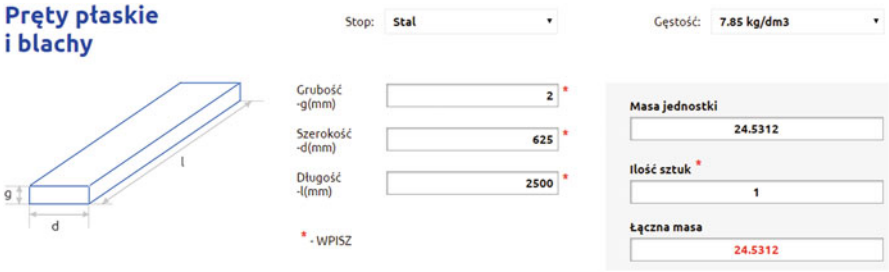

Fig. 4 Weight calculator (flat bars and sheet metals)—data source. Pręty płaskie i blachy—Flat bars and sheet metals, Stop—Alloy, Stal—Steel, Gęstość—Density, Grubość—Thickness, Szerokość—Width, Długość—Length, WPISZ—ENTER, Masa jednostki—Unit weight, Ilość sztuk—Number of pieces, Łączna masa—Total weight

The method of casting the semi-finished product, which is then subjected to removal machining and post-finishing, is used in the production of the machine working parts, such as: wheels, housings, orifices or connecting elements. In this case, the basis for the development of the casting technology of a given semi-finished product is its shape, dimension and degree of complexity and the material, which it has to be made of.

In case of 0203960660 wheel (Fig. 5)—taking into account necessary technological allowances and inclination—on the basis of the prepared documentation, a 3D computer cast model was created. The above action allowed to estimate the costs of the implementation of castings intended for further processing. The above action was the basis for further analyses; namely, they allowed for precise determination of the cost of making the cast model, which in the perspective, significantly contributes to profitability of the discussed—according to this variant—implementation.

Taking into account the costs of the raw material purchase (casting made of ductile iron)—PLN 17.60, labour costs—PLN 3.00 and additional implementation costs—associated with single execution of the cast model—in the amount of PLN 2500.00, production costs of one wheel within the framework of this variant are at the level of PLN 2520.60. Taking into consideration the implementation of 1000 wheels[4] and to every produced piece, it is important to add additional costs only in the amount of PLN 2.50. Hence, the implementation costs of one wheel are PLN

[4]Average annual sale of the product.

Fig. 5 Wheel—a method of valuation in terms of the raw material

23.10. In the context of the carried-out research, it was determined that the individual monitoring of each assortment position, which is a part of the product portfolio created by the manufacturer, is indicated. Within this meaning, it is possible to suggest that a type of the raw material, used in the production process of selected spare parts, implies the strategy related to the reduction of costs within its field.

3 Raw Material as a Resource Implying Implementation Effectiveness: Own Research Results

3.1 Research Scope and Subject

The manufacturing company, which operates in the agricultural mechanisation sector, was invited for the research. The research was conducted with the participation of the company owner, the production manager, and the chief process engineer, thanks to whom information—key from the perspective of the research implementation—was obtained; especially, taking into account their knowledge and practical professional experience. In each case, these were working people, actively participating in the implementation processes of the studied company.

In the context of the adopted objective, thirty intentionally selected products, different in terms of their destination, which were divided into three groups for the—used in their production process—raw material, were tested.

Within the framework of the carried-out analyses, it was necessary to use the available documentation (technical specification, process drawing, assembly documentation) and sometimes to conduct an interview with executive employees implementing individual process operations.

3.2 Assessment of Effectiveness of Product Innovations: Categorisation by the Raw Material

The tested products are characterised by various (often different) parameters, which affects different perception of their attractiveness from the perspective of the adopted efficiency criterion according to the authors' opinion. The products, the

manufacture of which is conditioned by using (purchase) the appropriate raw material type, which includes: steel bar (group I), sheet metal (group II), ductile cast iron (group III), were tested. It is relevant in the context of using the lean strategy. As far as in case of the selection of groups I and II, it is possible to apply the mentioned concept in relation to the raw material, it is virtually impossible—in the indicated range—within the framework of products included in group III. The authors refer to the actions on minimisation of the raw material reduction by the appropriate selection of the manufacturing technology. In taking the implementation decisions, the manufacturer should carefully analyse the possibilities of its use to minimise waste. The generated waste should be maximally used in other implementation processes. In this way, the manufacturer generates additional income significantly affecting the profit obtained by the manufacturer. In case of products included in group III, there is a possibility of using the strategy of reducing the product purchase cost. It is appropriate to strive for the raw material purchase at the possibly low price. The research carried out by the authors confirms the importance of the proper selection of a supplier, where the price elasticity constitutes one of the most important factors, which decide about the obtained above-average margin on the implemented product profit.

As a result of the carried-out research, it was determined that there is a relationship between the type of the raw material used in the production process of spare parts for agricultural machinery, and—resulting from their implementation—effectiveness. The highest margin is obtained by the manufacturer as a result of the implementation of parts made of a rolled bar. The average margin for products of this group is 224.51% in relation to the production costs. The detailed data were presented in Table 1.

Table 1 Steel bar as a resource implying implementation effectiveness—research results

SW[a]	CKS [PLN]	Cast [PLN]	Cast %	CKP [PLN]	CKW [PLN]	CS [PLN]	Profit [PLN]	Profit %
[W-1]	31.33	31.33	100	24.60	55.93	140.00	84.07	150.31
[W-2]	9.02	9.02	100	6.60	15.62	55.00	39.38	252.11
[W-3]	24.59	24.59	100	8.50	34.09	100.00	65.91	193.34
[W-4]	3.22	3.22	100	3.80	7.02	30.00	22.98	327.35
[W-5]	21.60	21.60	100	22.00	43.60	160.00	116.4	266.97
[W-6]	34.10	34.10	100	24.60	58.70	140.00	81.3	138.50
[W-7]	10.76	10.76	100	6.40	17.16	60.00	42.84	249.65
[W-8]	1.67	1.55	93	2.42	4.09	11.00	6.91	168.95
[W-9]	1.49	1.49	100	1.40	2.89	7.00	4.11	142.21
[W-10]	0.36	0.36	100	0.43	0.79	3.60	2.81	355.70
							Average	224.51

Key: CKS, total costs of the raw material; CKP, total labour costs; CKW, total production costs; CS, Sales price

[a]Product symbol [SW]: [W-1]—Low hub 0200134801/0, [W-2]—Shaft 0200213100, [W-3]—Shaft 0200213840, [W-4]—Sleeve 0200213270, [W-5]—Screw shaft 0200159560, [W-6]—High hub 0200134801, [W-7]—Shaft 0200214480, [W-8]—Pin 0203962180, [W-9]—Sleeve 0203964840, [W-10]—Link 0203964350

Table 2 Sheet metal as a resource implying implementation effectiveness—research results

SW[a]	CKS [PLN]	Sheet metal [PLN]	Sheet metal %	CKP [PLN]	CKW [PLN]	CS [PLN]	Profit [PLN]	Profit %
[W-11]	369.72	288.38	78	36.00	405.72	700.00	294.28	42.04
[W-12]	57.87	57.87	100	10.80	68.67	125.00	56.33	82.03
[W-13]	72.83	72.83	100	12.00	84.83	180.00	95.7	112.19
[W-14]	4.51	4.51	100	0.83	5.34	8.00	2.66	49.81
[W-15]	100.00	100.00	100	28.00	128.00	350.00	222	173.44
[W-16]	792.02	792.02	100	47.94	858.96	1550.00	691.04	80.45
[W-17]	89.97	89.97	100	14.00	103.97	180.00	76.03	73.13
[W-18]	45.82	42.32	93	9.50	55.32	250.00	194.68	351.92
[W-19]	8.88	8.88	100	3.40	12.28	45.00	32.2	266.45
[W-20]	26.36	26.36	100	7.00	33.36	80.00	46.4	139.81
							Average	132.92

Key: CKS, total costs of the raw material; CKP, total labour costs; CKW, total production costs; CS, sales price

[a]Product symbol [SW]: [W-11]—Board 0203940070, [W-12]—Cover 0204022910, [W-13]—Housing 0203905010, [W-14]—Conveyor block 0203961700, [W-15]—Hitch 26053 TGL, [W-16]—Floor 0203927530, [W-17]—Wall 0203943040, [W-18]—Rear extension 0204024080, [W-19]—Cover 0203965070, [W-20]—Cover 0204023060

The above-average margin is also provided by the products belonging to the second group. The parts made of the sheet metal generate profitability at the level of 133%, and at the same time, it is noted that the greatest productivity is generated by: [W-15]—Hitch 26053, [W-18]—Rear extension 0204024080 and [W-19]—Cover 0203965070. The detailed data were presented in Table 2.

The success of the organisation, measured by a degree of the assumed development strategy implementation, according to Cyfert et al. (2014, p. 15), depends on the skills related to dynamic adaptation of the organisation to the changing environmental conditions. The authors of this paper completely identify themselves with this view, at the same time, emphasising that the success is achieved by companies, which flexibly adapt to the environment. They often take difficult and unpopular decisions, thanks to which they transform threats into a chance of the value increase of their companies. However, it is emphasised that the developing ones include people, who co-create the reality, create the clients' expectations and needs, satisfy them, and think innovatively in the entire chain of the value creation.

The authors assume that manufacturing of a possibly large quantity of products within the framework of the product portfolio is an indicated activity, a strategy that should be implemented by the manufacturer from the perspective of the efficiency increase. In fact, it is noted that the higher the number of implemented products is, the greater probability of obtaining higher revenues, thanks to systematic reduction of costs elated to acquisition of the raw material used in the implemented manufacturing processes, is (Table 3).

The main problem that is faced by the manufacturer in case of the implementation of cast parts relates to the low price, at which the mentioned product can be

Table 3 Cast as a resource implying implementation effectiveness—research results

SW[a]	CKS [PLN]	Cast [PLN]	Cast %	CKP [PLN]	CKW [PLN]	CS [PLN]	Profit [PLN]	Profit %
[W-21]	17.60	17.60	100	3.00	20.60	28.50	7.9	38.35
[W-22]	15.50	15.50	100	1.00	16.50	26.50	10	60.61
[W-23]	17.60	17.60	100	2.60	20.20	55.00	34.8	172.28
[W-24]	62.00	62.00	100	5.70	67.70	180.00	112.3	165.88
[W-25]	6.40	6.40	100	1.50	7.90	22.00	14.1	178.48
[W-26]	145.00	145.00	100	10.80	155.80	330.00	174.2	111.81
[W-27]	43.00	43.00	100	4.80	47.80	120.00	72.2	151.05
[W-28]	350.00	350.00	100	40.40	390.40	550.00	159.6	40.88
[W-29]	31.90	31.90	100	6.40	38.30	70.00	31.7	82.77
[W-30]	145.00	145.00	100	13.00	158.00	350.00	192	121.52
							Average	112.36

Key: CKS, total costs of the raw material; CKP, total labour costs; CKW, total production costs; CS, sales price

[a]Product symbol [SW]: [W-21]—Wheel 0203960660, [W-22]—Front roller 0203962010, [W-23]—Carrier 0203976200, [W-24]—Housing 0203914630, [W-25]—Carrier 0204023630, [W-26]—Housing 0200214230, [W-27]—Wall 0203943040, [W-28]—Wheel 0200134640, [W-29]—Link 0200159720, [W-30]—Housing 0200213430

provided. In most cases, the price does not cover the costs related to the first implementation of parts: necessity of casting—cost from PLN 2500.00 to PLN 5000.00. As a result of strong competition among manufacturers of cast parts and agricultural machinery sub-assemblies, the manufacturer must take a decision on delivery of the product at the price offered by a competitive company or abandoning its implementation. In case of choosing the first option, the manufacturer must respect that with given implementation costs of parts, its delivery at a given market price can generate significant losses. In the event of refraining from the implementation, there is a probability of—a gradual loss—of the product portfolio attractiveness and reduction of the profit opportunities in the long-term perspective.

By considering different production variants—including the raw material purchase costs and labour costs—the model construction costs were not taken into consideration in the carried out analysis. Such action would require taking into consideration the sale of each of the tested cast parts. It was assumed that the implementation of parts included in the third group should be considered in the long-term perspective; repetitive investment.

The conducted analysis showed that the parts belonging to the cast group also generate a substantial—but the lowest of the tested ones—margin. The parts made of casts—without the cast model costs—generate profitability at the level of 112.36%, and at the same time, it is noted that the greatest productivity is generated by relatively cheap parts.

4 Conclusion

It is difficult to objectively assess effectiveness of the performed implementation processes without reliable measurement results. Thus, companies face many difficulties. How to design an implementation process? How to construct indicators of its assessment? In what way and how often should the product portfolio effectiveness be measured? These are the most common questions, to which entrepreneurs and managers look for replies. Unfortunately, due to editorial requirements on the paper volume and the main objective of the research, it is impossible to reply to all of them.

By initiating the research, it was assumed that effectiveness of the product innovation is a derivative of the raw material used in the production process of spare parts for agricultural machinery. In the course of the carried-out research, it was found that there is a possibility to categorise products taking into account a raw material—used in their production process.

According to the above fact, the following question arises: *In which of the adopted product categories the manufacturer should look for implementation opportunities constituting product innovations?*

In the context of such a set problem, the authors carried out a detailed analysis of products deliberately selected by the raw material. Such action was to estimate and specify whether implementation effectiveness of a given product is determined by a type of the raw material necessary for its implementation.

As a result of the carried-out research, it was determined that there is a relationship between the type of the raw material used in the production process of spare parts for agricultural machinery and effectiveness resulting from their implementation. The highest margin is obtained by the manufacturer as a result of the implementation of parts made of a rolled bar (group I). The average margin for products of this group is 224.51%. The above-average margin is also provided by the products belonging to the second group. The parts made of a sheet metal generate profitability at the level of 133%. The conducted analysis showed that the cast parts—belonging to group III—also generate a substantial—but the lowest of the distinguished ones—margin. The parts made of casts—without the cast model costs—generate profitability at the level of 112.36%.

At this point, it is worth noting that the company's competitive advantage is associated with obtaining the above-average profitability, the achievement of which is also possible thanks to minimising the costs related to the raw material supply implied by a given production process. In the context of the carried-out research, it was also found, which of the used raw materials generates the highest costs related to processing. In this field, it is important to look for the cost reduction opportunities, which, as a result, will affect the reduction of total production costs of a given product. The conducted research confirmed the authors in their belief that the basic raw materials used in the production process of agricultural machinery spare parts include steel bars, sheet metals and cast iron. In view of the above, it is possible to outline a general strategy aimed at "leaning" in terms of the consumed raw material.

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Institutions and Entrepreneurial Environment in Visegrad Four Countries and Finland

Frantisek Okruhlica and Marian Holienka

Abstract The main aim of the paper is to point out the differences in entrepreneurial environment institutional frameworks between the Visegrad four countries (the Czech Republic, Slovakia, Poland and Hungary—V4) and Finland. The comparison of institutions affecting entrepreneurship was based on creation and analysis of institutional profiles comprising of four pillars essential to understand the emergence of entrepreneurship—regulative, cognitive, normative and conducive dimensions. Our results suggest that entrepreneurial environment in V4 countries substantially differs from that of Finland. V4 countries lack in development of regulative attributes as well as in conducive dimension crucial for innovative entrepreneurship. Subsequently, different quality of environment is reflected in different quality of business activity, and its allocation between independent entrepreneurship and intrapreneurship.

Keywords Institutions • Entrepreneurial environment • Institutional framework • Visegrad Group • Finland • Entrepreneurial activity

1 Introduction

Nowadays dynamic technological and global changes are increasing the pressure on competitiveness of economies across countries and regions. There are successful countries able to sustainably secure welfare of their society, countries that make efforts to join this club, but also countries that fail in securing even the basic needs of their citizens. Across all of these, different forms of behaviour have evolved over the history, that either improve or decrease security and stability of social and economic environment. We talk about institutions that form the institutional framework of the economies.

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The main aim of the paper is to point out the differences in entrepreneurial environment institutional framework between Visegrad four countries (the Czech Republic, Slovakia, Poland and Hungary—V4) and Finland. While the V4 countries have gone through extensive transformation to become a part of the European Union and global economy, Finland belongs to successful European countries with similar size. Using the comparative analysis methods, we also aim to identify the broader context of differences in competitiveness and emphasize barriers of shifting V4 countries to success with this respect. We built on evaluation of renowned international organizations dealing with evaluation and comparisons of competitive ability of economies based on selected factors. Combinations of their results lead to interesting findings discovering the importance and role of institutional framework in relation to development of economy and society as such.

2 Institutions as Rules of Game

Capitalist market economy resulted from thousand years' evolution of shared values in the society and its economic activities. Values represent concepts and standards and act as reference points for norms creation in decision making among individuals. If at least two actors enter any interaction, they have certain expectations resulting into strategic uncertainties. If one of the parties involved does not fulfil the expectations, an interaction is perceived only as short-term, division of labour decreases, and transactions become limited, which negatively influences the development of specialization. On the contrary, a society that supports growth of welfare aims to reduce strategic uncertainties and extend the horizon of interactions between transactions' actors. This function is carried by institutions (Voigt 2008).

Institutional economy plays an important role in this respect, as it deals with the role of institutions for economic growth (Voigt 2008). New institutional economy studies the nature of transaction actors' motivation to participate in institutions' formation. It follows the definition by North (1990), who considered institutions as rules of game within society, i.e. humanly devised restrictions of interaction in the form of constraints and rules. Institutions signalize information on particular constraints, thus reducing the strategic uncertainty.

Institutions are linked with norms and shared values. In the history, language, family, religion, private ownership, customs and tradition have transformed to institutions as established norms of behaviour. Synergy between these norms organized and structured each interaction and internalization of norms, and tendency to penalize deviation. Creation of norms is also explained by the evolutional theory of games. Norms influence the subconscious actions of individuals so they select the conditioned cooperation to preserve their own reputation and favour. Thus, institutions support the system of reputation. Individual behaviour in repeated transactions results into normative expectations for the future among the other actors, which represents a cognitive side of the problem.

2.1 Types of Institutions

Members of society developed cooperation and specialization to solve interactions as successful transactions. This stimulated societies' attention to institutions and evaluation of institutional framework of particular economies. There are two generally accepted types of institutions—formal and informal institutions (Hučka et al. 2011).

Formal institutions have constitutional and legislative nature and political undertone. They represent an entire legal framework of an economy shaping economic behaviour of the members of society (Okruhlica 2013b). The most important are the institutions of ownership rights, ownership protection, business law, contractual law, independent judiciary, contracts enforcement, as well as labour and social legislation. Formal institutions can be enforced, and have several levels of importance, from lower legal standards, through national legislation, to international legal regulations, contracts and agreements. Development of civilization is closely linked to the role of state in the context of institutions (North 1981) affecting the free market economy (Stiglitz 1989).

Informal institutions represent the values and norms as components of cultural background of the society that became a base of societal arrangement. They result from spontaneous cultural evolution, based on collective selection resulting to adaptation to certain rule in the hope of survival. Civilizational evolution leads to recognition that voluntary respecting of certain rules enables mutual interaction and life without chaos and violence, as well as success in competition with rivals. Thus, they do not result from rational activities, but became an autonomous mechanism of social selection as long-term ethical traditions (Hayek 1984).

Literature also offers classification of institutions as external, i.e. rules established by state, and internal, i.e. rules formed and enforced within society (Voigt 2008), thus conceptually dividing state and society. As has been mentioned, institutions are evolving and changing, and their function is to reduce strategic uncertainties. Structure of both types of institutions depends on former evolution. The change has to be based on openness of interactions and combination of both types in the reaction to changes of economic environment.

3 Entrepreneurial Context and Influence of Institutions on Entrepreneurship

We assume that the combination and the state of institutions as a result of social and cultural development in particular economy will be reflected by quality of its entrepreneurial environment, as illustrated in Fig. 1.

Changes in structure of institutions influence the setting of entrepreneurial environment into two different fields—illustrated as black and white. If formal institutions thanks to developed informal institutions encourage predictable

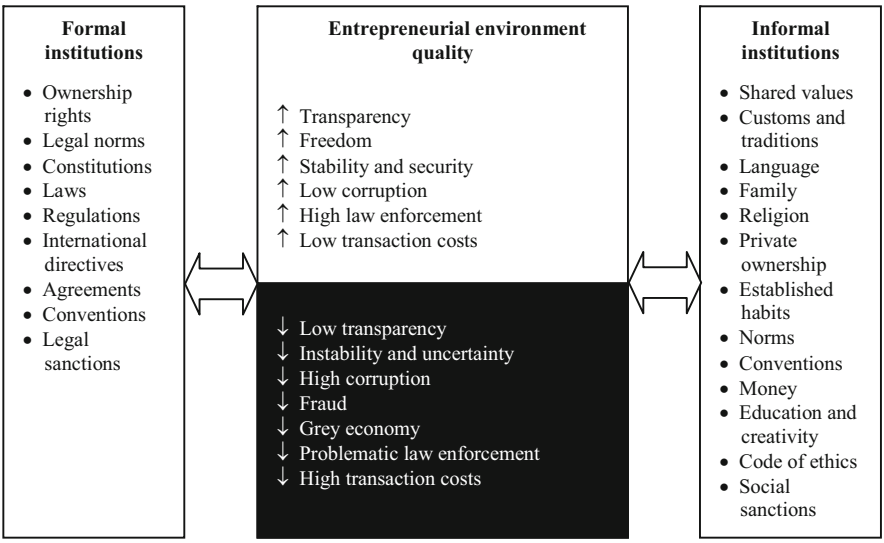

Fig. 1 Influence of institutions on entrepreneurial environment quality (Okruhlica 2013a)

behaviour, they positively influence transparency, stability, law enforcement, low corruption and transaction costs, entrepreneurial environment will be positioned in the white field of high quality. On the contrary, if informal institutions fail, it results into instability, high corruption and clientelism, limited access to information and low transparency, growth of grey economy and tax evasions, resulting into high transaction costs. Entrepreneurial environment with such parameters is risky and would be classified in the black field of low quality. Naturally, certain countries incline to support highly developed informal institutions before formal institutions, or have efficient law enforcement systems, and are classified in the white field entrepreneurial environment.

As presented in Fig. 1, the relationships are comprehensive (Voigt 2008). Differences in quality of institutions are the main reason for different economic performance between countries (Hučka et al. 2011). Thus, stagnant countries try to influence evolution of their own institutions by adopting legal norms of successful countries with highly developed culture and ethics, referred to as institutional xerox (Mlčoch 2005). However, this approach might not lead to desired results as institutions are frequently not compatible. As stated above, due to limited rationality and transaction costs, even positively meant institutional intentions may increase uncertainty. To increase economic growth and reduce transaction costs, changes in particular institutions should be transparent and efficient (Williamson 1996). This is the role of economic policy aimed at de jure and de facto convergence of institutions (Voigt 2008). Different approaches to this task result into differences between countries measured by indexes of renowned international institutions that will be presented further in the article.

Entrepreneurial environment is considered to substantially influence the entrepreneurial activity in an economy (Stenholm et al. 2013). Even though individual-level factors also play an important role related to activities of individuals, they are also affected by immediate interaction with economic or socio-cultural environmental factors influencing entrepreneurship (Krueger et al. 2000). According to Baumol's rules of game concept (1990) the importance of entrepreneurial environment lies not only in its effect on quantitative aspects of entrepreneurial activity, but mainly in the influence on its qualitative allocation. Baumol's theory is based on a hypothesis that it is not the supply of entrepreneurs or the nature of their goals, but the set of rules which dictates the ultimate effect on the economy via allocation of entrepreneurial resources. The previous research provided evidence confirming this concept (e.g. Sobel 2008).

The understanding of entrepreneurial environment and mechanisms of its effect on entrepreneurial activity growingly builds on the theory of institutions. Entrepreneurship is also a type of human interactions shaped by the institutions (Bruton et al. 2010). The theory of institutions, thanks to its applicability in specific areas, as well as its comprehensive coverage of factors influencing human actions, provides a proper basis to understand the entrepreneurial environment concept. Unlike the approaches building on internal perspectives or efficiency it also considers social forces (Barley and Tolbert 1997). Also, unlike the approaches inclining to culture as the dominant factor (e.g. Hofstede 1980) it also expands the attention to broad scope of factors potentially affecting entrepreneurial activity (Busenitz et al. 2000). Here we can recall the Baumol's rules of game concept (Baumol 1990) considering particular institutional framework components as rules of game shaping entrepreneurial activity in an economy.

3.1 Institutional Framework Dimensions from Entrepreneurship Perspective

In addition to traditional classification (North 1990), another entrepreneurship-specific classification of institutions has been introduced by Scott (1995) and further used by several authors in the field (e.g. Kostova 1997; Busenitz et al. 2000). It distinguishes between three institutional pillars affecting legitimacy achievement and it is crucial to understand the development of entrepreneurial activities—regulative, cognitive and normative institutions.

The *regulative pillar* considers the existing legislation and rules that promote or inhibit certain types of behaviour. It includes, for example, the nature of rules, their application and enforcement, influence of regulation on the level of risk linked with business (Baumol and Strom 2007), or access to resources (Busenitz et al. 2000). The *cognitive pillar* reflects cognitive structures and shared social knowledge shaping the selection and interpretation of information. The most important attributes affecting entrepreneurial activity covered within this pillar are perceptions of

uncertainty and attitudes towards risk (Dickson and Weawer 2008), opportunity recognition (Baron 2007; Arenius and Minniti 2005) and entrepreneurial self-efficacy (Krueger et al. 2000; Busenitz et al. 2000). Finally, the *normative pillar* comprises of norms, values, beliefs and assumptions socially shared and carried by individuals and affecting their behaviour. In particular, they shape social desirability of entrepreneurship as career choice (Krueger et al. 2000), orientation on industrial progress (Casson 2003), public attention to successful entrepreneurs (Lounsbury and Glynn 2001), uncertainty avoidance (Bowen and De Clercq 2008) or level of individualism (Dickson and Weawer 2008).

This classification has been further expanded by Stenholm et al. (2013) who introduced the so called *conducive dimension* especially related to high-impact, innovative and growth-oriented entrepreneurship. This dimension includes conditions essential for new innovations and knowledge-driven growth, such as "feeder" industries and institutions for such type of entrepreneurship, skilled workforce, sophisticated markets or quality high-education institutions. According to the authors, conducive dimension has no effect on quantity of entrepreneurial activity in an economy, but is closely related to its qualitative side by influencing innovative high-growth high-impact entrepreneurship.

In our comparison of institutional profiles in V4 countries and Finland we will employ the perspectives of regulative, cognitive and normative institutions (Scott 1995) together with the conducive dimension (Stenholm et al. 2013). We aim to provide a comprehensive picture, including conditions especially affecting innovative entrepreneurial activities.

4 Country Institutional Profile and Comparative Studies

During the last years, many empirical approaches that aim to measure and compare the quality of institutions across economies have evolved worldwide (Holienka and Pilkova 2015). Results of these empirical comparisons should indicate to governments and investors the state of institutions in particular economy. The most acknowledged and respected competitiveness comparisons, which will also be used in our study, include:

- Global Competitiveness Report (GCR) by the World Economic Forum (WEF),
- Doing Business (DB) report by the World Bank,
- Global Entrepreneurship Monitor (GEM) by Global Entrepreneurship Research Association (GERA) academic consortium,
- Index of Economic Freedom (IEF) by The Heritage Foundation in cooperation with The Wall Street Journal.

Composing the country's institutional profile substantially depends on the context (i.e. the purpose and perspective employed) in which it takes place (Holienka 2013). Our aim is to explore the institutional profile comprising the four dimensions that are crucial for entrepreneurial activity development, namely regulative,

cognitive, normative and conducive dimension. Thus, we build on the work of Stenholm et al. (2013) who proposed, constructed and tested the last of the above mentioned. Visualization of the institutional profile is presented in Fig. 2.

The regulative pillar is characterized through the concepts of business freedom, easiness of starting up and closing a business, as well as property rights situation. These concepts are operationalized using the Doing Business (BD) and Index of Economic Freedom (IEF) variables. Business freedom indicator within the IEF assesses the regulatory burden related to entrepreneurial activity. Easiness of starting up indicator (DB) is focused on steps, time, costs and capital requirements necessary to start a business, while easiness of closing indicator (DB) monitors time, costs, results and restart rate linked to cancelling a business and solving insolvency. Finally, the property rights indicator as a part of IEF evaluates to which extent individuals are allowed to accumulate private property.

The cognitive pillar is characterized through perception of business opportunities, social capital related to knowing entrepreneurs, and self-evaluation of entrepreneurial skills. These attributes are operationalized using the GEM adult population survey's aggregated national level variables. Opportunity perception indicator captures the share of adult population perceiving good opportunities to start a business in the near future in the area where they live. Knowing entrepreneurs indicator reflects the share of adult population knowing someone with

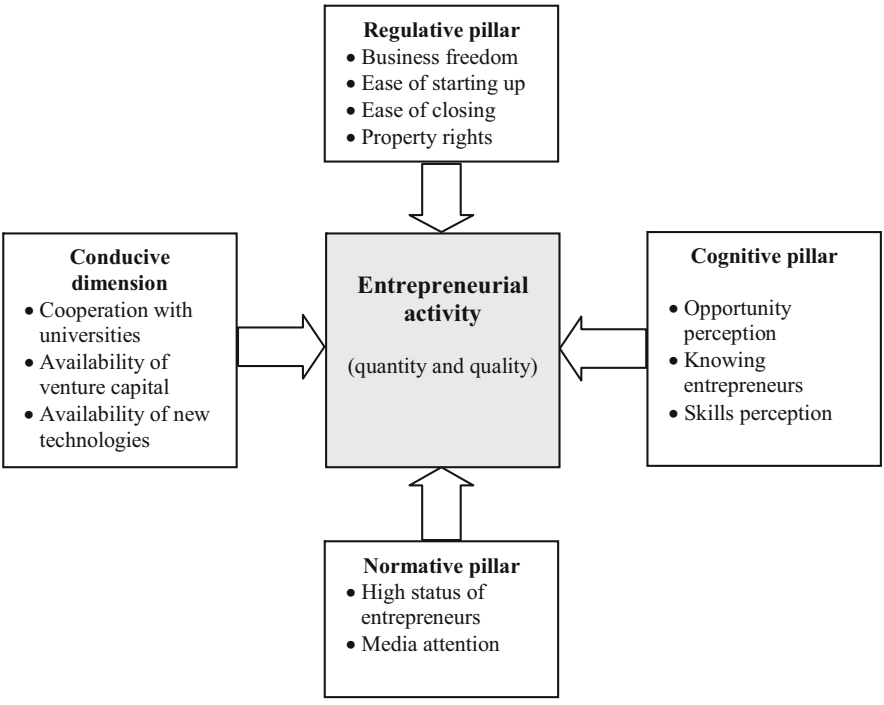

Fig. 2 Institutional profile of an economy (adjusted from Stenholm et al. 2013)

recent business start-up experience. Skills perception indicator shows the share of adult population that is confident about having skills, knowledge and experience required to start a business.

Normative pillar is defined by perceived societal status of entrepreneurs and media attention devoted to entrepreneurship. Both concepts are operationalized using aggregated GEM adult population survey's indicators. First, perceived status of entrepreneurs is reflected by the indicator capturing share of adult population agreeing that individuals successful in starting a new business enjoy high societal status. Second, media attention indicator reflects share of adult population that perceives frequent presentation of stories about successful new businesses and entrepreneurs in public media.

The conducive dimension, i.e. attributes especially related to high-growth, productivity and innovation focused businesses, is characterized through availability of new technologies and venture capital, as well as university-business cooperation. These attributes are operationalized using Global Competitiveness Report indicators. Namely, the university-business cooperation indicator evaluates the scope of cooperation between these sectors in research and development area. The venture capital availability evaluates access to such financing for entrepreneurs with innovative but risky ideas. The new technology availability indicator assesses the overall access to the latest technologies within an economy.

5 Comparing Visegrad Four Countries and Finland

Institutions affecting entrepreneurship in V4 countries and Finland were compared by creating and analysing their institutional profiles. The profiles were created based on empirical data studied on comparative sample of most developed economies (i.e. classified as "innovation-driven" according to WEF framework—Schwab 2013) in Europe, complemented by the V4 countries classified in the lower, transition stage (Hungary, Poland and Slovakia for 2013–2014 edition). Availability of GEM 2013 data was the main sampling criteria, resulting to total comparative sample of 23 economies. Data on DB, IEF and GCR indicators were further collected for the countries in the comparative sample to obtain their institutional profiles. To improve the robustness of the data average values of indicators during the last 3 years (2013–2015) were considered (where available). Due to different units across the indicators we normalized their values to 0–1 interval (0 = lowest value, 1 = highest value).

The analysis was performed in two steps. First, we studied institutional profiles of V4 countries and Finland to search for the main differences and common patterns in the overall profile and its specific components. Second, to explore the empirical evidence obtained from the entire sample, we performed a cluster analysis to group the evaluated economies according to their institutional profiles. We discussed findings from both steps in the context of both quantitative as well as qualitative indicators of entrepreneurial activity.

5.1 Comparing Visegrad Four Countries' and Finland's Institutional Profiles

Institutional profiles of V4 countries and Finland are presented in Table 1 and visualized in Fig. 3.

Institutional profile comparison clearly indicates that V4 countries significantly lack behind Finland. While Finland shows especially high evaluation of three dimensions (regulative, normative and conducive), V4 countries underperform particularly in these three. High overall evaluation of Finland is based on positive assessment of particular indicators, where it achieved the highest values among the entire comparative sample in 5 out of 12 indicators. On the contrary, the Czech Republic showed lower evaluation in case of three dimensions, Hungary in case of two dimensions, and Poland in case of one dimension.

Visualization of the internal structure of particular dimensions composing the overall institutional profile points out several interesting findings. First, high similarity of profiles is observed between Slovakia and Poland, with rather unfavourable state of regulative pillar, and particularly poor state of conducive dimension (with VC availability showing the highest evaluation in both countries). Also, very high similarities are shown in cognitive dimension, with extremely low opportunity perception, but very high rate of knowing entrepreneurs, and even extremely high entrepreneurial (over)confidence. Finally, normative pillar structure also shows similar pattern, with more favourable state in media attention to entrepreneurs. Second, while showing considerably high evaluation across indicators, Finland indicates especially low skills perception, i.e. the aggregated entrepreneurial

Table 1 Evaluation of institutional profiles of V4 countries and Finland (own elaboration)

Dimension	Indicator	CZE	SVK	HUN	POL	FIN
Regulative	Business freedom (Reg 1)	0.000	0.001	0.227	0.014	0.837
	Ease of starting up (Reg 2)	0.000	0.327	0.605	0.214	0.796
	Ease of closing (Reg 3)	0.660	0.500	0.000	0.505	1.000
	Property rights (Reg 4)	0.625	0.188	0.250	0.406	0.938
	Average	*0.321*	*0.254*	*0.271*	*0.285*	*0.893*
Cognitive	Opportunity perception (Cog 1)	0.138	0.117	0.127	0.272	0.555
	Knowing entrepreneurs (Cog 2)	0.176	0.798	0.433	0.844	1.000
	Skills perception (Cog 3)	0.518	0.941	0.368	1.000	0.205
	Average	*0.277*	*0.619*	*0.309*	*0.705*	*0.587*
Normative	High status of entrepreneurs (Nor 1)	0.000	0.336	0.642	0.258	1.000
	Media attention to entrepreneurs (Nor 2)	0.807	0.540	0.000	0.593	0.928
	Average	*0.403*	*0.438*	*0.321*	*0.425*	*0.964*
Conducive	Univ.-industry collaboration (Con 1)	0.379	0.101	0.427	0.164	1.000
	VC availability (Con 2)	0.477	0.391	0.150	0.223	0.991
	New technologies availability (Con 3)	0.405	0.344	0.343	0.000	1.000
	Average	*0.420*	*0.278*	*0.307*	*0.129*	*0.997*
Overall country evaluation average		*0.382*	*0.349*	*0.298*	*0.374*	*0.854*

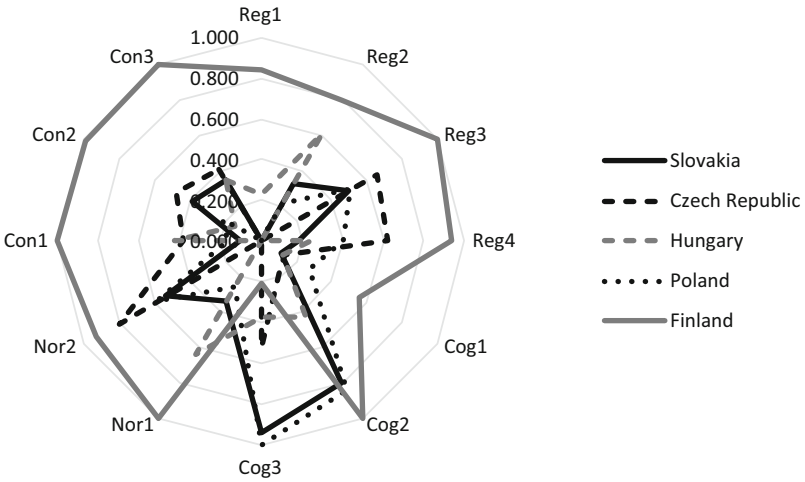

Fig. 3 Visualization of institutional profiles of V4 countries and Finland (own elaboration)

self-confidence. Thus, all V4 countries, especially Poland and Slovakia, outperform Finland. Third, except for Slovakia and Poland, there is no considerable common pattern of institutional profiles among V4 countries. The Czech Republic dominates in average evaluation of conducive and regulative, Slovakia in normative, and Poland in cognitive dimension.

5.2 Cluster Analysis Results

The cluster analysis based on empirical evaluation of particular institutional profile's components classified the examined economies into four clusters (Table 2). To demonstrate the level conformity of V4 region and Finland with their respective clusters we analysed their institutional profiles (Fig. 4).

According to the empirical evaluation of their institutional profiles, Visegrad countries were all classified in the same cluster (numbered "1"), which indicates certain similarity of their institutional profiles in the context of developed European economies. The cluster contains three other countries: Greece, Spain and Italy. All cluster members can be considered as modest or moderate performers in terms of institutional framework quality, and the cluster as a whole clearly underperforms the other clusters, with most significant lack in conducive pillar. Following the pejorative term "PIGS", this cluster could be labelled as "V4-IGS".

On the other hand, Finland was classified within the cluster (numbered "2") exhibiting the highest average evaluation of all four pillars, standing out especially in evaluation of conducive pillar. Thus, it belongs to the group of economies showing the most favourable conditions for development of both quantity, but mainly quality of entrepreneurial activities.

Table 2 Cluster members and average evaluation of institutional pillars (own elaboration)

Cluster	Cluster members	Cluster averages			
		Reg	Cog	Nor	Con
1	Greece, Spain, Italy, Czech Republic, Poland, Hungary, Slovakia	0.310	0.400	0.382	0.251
2	Netherlands, UK, Sweden, Norway, Germany, Finland	0.819	0.515	0.716	0.862
3	Belgium, Portugal, Ireland, Slovenia	0.730	0.406	0.626	0.574
4	France, Switzerland, Luxembourg, Estonia	0.528	0.506	0.421	0.716

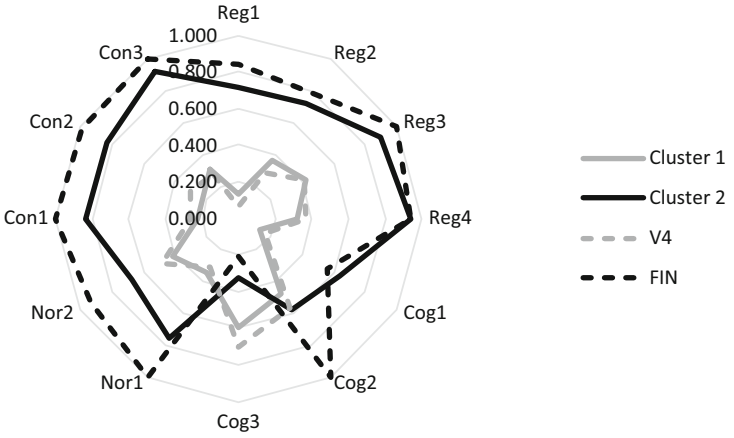

Fig. 4 Visualization of V4's and Finland's profiles with their respective clusters (own elaboration)

As we can see from the visualization in Fig. 4, both V4 countries and Finland conform well to their clusters in terms of their institutional profiles' structures, with Finland consistently outperforming its cluster in evaluation of particular components. Comparing the two, we clearly observe the already identified pattern, where V4 countries show significantly lower evaluation across all components, except of the two cognitive attributes—entrepreneurial networks and mainly entrepreneurial self-confidence.

5.3 Main Findings and Implications

Our analysis results into several main findings and implications. Looking at particular components, we clearly observe underperformance of V4 countries especially in dimensions under the competence of governments through their policies, i.e. in regulative and conducive dimension. This pattern, however, does not work other way round, as Finland exhibits high evaluation also in normative pillar, determined

by long-term societal evolution. Cognitive dimension as a whole shows similar overall evaluation, but substantial difference in its structure. High (over)self-confidence in V4 countries is mirrored by considerably modest self-evaluation in Finland. On the contrary, Finland shows the highest knowing of entrepreneurs and outperforms V4 countries especially in perception of good business opportunities.

Contrasting our findings with indicators of entrepreneurial activity further develops the context of understanding this phenomenon. We build on GEM indicators and consider multiple perspectives—quantity, quality, motivations, aspirations and allocation between independent activity and intrapreneurship (Table 3).

Favourable conditions seem not to affect the quantity of entrepreneurial activity. Finland, despite clearly more favourable situation, exhibits lower rate of early-stage entrepreneurial activity (TEA—a share of adult population actively involved in starting a business or owning-managing a business younger than 3.5 years) together with lower entrepreneurial intention (i.e. share of adult population expecting to start a business within next 3 years). Thus, the positive state of conditions to entrepreneurship, and especially favourable conducive dimension, show no effect on quantity of entrepreneurship, which is in line with theory (Baumol 1990) and previous research (Sobel 2008; Stenholm et al. 2013).

As for qualitative aspect of entrepreneurial activity, V4 countries show higher share of activity with high job creation aspirations (share of expected creation of 20+ jobs in 5 years on TEA) compared to Finland. It is a paradox, as favourable institutional framework in general, and especially in case of conducive dimension, objectively creates higher assumption for high-growth entrepreneurship in Finland. Optimistic aspirations in V4 countries might result from high self-confidence, despite lacking in regulative and especially in conducive dimension. Ambitions of V4 entrepreneurs are thus based rather on subjective self-confidence than on objective conditions supporting (high-growth) entrepreneurship. However, difference in institutional framework is better reflected in the structure of start-up motives. While Finland shows the lowest share of necessity entrepreneurs, the highest shares are in Poland and Slovakia, i.e. in countries with especially high self-confidence. Therefore, this high (over)confidence seems to be realized through necessity-based activities.

Finally, an interesting perspective is offered by confrontation of institutional framework evaluation and allocation of entrepreneurial activity. In Finland, a considerable portion of entrepreneurial capacity is realized through

Table 3 Evaluating entrepreneurial activity in V4 countries and Finland (own elaboration)

Indicator	SVK	CZE	POL	HUN	FIN
Entrepreneurial intention	18.8%	15.3%	22.4%	17.1%	13.4%
Total early-stage entrepreneurial activity (TEA)	9.6%	7.3%	9.2%	7.9%	6.6%
Share of high-growth-ambition activity on TEA	15.6%	12.1%	10.2%	16.4%	9.9%
Share of necessity-driven activity on TEA	31.1%	22.8%	28.0%	23.2%	15.0%
Employee entrepreneurial activity (EEA)	3.1%	NA	3.3%	1.8%	4.7%
EEA/TEA ratio	0.32	NA	0.36	0.23	0.71

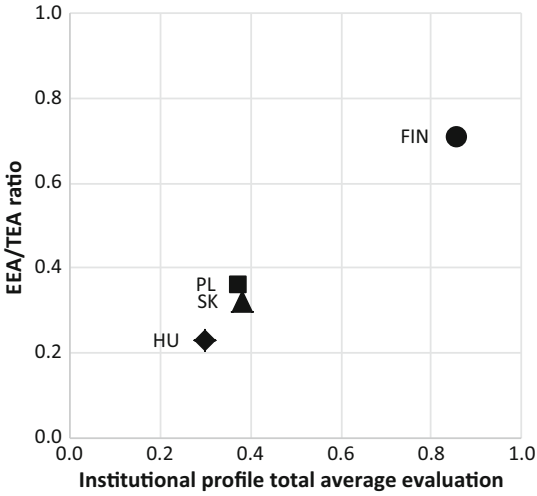

Fig. 5 EEA/TEA ratio vs. institutional profile total average evaluation (own elaboration)

intrapreneurship (measured by employee entrepreneurial activity—EEA indicator as a share of adult population conducting intrapreneurial activity for their employers. As seen in Fig. 5, positive state of institutional framework (0.85) is linked with quite high balance of entrepreneurial capacity allocation between independent activity and intrapreneurship (0.71). On the contrary, V4 countries (except for the Czech Republic due to missing data) form a rather consistent cluster with worse conditions for entrepreneurship and lower relative incidence of intrapreneurship. There are several possible explanations. First, in highly developed environment, opportunity costs of independent entrepreneurship are higher, as individuals can more easily find good employment, leaving the risky entrepreneurship as less favourable career choice. Second, strong corporate sector in developed economy realizes many projects (e.g. related to venture development, innovations and research) requiring and utilizing enterprising talent of employees. Thus, we can conclude that allocation of entrepreneurial capacity to intrapreneurship seems to be related to the level of institutional framework development. This finding is in line with recent WEF report (2015) pointing out the pattern of relationship between competitiveness and intrapreneurial activity.

6 Discussion

Our paper contributes to the body of knowledge on effect of entrepreneurial environment and its framework conditions on entrepreneurial activity in its quantity and qualitative allocation. First and foremost, our findings are in line with Baumol (1990) in suggesting that different rules of game in V4 countries compared to Finland are reflected in different pattern of entrepreneurial capacity allocation, with lower proportion of necessity-driven independent entrepreneurship and

considerably higher realization of entrepreneurial capacity through intrapreneurship in case of Finland. Also, overall entrepreneurial intentions and early-stage entrepreneurial activity in Finland is lower compared to V4 countries. Thus, in line with Sobel (2008) we agree that higher quality of entrepreneurial context does not necessarily imply "more" entrepreneurship but rather "better" entrepreneurship and "other" forms of realizing of entrepreneurial potential. Second, our findings are in line with findings of Stenholm et al. (2013) who pointed out the importance of so called conducive dimension in driving more sophisticated business endeavours. Finland exhibits higher evaluation of conducive dimension attributes, and entrepreneurial capacity is more significantly channelled through opportunity-driven activities and intrapreneurship. Third, our findings suggest that favourable "hard" conditions (such as regulative or conducive dimensions) are not equally mirrored in "soft" cognitive structures. While aggregate opportunity perception seems to correspond well with the quality of entrepreneurial environment, aggregate skills perception shows in our comparison rather opposite pattern. The potential explanations are twofold: (1) skills perception in population originates differently than opportunities perceptions; and (2) different skillset is required to succeed on more developed and sophisticated markets than on markets with higher proportion of simpler (often necessity-driven) activities.

As for the limitations of our approach, we understand that the selected set of indicators composing country institutional profile is not exhaustive. There are plenty of other indicators that could be considered for inclusion in our concept. However, construction of composite indices shall not attempt to include as many indicators as possible, but to select the most appropriate ones, following the purpose and perspective of the analysis. In our composition of institutional profile, we followed established perspectives on entrepreneurship-relevant institutions (Scott 1995; Kostova 1997) and their operationalization (Stenholm et al. 2013). Another limitation of our approach lies in the limited sample size. In order to base the comparison of institutions among the studied countries on relevant benchmarks, we included only developed economies in our analysis. Also, we were limited by the data availability for different indicators. However, our approach can be further replicated and challenged with expanded samples or timespans.

Our findings lead to several implications for entrepreneurship policy makers. First, different approaches to entrepreneurship development are required in different contexts, building on particular strengths and addressing particular challenges of the respective context. Second, entrepreneurship training and education in V4 region shall also focus on preparing potential entrepreneurs for alternative forms of expressing their enterprising capacity, such as intrapreneurial activities in their employment, as with further development of the region, an importance of such endeavors shall increase. Finally, as our results indicate alarming negative state of regulative as well as conducive dimension, policy makers shall focus their efforts on decreasing the regulatory burden on entrepreneurship, and on creating favorable conditions for developing conducive dimension attributes, such as R&D transfer, cooperation between business and academia, or access to alternative financing.

7 Conclusion

In conclusion, the results of our comparative analyses suggest that entrepreneurial environment in V4 countries substantially differs in terms of institutional framework from the environment in Finland. Countries in our region lack in regulative attributes as well as in conducive dimension, which is particularly important for innovative, high-growth businesses. The different quality of entrepreneurial context is reflected in allocation of entrepreneurial capacity. While in V4 countries we observe a domination of independent entrepreneurship, high share of necessity but highly ambitious in terms of growth in jobs provided, in Finland the capacity is more evenly distributed between independent, opportunity-driven and more realistic (in terms of expected job creation) activity, and intrapreneurship.

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A Random Walk of Stock Prices in Visegrad Group: Efficient Market Hypothesis

Yagmur Saglam and Gulcin Guresci

Abstract The purpose of this paper is to investigate Efficient Market Hypothesis (EMH) for Visegrad Group. The stock prices have been analyzed for the period between 1995 and 2014 with panel multiple structural breaks unit root test which is developed by Carrion-i-Silvestre et al. (2005). According to the findings, Efficient Market Hypothesis is accepted for Hungary, Poland, Czech and Slovak Republics (for all Visegrad Group). Stock prices have random walk. Due to the importance of monetary policy in equity markets the co-integration between interest rates and stock prices is also examined by the multiple structural breaks co-integration test which is developed by Basher and Westerlund (2009). This test considers the cross-section dependence between individual units. According to the test results; there is co-integration between interest rates and stock prices. Therefore, we could say that monetary policy decisions have an impact on investors' behaviors.

Keywords Visegrad Group • Stock prices • Multiple structural breaks

1 Introduction

There is a rising popularity to test EMH not only to understand the growth of equity markets but also globalization of financial markets. Equity markets are not national markets anymore because investors and stock holders from different markets around the world are chasing after the same information. Especially for developing economies the portfolio investments are the main source of short-run economic growth rate. The lack of infrastructure or technological hardware is pushing the developing or underdeveloped countries to a vicious circle which is the main obstacle in front of deep and broad financial markets and systems.

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EMH is an investment theory and implies that stocks always traded at their fair value (not under or overvalued-inflated prices) so it is impossible to beat the market. EMH means for investors to invest always in low cost portfolio and to do better thanks to randomness of the market. There are three types of EMH; strong (market is efficient and able to reflect all public and private information), semi strong (market is efficient and reflects all publicly available information) and weak form (market is efficient and reflects all market information) of EMH. Dong et al. (2013) mentioned that a number of previous studies which used panel data analysis to test limited number of equity markets and the causality for current level of global stock markets among cross-countries rejected semi strong EMH. It is not even weak form of EMH due to cross market historical levels of global financial markets indexes can affect only their current levels.

Lee and Lee (2009) define EMH as anything which is out of our knowledge that possibly affects future prices and appears randomly. According to Efficient Market Hypothesis, different economic development levels exist at the same time in the market. According to Fama (1970), there is a strong linkage between stock markets and real economy. The dynamic structure of stock prices shows random walk which is the weak form of EMH or mean reverting process. Ahmad et al. (2010), the mean reverting process (trend stationary) claims that current stock prices are predictable because they based on previous prices. Contrary to mean reverting process stock prices have unit root (not stationary) and any kind of shock will have a permanent effect on stock prices. That supports the weak-form of efficient market hypothesis. Random walk theory suggest that stock prices have the same distribution and independent. Future prices cannot be predicted based on their previous prices or information from the past because each time the stock prices will reach to a new equilibrium. The idea comes from stocks take a random walk and unpredictable path.

As Chaudhuri and Wu (2003), Narayan (2008) described that non-stationary has two components; a linear deterministic (trend stationary) one and a stochastic one (difference stationary-unit root). If EMH is accepted than stock prices have unit root (random walk) and unit root has permanent effects on stock prices via stochastic trend, if there is no unit root, the price level will return to its trend path in time. Lee et al. (2010) points out that one of the implications of random walk process is volatility of stock prices. The stock price volatility rises unstable over time and it shapes the direction of the investment decisions and strategies. According to Sharpe (1991), if stock prices are trend stationary it allows investors to earn higher than average returns because it is possible to forecast future prices which is based on past behavior and trading strategies. The specification of volatility is time-invariant so as described by Kanas (2001), Narayan and Smyth (2005) volatility is not constant over time.

Most of the empirical studies just examine the stationarity of stock prices to decide if EMH is accepted or rejected but they do not consider the interaction between monetary policy decisions and stock prices (equity markets). Ferreira et al. (2013) mentions that the stock markets are integrated with financial (asset management) and economic theory and Kurov (2010) found that monetary policy has a strong effect on stocks. It affects the investors' behavior and the environment of credit markets. According to Kumar and Lee (2006) the sensitivity (sentiment) of

an investor depends on FED (Federal Reserve) and ECB (European Central Bank) policies via expected stock returns. For that reasons, we also check the co-integration between interest rates [chosen as government bond yield according to the study of Ferreira et al. (2013) as an indicator of money demand] and stock prices (stock market turnover ratio % is chosen as a proxy according to study of Fama in 2013). The third one; structural breaks in a panel framework with cross-section dependence have been taken under consideration to not to have unbiased empirical results and not to recommend wrong policy implications. Especially there is a rising tendency of cross-section dependence in regional integrations.

In addition, in this study we chose four developing markets of EU which is called Visegrad Four (V4) and compared to developed markets they are more isolated from the capital markets, their financial markets and also finance sector indicators such as; exchange rates, interest rates (banking privatization is an exception) etc. are less liberal. This is why we applied the Carrion-i-Silvestre et al. (2005) panel data unit root test; Basher and Westerlund (2009) panel data co-integration test which considers multiple structural breaks. Thanks to these tests the effects of real economy (crisis, regime shifts) on financial markets can be seen. The reason for working with Hungary, Slovak Republic, Poland and Czech Republic is that there is a gap in the literature and a few studies are about them as a group of country. Selected countries have common history in the past and they have similar regulations and transition process for their financial markets after the collapse of Berlin Wall. Also they signed a declaration in 1995 to be part of the cooperation with common goals. Brazova et al. (2013), those countries tried to build democracy, freedom, modern market economy and integration into Europe. In May 2004, they became a member of EU after the enlargement policy of European Union and they promised to complete their political and financial regulations as soon as possible. The banking system was crucial with quick privatization policies which has called shock therapy.

The rest of the paper organized as follows. Section 2 presents data and methodology; reports and discusses the empirical results in Sect. 3, and conclusions and policy implications in Sect. 4.

2 Literature

Ahmad et al. (2010), used panel stationary tests which consider multiple structural breaks and cross-sectional dependence for 15 emerging stock markets. The data (stock prices) is collected from International Finance Corporation's EMDB for the period 1985–2006 and tested with not only Im et al. (2005), Carrion-i-Silvestre et al. (2005) stationary tests but also Maddala and Wu (1999) bootstrap method. The findings showed that stock prices follow a random walk and dependence.

Lee et al. (2010), studied on developed and developing countries to test efficient market hypothesis for the period between 1999 and 2007 with monthly data. The purpose of the paper to see whether the EMH is valid in different economic

development levels. The empirical model has been tested with panel data analysis. Stationary of stock prices examined by Carrion-i Silvestre multiple structural breaks test. The results gained from the application supported inefficient stock markets but it can be temporary and in the long term stock prices will return to their original equilibrium.

Nguyen and Muhammad (2011), tested Dhaka Stock Market for Bangladesh with Dockery and Kavussano's multivariate model. Panel data set is monthly and includes December 2006 till January 2007. The findings strongly supported that Dhaka Stock Market is not efficient. Poor developing countries have the same characteristics so their equity markets are not even weakly efficient.

Nguyen et al. (2012), examined weak form of EMH for Taiwan Stock Market. The data has been chosen for the period between 2008 and 2010, monthly and among the listed companies in Taiwan Stock Market. They adopted one more time the Dockery and Kavussano's (1996), multivariate model. Taiwan economy is emerging one but still smaller than Japan and United States of America (U.S.). Taiwan stock market has excessive volatility this is why null hypothesis of the EMH is rejected at any level of significance and it supports the idea that Taiwanese stock market is not informationally efficient.

Ferreira et al. (2013), the study analyzes three developed European Markets (France, United Kingdom and Germany) during the period 1999–2012. They picked up U.S. as benchmark for the empirical model. Different structural break unit root tests used for the analysis such as; Lumsdaine and Papell (LP), Lee and Strazicich (LS). Also with Gregory and Hansen test, the co-integration relationship tried to be detected at the possible presence of structural breaks. According to the results; the structural breaks which are identified at the end of 2010 is the reason for rejecting null hypothesis "there is no co-integration".

Dong et al. (2013), the purpose of their paper is to test weak form of EMH and how investors react different information about market indexes. For these reasons 37 most influential equity market indexes are selected from Wall Street Journal daily report. The Granger Causality test has been applied to the data set. The results indicate that the weak form EMH is rejected.

Ferreira et al. (2014), developed the study of Ferreira et al. (2013) with the dynamics of financial system and latest sovereign debt crisis in Europe. The stationary of time series analyzed with LP, LS, Bai-Perron and Ziwot Andrews tests for six European countries and used UK, Germany and France as a benchmark in 13 years-period. According to the results of Gregory-Hansen co-integration test; economies are interconnected with stock markets and integrated with each other, bivariate relationship found between interest rates and stock market prices.

3 Data and Methodology

This paper is testing the EMH hypothesis for Visegrad Group (Hungary, Slovak Republic, Czech Republic and Poland). The data is taken from World Bank Development Indicators for the period between 1995 and 2014. Due to lack of

data the previous years were not included. The data is annual and the natural logarithmic form of stock turnover ratio % (indicator of stock prices) and interest rates are existed. Firstly, Delta and CD_{LM} tests are applied to find out cross-sectional dependence and heterogeneity of variables. Later the unit root test developed by Carrion-i-Silvestre et al. (2005) is used to understand if stock prices are stationary or not. At the end, the co-integration between interest rates and stock prices has been tested with Basher and Westerlund (2009) multiple structural panel co-integration test. All the tests carried out with Gauss 10.0 program of econometrics.

3.1 Empirical Results

The previous studies mostly focused on serial correlation analysis or co-integration and causality tests to run efficient market hypothesis. The problem is that they do not consider structural breaks and there is still a debate in the literature about the stationary of stock prices because they have mixed (rejecting and supporting) results. Ferreira et al. (2014), structural changes (break or time shift in trend function) affect models with economic or financial indicators. According to Nelson and Plosser (1982) most of the time series are characterized with unit root and the shocks (external, internal) to these series have permanent effects. Lee et al. (2010) claims that structural breaks give more detailed information about behavior of stock prices generally related with atypical events such as; liberalization, integration, regulations etc.

Homogeneity of the variables has been examined via Delta test which is developed by Pesaran and Yamagata (2008). The panel data analysis has two dimensions; time and cross-sections. So it is not possible to assume that an external or internal shock which comes to one cross-section unit has no effect on the others. Homogeneity of the variables has an effect on the directions and structures of following unit root and co-integration tests.

$\widetilde{\Delta}$ shows the delta test statistics for small samples, $\widetilde{\Delta}_{adj}$ represents adjusted delta test statistics for big samples. According to the results on Table 1, the variables in the panel data set are heterogeneous. The value of probability is significant (smaller than 0.05). Therefore, H_0 null hypothesis is rejected. After Delta test it is also crucial to find out if there is cross-sectional dependence between units or not by CD_{LM} test which is developed by Pesaran (2004). The null hypothesis claims that there is no cross-sectional dependence. For the significance of test results Breusch-Pagan LM test statistic and for the big samples CD_{LM} (Pesaran 2004) probability, should be taken under consideration.

Table 1 Delta test results

Test	T-statistics	Prob.
$\widetilde{\Delta}$	2.336	0.010
$\widetilde{\Delta}_{adj}$	2.523	0.006

According to the results presented in Table 2, the null hypothesis is rejected. So there is a dependence between the cross sections. The Efficient Market Hypothesis is tested with PANKPSS unit root test in this study. The purpose of this test is to show that stock prices are trend stationary. PANKPSS firstly invented by Kwiatkowski, Phillips, Schmidt and Shin and later developed by Carrion-i-Silvestre et al. (2005). This test respects the existence of multiple structural breaks in different dates and numbers.

The stationary of panel data and breaks can be estimated separately for each cross-section units at the same time (Carrion-i-Silvestre et al. 2005: 160).

$$y_{i,t} = \alpha_{i,t} + \beta_i t + \varepsilon_{i,t} \tag{1}$$

i represents the cross section units $i = 1, 2, \ldots, N$ and t shows time dimension $t = 1, 2 \ldots, T$ when α is constant and β is coefficient (Carrion-i-Silvestre et al. 2005: 161);

$$\alpha_{i,t} = \sum_{k=1}^{m_i} \theta_{i,k} D\left(T_{b,k}^{i}\right)_t + \sum_{k=1}^{m_i} \gamma_{i,k} DU_{i,k,t} + \alpha_{i,t-1} + v_{i,t} \tag{2}$$

$$\beta_{i,t} = \sum_{k=1}^{m_i} \varnothing_{i,k} D\left(T_{b,k}^{i}\right)_t + \sum_{k=1}^{m_i} \delta_{i,k} DU_{i,k,t} + \beta_{i,t-1} + u_{i,t} \tag{3}$$

Regressions number (2) and (3) explain hypothesis of stationarity under the effect of two different multiple structural breaks. The first regression shows stochastic process. DU, is dummy variables. If $D\left(T_{b,k}^{i}\right)_t = 1, \ t = T_{b,k}^{i} + 1, 0$ and if $t > T_{b,k}^{i}, 0$, then dummy equals $DU_{i,k,t} = 1$. $T_{b,k}^{i}$ is the break point. *kth* is the break date for each *ith* cross-section unit. This test allows maximum five structural breaks. But in this study we followed Papell (2002); Harris et al. (2005) recommendations and allowed only three structural breaks. This is because the time dimension of the panel data set in this empirical model is not long enough. The choice of a larger number of breaks leads only to inaccurate estimations (Basher and Westerlund 2009: 509).

The null and alternative hypothesis of PANKPSS test is written as follows (Carrion-i-Silvestre et al. 2005: 162);

$$H_0 : \sigma_{s,i}^2 = 0 \quad \text{stationary} \qquad i = 1, 2, \ldots, N \tag{4}$$

$$H_A : \sigma_{s,i}^2 > 0 \quad \text{non-stationary} \quad i = 1, 2, \ldots, N \tag{5}$$

Table 2 Cross-section dependency test results for the model with constant and trend

CD test	T-statistics	Prob.
LM (Breusch and Pagan 1980)	15.360	0.018
CD LM 1 (Pesaran 2004)	2.702	0.003
CD LM 2 (Pesaran 2004)	−2.159	0.015
Bias-adjusted CD (Pesaran et al. 2008)	4.393	0.000

KPSS *LM* test statistic is adjusted by Carrion-i-Silvestre et al. (2005) in accordance with the assumption of long-term variance can be homogeneous or heterogeneous.

In Table 3, only unit root test results which belong to the models with trends are reported. m shows the number of break points and it is assumed to be 3 as mentioned above. According to bootstrap critical values of both homogenous (constant variance) and heterogeneous (variable variance) 5% significance (*) level the null hypothesis, that 'stock price is trend stationary', is rejected. Also individual KPSS test statistics are smaller than the calculated critical values for all levels (0.90–0.95–0.99). It is possible to say that for each country weak form of EMH is accepted. The stock prices have random walk and are not predictable based on previous prices or historical information. There is at least one structural break exists (1995–1996) for each country.

We examined the co-integration between stock prices (SP) and interest rates (chosen as government bond yield-IR) at the second part of the analysis to be sure that monetary policy has effect on stock prices and changes the direction of investors behavior. The chosen co-integration test has been developed by Basher and Westerlund (2009). It considers cross-sectional dependence and allows three maximum multiple structural. The null hypothesis and alternative hypotheses are written as follows. Null hypothesis claims that all individuals of the panel are co-integrated (Basher and Westerlund 2009: 508).

$$H_0 : p_i = 0, \qquad i = N_1 + 1, 2 \ldots, N \tag{13}$$

$$H_1 : p_i \neq 0, \qquad i = 1, 2 \ldots, N_1 \tag{14}$$

The specific LM (Lagrange Multiplier) test statistic is calculated as follows (Basher and Westerlund 2009: 508);

Table 3 Unit root test results for stock prices with trend

Panel A: Individual KPSS test and break dates								
Countries	**KPSS**	**m**	T_{b1}	T_{b2}	T_{b3}	**Finite sample critical values**		
						0.90	**0.95**	**0.99**
C. Republic	0.115	1	–	1995	–	1.103	1.672	3.475
Poland	0.090	1	–	1996	–	1.082	1.651	3.023
Hungary	0.293	1	–	1995	–	0.822	1.243	2.597
Slovak R.	0.141	3	1995	1995	1995	0.990	1.415	3.463
Panel B: PANKPSS test for whole of panel								
Model		**Test statistic**				**Probability**		
LM (λ) (homogeneous)		4.005				3.1002e–005*		
LM (λ) (heterogeneous)		4.994				2.9480e–007*		
Panel C: Bootstrap critical values								
Model		**0.90**		**0.95**		**0.99**		
LM (λ) (homogeneous)		35.883		66.737		155.93		
LM (λ) (heterogeneous)		37.632		48.068		79.514		

$$Z(M) = \frac{1}{N_1} \sum_{i=1}^{N} \sum_{j=1}^{M_{i+1}} \sum_{t=T_{ij-1}+1}^{T_{ij}} \frac{s_{it}^2}{\left(T_{ij} - T_{ij-1}\right)^2 \widehat{\sigma}_i^2} \tag{15}$$

S_{it}, refers to the residual vector of predictors which is similar to the Ordinary Least Squares method developed by Phillip and Hansen (1990). $\widehat{\sigma}_i^2$ represents the long-term variance estimator based on these residuals. The test statistic obtained by simplifying the above LM test statistic by taking the cross-section averages shows the normal distribution $N(0, 1)$ (Basher and Westerlund 2009: 508);

$$Z(M) = \sum_{t=T_{ij-1}+1}^{T_{ij}} \frac{s_{it}^2}{\left(T_{ij} - T_{ij-1}\right)^2 \widehat{\sigma}_i^2} \tag{16}$$

Maximum number of breaks is three. Critical values have an asymptotic distribution but probability (p^b) has bootstrap distribution. p^a refers to the asymptotic probability value. According to Table 4, the null hypothesis cannot be rejected because the bootstrap probability is over 0.05 and not statistically significant. There is co-integration between stock prices and interest rates (they move together).

It is easily seen from Table 5 that for Czech Republic and Slovak Republic, there are different structural breaks in different times. Respectively 1996, 2001 and 2008 for Czech Republic; 1995 and 2005 for Slovak Republic. There are no breaks in Poland and Hungary surprisingly. Each break represents another shock or regime shift (economic crisis or their short-long run effects) in selected countries' financial or real markets. V4 countries are pre-communistic countries and all of them declared their independence after the collapse of the USSR one by one. The transition process has started with Poland in 1991 under the enlightenment of privatization. The shock therapy, which is supported also by the IMF (International Monetary Fund) and other global institutions aims to catch up with developed European Countries as soon as possible with liberalization of trade and financial markets. Foreign banks were dominant in banking system because of quick

Table 4 Panel co-integration test results (Model with constant and trend)

	T-statistics	Bootstrap prob.	
No breaks	2.747	p^a *value*	0.003
		p^b *value*	0.000
Breaks	15.087	p^a *value*	0.062
		p^b *value*	1.000

Table 5 Break dates and numbers for the model with constant and trend

Countries	Number of breaks	1st break point	2nd break point	3rd break point
Czech R.	3	1996	2001	2011
Poland	0	–	–	–
Hungary	0	–	–	–
Slovak R.	2	1995	2005	–

privatization policy and the role of government was minimum in regulation process. Commercial banks plunged mostly in transactions with foreign exchange and trade volume surpassed in transition economies compare to earlier stages of transition. In general monetary policy had crucial impact on exchange rates and Visegrad Group adopted inflation targeting and during the period of faster money growth, domestic inflation numbers increased especially in Hungary and Poland. Because, the central bank did not give the priority to the price stability. So in the early stages of transition all V4 countries especially Czech and Slovak Republics faced with banking crises, financial crises and political crises. First the crisis in 1997 (Asia), 1998 (Russia), 1999 (Brazil) had important effects on all financial and exchange markets. Later the mortgage crisis which is started in USA at the end of 2007 created a chaos in real and financial markets. So the break dates we can see from Table 5 for Slovak and Czech Republic can be seen as a proof to worldwide shocks and their permanent effects and the importance to consider structural breaks for empirical studies.

4 Conclusions

Efficient Market Hypothesis has been tested many times for developed and developing countries. But there are not many papers especially written for Visegrad Group. To fill this gap and also contribute to the empirical literature we analyzed stock prices with panel unit root test which allows structural breaks. In addition, we consider the effect of monetary policy on equity markets. So the co-integration between interest rates and stock prices has been examined with another panel data test. This test takes into account not only cross-section dependence but also multiple structural breaks. According to results gained from the empirical part of the study weak form of EMH hypothesis is accepted for selected countries so stock prices are not trend stationary and have random walk; if stock prices are characterized by an efficient market it shows that there are no profitable arbitrage opportunities among stock prices. Changes in stock prices are mostly temporary and after the global shifts in financial markets, stock prices will return to the equilibrium. But in the long run there is co-integration between interest rates (demand for money) and stock prices therefore the monetary policy can change the sensitiveness of investors' behavior or credit markets. We assumed that in the long term, EMH is violated only if there is a consistent trend of lack of price convergence to an assets intrinsic value.

The openness of equity markets in European transition economies are less than other developed European countries. Maybe the governments' stock market intervention policies cannot be enough or effective in Visegrad Group. However, this does not mean that their financial markets, stock prices or investors will not be affected by global activities or are not interacted or integrated. Especially the growth rate in these countries depends on portfolio investments. Therefore, the stability or predictability of stock prices based on previous estimations is crucial for

their economies. Unfortunately for selected dates the stock prices have random walk and it is not possible to estimate investors behavior before. This is why other international macroeconomic indicators of these countries which have important effect on investors' decision can be arranged with another channel such as cooperation between government and institutional investors.

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Performance Measurement and Financial Results in Polish Enterprises: Empirical Evidence

Wanda Skoczylas and Piotr Waśniewski

Abstract The paper presents results of a study, which was conducted twice, in the years 2012 and 2014, examining relationships between the solutions adopted within performance measurement systems and financial performance (profit/loss) in Polish companies. In the light of the complexity of performance measurement systems, two approaches were adopted in the study. In the first approach, the focus was on separate and most frequently used individual elements of the system, considered as important. In the second approach, three types of systems were examined; they were created and defined in the process of gradual adding new elements from among those accepted for the study. The association between variables was evaluated with Pearson's chi-squared test for independence and Tschuprow's T coefficient.

The results obtained in the study do not provide a conclusive answer as to the association between given solutions adopted within performance measurement systems and financial results reported by companies. This association was found to be significant for selected elements of a performance measurement system in the study carried out in 2014. These elements include: having a strategy incorporating measurable goals, and linking performance measures to the incentive system in the group of companies whose strategies incorporate measures.

Keywords Performance measurement • Financial performance • Association analysis

1 Introduction

A knowledge-based economy displays several basic characteristics: an increasingly volatile inner and outer environment; a need for a more global view of the economy, market and environmental protection; a necessity to acquire knowledge and put it to use; recognition of the increasing role of intangible assets (knowledge, intellectual capital and information); transformation of the industrial society into an information society; and dependence of organizations' survival on the access to information

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and its skillful processing, and on the adaptation to change (Skrzypek 2011). In response to changes in business environment, changes in business management occur. High importance of information, which is essential to uninterrupted operation and growth of businesses, contributed to development of performance management. Effective and efficient performance management, which is focused on meeting stakeholders' goals, requires appropriate performance measurement systems to be designed and implemented.

The aim of the authors of this paper was to evaluate the associations between performance measurement systems of various degrees of complexity and financial results reported by Polish companies.

There are no standard definitions for performance measurement systems and performance itself available in the literature on the subject. Similarly, the outcome of development and implementation of performance management systems may be understood differently. In the paper, in the light of the complexity of performance measurement systems, first the nature of those systems was addressed. And so two approaches were adopted in the study. In the first approach, the focus was on separate and most frequently used individual elements of the system, considered as important. In the second approach, three types of systems were examined; they were created and defined in the process of gradual adding new elements from among those accepted for the study.

Next, possible consequences of implementation of a performance measurement system were discussed. Focus on meeting stakeholders' objectives makes the effects of development and implementation of a performance measurement system multidimensional. Franco-Santos et al. (2012) classified these consequences into three categories, as affecting: people's behaviour, organisational capabilities, and financial and non-financial performance. Financial consequences are the most general category as they incorporate all the other effects; in order to make a profit, i.e. achieve shareholders' goals, it is essential to satisfy the needs and goals of other stakeholders.

In order to evaluate significance of the association between performance measurement systems and profitability of Polish companies representing the non-financial sector, results of a study carried out twice, in the years 2012 and 2014, were used. In the study, samples of 300 companies representing the non-financial sector each were analysed using the CATI method, and the association between variables was evaluated with Pearson's chi-squared test for independence and Tschuprow's T coefficient (Hozer 1997).

The results obtained in this way were next compared and contrasted with results of other, earlier analyses carried out in this field.

2 Performance Measurement System and Effects of Its Development and Implementation

There are a variety of definitions of performance measurement to be found in the literature on the subject. A team of researchers led by Franco-Santos et al. (2007) reviewed 17 such definitions. As a result, the authors found that these definitions

emphasised only one or a combination of several aspects of performance measurement systems, and no set of characteristics was referred to in more than one definition. In particular, the following aspects were identified: elements understood as individual components comprising a performance measurement system, including e.g. strategic objectives, which are the starting point for designing activity measures that allow strategy monitoring, an integrated set of performance measures in four key areas: financial, customer, internal and employee, guidelines for rewarding employees, related to the level of achievement of performance targets; functions; tasks; roles; and processes. What this analysis lacks is the effects of implementation of systems in the form of improved efficiency of operations, which in turn leads to better performance.

In the light of this complexity of performance measurement systems and hence the difficulty to provide one standard definition incorporating all the above-mentioned aspects, following the examples of German (Speckbacher et al. 2003) and English (Franco-Santos et al. 2012) researchers, the authors adopted a complex classification of performance measurement systems. The following aspects were recognised as elements or individual components: having a strategy incorporating measures which comprise a consistent system of financial and non-financial measures, and linking measures to the incentive system. As a result, two approaches were adopted in the study. In the first approach the focus was on individual components of the system, whereas in the second approach—on three types of systems, which were created and defined in the process of gradual adding new elements from among those accepted for the study. As a result, the first type of performance measure systems (T1) is a strategy incorporating measures. The second type (T2) is a strategy incorporating measures which comprise a consistent system of financial and non-financial measures. The last type (T3) is understood as a strategy incorporating measures which comprise a consistent system of financial and non-financial measures that are linked to the incentive system.

The focus on meeting stakeholders' objectives leads to multidimensionality of the effects of development and implementation of a performance measurement system. Franco-Santos et al. (2012) classified these consequences into three categories, as affecting: people's behaviour (related to the actions or reactions of employees, e.g. participation, motivation and their underlying cognitive mechanisms such as perceptions); organisational capabilities, related to specific processes, actions or competences, which lead to competitive advantage, such as organisational learning; and financial and non-financial performance. Financial consequences are the most general category as they incorporate all the other effects; in order to make a profit, i.e. achieve shareholders' goals, it is essential to satisfy the needs and goals of all the other stakeholders, i.e. clients, deliverers, creditors, local communities and the state.

This study is rooted in the stream of previous research studies carried out so far in this field. Table 1 summarises the results of earlier studies on the impact of performance measurement on financial results of enterprises, indicating the direction of this impact.

Table 1 The impact of performance measurement on financial results—findings from selected studies (based on mentioned literature)

Study	Data collection	Level of analysis	Data analysis
Performance measurement system has a positive influence on financial results			
Banker and Potter (2000)	Archival research (18 hotels)	Business unit	Regression analysis
Crabtree and DeBusk (2008)	Survey and archival research (107 managers, IMA members)	Organisation	Paired t-test and Wilcoxon test
Cruz et al. (2011)	Case study (equity joint venture, 39 semistructured interviews and 11 other)	Organisation	Qualitative coding, construction of critical incident chart
Davis and Albright (2004)	Quasiexperimental design (2 divisions, 9 branches)	Business unit	Wilcoxon analysis
Ittner and Larcker (1998)	Archival research (1 firm)	Business unit	Regression analysis
Orlitzky et al. (2003)	Meta-analysis (52 studies and 33,378 observations of firms)	Organisation	Correlation meta-analysis
Laisasikorn and Rompho (2014)	Survey (101 firms)	Organisation	Statistical analysis
Endrikat et al. (2015)	Meta-analysis (40 studies and 22,201 observations of firms)	Organisation	Hedges-Olkin meta-analysis (HOMA)
Non-existent or very weak (positive or negative) association between performance measurement systems and financial results			
HassabElnaby et al. (2005)	Archival research (91 firms)	Organisation	Regression analysis, Cox survival analysis
Ittner et al. (2003)	Survey (140 executives)	Organisation	Correlation Regression analysis
Said et al. (2003)	Archival research (91 firms)	Organisation	Regression analysis
Studies with inconclusive findings as to this association			
Braam and Nijssen (2004)	Survey (41 b2b firms)	Organisation	Regression analysis
Griffith and Neely (2009)	Quasi-experiment (2 divisions of 156 branches and 121 branches of 1 firm)	Business unit	Regression analysis
Ittner and Larcker (1997)	Survey (249 firms) and interviews (44 firms)	Organisation	Regression analysis
Kihn (2007)	Survey and archival research (36 responses)	Business unit	Regression analysis with interactions

When summing up the concise overview of study results shown in Table 1, it should be highlighted that they are inconclusive, and frequently even contradictory, which gives rise to a need for further studies in this area and emphasises the requirement of certain diffusion of theoretical solutions to business practice.

3 Methodological Assumptions of the Study

The analysis was based on the results of a survey carried out with the CATI method among Polish enterprises representing the non-financial sector and employing more than ten people. The study was conducted twice, i.e. in the years 2012 and 2014, each covering 300 companies classified into three groups according to their size (100 companies in each group—small, medium-sized and big enterprises).[1] The sample was representative in terms of the NACE section for each size group. After excluding companies which did not provide complete information, the authors arrived at the final number and structure of companies as presented in Table 2.

The dependence between variables was evaluated with the Pearson's chi-squared test and Tschuprow's T coefficients (Hozer 1997). In order to satisfy the assumptions of the Tschuprow's T test,[2] the variable describing financial results of the analysed enterprises was divided into two categories: (1) profits made in all the 3 years of analysis, and (2) other results. This was justified by the qualitative nature of the explanatory variables, and the systemic decline in the research effort in each type of performance measurement system. As it is presented in Table 1 the correlation analysis as a data analysis method was also used in Ittner et al. (2003), and meta-analysis (basing on numerous researches) was used in Orlitzky et al. (2003).

4 Findings from the Study on Financial Consequences of Performance Measurement in Polish Companies

The first of the analysed relationships was the association between having a development strategy incorporating measurable goals and financial performance. Table 3 presents input data and results of statistics calculated for this relationship.

Based on the results of the chi-squared test for independence performed at the 0.05 significance level, there are no grounds for rejecting the null hypothesis that the examined variables are independent for the companies analysed in the year 2012. Opposite conclusions can be drawn for the study conducted in 2014. Tschuprow's T coefficients, in turn, reveal a low dependence, although for the year 2014 this dependence was considerably higher than in 2012. It means that the responses given in the survey suggest a dependence between having a strategy incorporating measurable goals and financial performance (results).

The next aspect examined in the study was the impact of a consistent set of performance measures on financial performance.

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[1]Research project on "Key performance indicators in company's performance management", project leader: prof. W. Skoczylas, in the years 2011–2015, Application No. N N115 436640, Contract No. 4366/B/H03/2011/40.

[2]Grouping classes with small population sizes.

Table 2 Number of enterprises under study by their size, year of study and financial performance

		2012			2014		
		Number of enterprises		% of enterprises reporting profits for three preceding years	Number of enterprises		% of enterprises reporting profits for three preceding years
	Size	Total	Of which: reporting profits for three preceding years		Total	Of which: reporting profits for three preceding years	
1	Small	92	65	70.7	89	59	66.3
2	Medium-sized	98	58	59.9	86	67	77.9
3	Big	93	70	75.3	86	64	74.4
Total		283	193	68.2	261	190	72.8

Classification of companies covered by both studies according to whether or not they had a consistent set of performance measures set against their financial performance is shown in Table 4.

In the case of these variables there are no conclusive findings as to dependence between the analysed elements. In the 2012 study, the highest number of companies reported having either a set of separate, unrelated financial and non-financial measures unique for each department, or a consistent set of the two types of measures. Nevertheless, only approx. 63% of companies in both groups reported profits for the three consecutive years under study. In the 2014 study, on the other hand, the highest number of responses (excluding the answer "I don't know, hard to tell") was found for companies which measured performance with sets of separate, unrelated measures unique for each department—either financial and non-financial, or financial alone (the latter being the second most popular answer). Considerably fewer respondents declared their companies had a consistent system of financial and non-financial measures. It is this group, however, that outperforms the former two in terms of the share of companies reporting profits in the 3 years preceding the study.

The results of tests evaluating dependence between these variables are summarised in Table 5.

Based on the results of calculations, no significant dependence was found (at the 0.05 significance level) between the degree of consistency of performance measure sets and financial performance for the two studies. Tschuprow's T coefficient also points to low dependence.

In the next step, the focus was on the distribution of responses provided only by companies which declared their strategies incorporated measures next to a descriptive part (type T1 performance measurement system). The results of this analysis are presented in Table 6.

After reducing the size of the sample to include only companies with a strategy incorporating measures for the year 2012, the highest number of companies is found

Table 3 A strategy incorporating measurable goals and financial performance of enterprises

Year of study	Number of enterprises having a strategy incorporating measurable goals	Total profits for three preceding years	% of enterprises reporting profits for three preceding years	Tschuprow's T	Chi-squared statistic	Degrees of freedom	p level	Conclusion
2012	107	76	71.0	0.090	3.261	2	0.196	Independent
2014	86	74	86.0	0.176	11.474	2	0.003	Dependent

Table 4 Number of companies according to the degree of consistency of their performance measure sets and their financial results

Specification	2012			2014		
	Number of enterprises		% of enterprises reporting profits for three preceding years	Number of enterprises		% of enterprises reporting profits for three preceding years
	Total	Of which: reporting profits for three preceding years		Total	Of which: reporting profits for three preceding years	
A set of separate, unrelated financial measures unique for each department	53	39	73.6	44	35	79.5
A set of separate, unrelated financial and non-financial measures unique for each department	78	49	62.8	81	60	74.1
A set of separate, unrelated non-financial measures unique for each department	5	5	100.0	9	6	66.7
A consistent set of financial measures	28	18	64.3	7	6	85.7
A consistent set of financial and non-financial measures	67	42	62.7	38	32	84.2
I don't know, hard to tell	52	40	76.9	82	51	62.2
Total	283	193	68.2	261	190	72.8

Table 5 The degree of consistency of performance measure sets and financial results

Year of study	Tschuprow's T	Chi-squared statistic	Degrees of freedom	p level	Conclusion
2012	0.105	7.041	5	0.218	Independent
2014	0.124	8.993	5	0.109	Independent

in the group having a consistent set of financial and non-financial measures. Nearly 70% of those companies report profits for the three consecutive years under analysis. In the 2014 study, the most numerous were companies with a set of separate, unrelated financial and non-financial measures unique for each department. The second in terms of size was the group of companies most advanced in developing a performance measurement system, i.e. those with a consistent set of

Table 6 Number of companies which declare having a strategy incorporating a set of measures according to the degree of its consistency, and their financial performance

Specification	2012			2014		
	Number of enterprises		% of enterprises reporting profits for three preceding years	Number of enterprises		% of enterprises reporting profits for three preceding years
	Total	Of which: reporting profits for three preceding years		Total	Of which: reporting profits for three preceding years	
A set of separate, unrelated financial measures unique for each department	10	7	70.0	10	9	90.0
A set of separate, unrelated financial and non-financial measures unique for each department	31	21	67.7	30	25	83.3
A set of separate, unrelated non-financial measures unique for each department	0	0	0	1	1	100.0
A consistent set of financial measures	13	8	61.5	5	5	100.0
A consistent set of financial and non-financial measures	36	25	69.4	21	18	85.7
I don't know, hard to tell	17	15	88.2	19	16	84.2
Total	107	76	71.0	86	71	82.6

Table 7 The degree of consistency of performance measure sets in companies with strategies incorporating measures, and their financial performance

Year of study	Tschuprow's T	Chi-squared statistic	Degrees of freedom	p level	Conclusion
2012	0.127	3.457	4	0.485	Independent
2014	0.209	8.438	5	0.134	Independent

financial and non-financial measures (type T2). Profitability analysis for both groups reveals that the latter outperforms the former: 85.7% of companies in the former group report profits in the 3 years preceding the study. Results of the statistical analysis of this association are shown in Table 7.

As can be seen in Table 7, there are no grounds for rejecting the null hypothesis that a type T2 performance measurement system and financial performance are independent. Tschuprow's T coefficient points to a small dependence between the analysed variables.

The last association under examination was the dependence between linking performance measurement to incentive systems of companies and their financial performance. The structure of enterprises according to the analysed variables is shown in Table 8, including also the share of companies reporting profits in all the 3 years covered by the study.

According to the data in Table 8, the majority of enterprises link performance measurement to their incentive systems, although they differ in the type (extent) of this link. In the 2012 study, the share of companies reporting profits in the three preceding years was smaller in this group than in the group where such a link is not found. In the 2014 study, in turn, despite a smaller number of companies which declare linking performance measures to their incentive system, the share of companies reporting profits in the 3 years is higher. It can be vividly seen particularly in the group of companies which link measures to their incentive systems for all the employees.

The results of the analysis of dependence between these variables are shown in Table 9.

Also in this study, based on the results of calculations, it is impossible to reject the null hypothesis that the analysed variables are independent (at the 0.05 significance level). Companies from the two studies showed a slight dependence.

After reducing the sample to the group of companies incorporating measures in their strategies (type T1), the structure of companies according to the link between performance measures and the incentive system was obtained as shown in Table 10.

Table 8 Structure of enterprises by the link between performance measures and their incentive system, and their financial performance

Link between performance measures and the incentive system	2012		% of enterprises reporting profits for three preceding years	2014		% of enterprises reporting profits for three preceding years
	Number of enterprises			Number of enterprises		
	Total	Of which: reporting profits for three preceding years		Total	Of which: reporting profits for three preceding years	
Yes, for all the employees	112	73	65.2	109	84	77.1
Yes, but only for selected groups of employees	110	76	69.1	82	58	70.7
No	61	44	72.1	70	48	68.6
Total	283	193	68.2	261	190	72.8

Table 9 Link between performance measures and the incentive system, and financial performance of enterprises

Year of study	Tschuprow's T	Chi-squared statistic	Degrees of freedom	p level	Conclusion
2012	0.049	0.946	2	0.623	Independent
2014	0.070	1.810	2	0.405	Independent

Table 10 Structure of companies according to the link between performance measures and the incentive system in the group of companies with strategies incorporating measures, and financial results of these companies

Link between performance measures and the incentive system	2012		% of enterprises reporting profits for three preceding years	2014		% of enterprises reporting profits for three preceding years
	Number of enterprises			Number of enterprises		
	Total	Of which: reporting profits for three preceding years		Total	Of which: reporting profits for three preceding years	
Yes, for all the employees	46	33	71.7	30	28	93.3
Yes, but only for selected groups of employees	48	34	70.8	40	31	77.5
No	13	9	69.2	16	15	93.8
Total	107	76	71.0	86	74	86.0

The data in Table 10 shows that the average best financial performance for the two studies also in this case is found in the group of companies linking performance measures to the incentive system for all the employees but the difference in favour of this dependence is rather insignificant. The results of analysis of the dependence between these variables are shown in Table 11.

The results of the 2014 study reveal that the link between the incentive system and performance measurement and financial performance of type T1 companies are dependent, and based on Tschuprow's T coefficient, this dependence is considered as moderate.

Further exclusions from the population reducing the sample to include only enterprises whose strategies include measures next to qualitative descriptions, and which adopted a consistent set of interrelated financial and non-financial measures (type T2) result in the structure of companies according to the links between performance measures and the incentive system as presented in Table 12.

Once again the data suggests that when both studies are considered, the average best financial performance is reported for companies which relate performance measures to their incentive systems for all the employees (type T3). Results of a statistical analysis of this dependence are summarised in Table 13.

Table 11 Link between performance measures and the incentive system in the group of companies with strategies incorporating measures, and financial performance of these companies

Year of study	Tschuprow's T	Chi-squared statistic	Degrees of freedom	p level	Conclusion
2012	0.053	0.426	2	0.808	Independent
2014	0.292	10.383	2	0.006	Dependent

Table 12 Structure of companies with strategies incorporating a consistent system of financial and non-financial measures according to the link between performance measures and the incentive system, and financial performance of these companies

Link between performance measures and the incentive system	2012		% of enterprises reporting profits for three preceding years	2014		% of enterprises reporting profits for three preceding years
	Number of enterprises			Number of companies		
	Total	Of which: reporting profits for three preceding years		Total	Of which: reporting profits for three preceding years	
Yes, for all the employees	15	12	80.0	9	8	88.9
Yes, but only for selected groups of employees	17	11	64.7	10	9	90.0
No	4	2	50.0	2	1	50.0
Total	36	25	69.4	21	18	85.7

Table 13 Link between performance measures and the incentive system in the group of companies having a strategy incorporating a consistent system of financial and non-financial measures and financial performance

Year of study	Tschuprow's coefficient	Chi-square statistic	Degrees of freedom	p level	Conclusion
2012	0.053	0.426	2	0.808	Independent
2014	0.328	3.196	2	0.202	Independent

It is impossible to reject the null hypothesis that the link between the incentive system and performance measurement, and financial performance are independent for type T3 enterprises.

5 Discussion

The analysis of associations between performance measurement solutions used by Polish enterprises and their financial performance does not provide conclusive answers. The significance of these dependences was proved by our results for

certain elements of performance measurement systems in the 2014 study. These elements include having a strategy incorporating measurable goals, where Tschuprow's T coefficient with financial results amounted to 0.176, and linking performance measures to the incentive system in the group of companies which declare having a strategy incorporating measurable goals and financial performance at the level of 0.292 (without specifying the type of measures and relationships between them).

These results are supported by the results of analyses performed with Cramér's V where the association between the type of measures and financial performance additionally proved significant (Batóg and Batóg 2016). Allowing for the size of enterprises in the study, and the employment of logit models led to identification of two types of performance measurement systems, i.e. those observed in big and medium-sized enterprises and those found in small enterprises. The former of the two types is usually formalised and well-structured and, as such, is more likely to yield higher revenues than the solutions adopted in small enterprises that lack the structure of a consistent system. In the evaluation of effectiveness and efficiency of performance measurement also studies which take into account the business sector and ownership structure are essential. An analysis of the correspondence has shown that advanced performance measurement systems in Polish companies are those found in big industrial companies with foreign capital. What is also noteworthy is the change in both approaches to measuring performance and their impact on financial performance over time. The results of the second study show a strong dependence between financial performance of Polish companies with: using financial and non-financial measures in performance measurement tailored to individual needs of business units, which, however, do not form causal chains; systematic measuring of performance; and measuring performance at different levels of organisation (the organisation as a whole, individual business units, individual employees) (Batóg and Batóg 2016).

The presented approach in the assessment of the relationship between the performance measurement system and financial results extends the scope of the earlier study of Batóg and Batóg (2016), but unfortunately taking into account the three levels of systems failure to confirm the relevance of the relationship. This applies to companies with T2 type performance measurement systems as well as to a narrow group of companies declaring possessing the most advanced T3 system type.

The results of the performance measurement system in Polish companies are consistent with results of studies by other authors such as Braam and Nijssen (2004), Griffith and Neely (2009), Ittner and Larcker (1997) and Kihn (2007). This is the first study conducted on such large, representative research sample in Poland. Thus, its results complement the results of world research on evaluation of performance measurement systems in Poland and the effectiveness of their implementation.

6 Conclusion

The study, despite inconclusive findings, recognises the need for further studies on performance measurement systems and their diffusion to business practice. The evaluation of associations between performance measurement systems and financial performance of companies conducted in 2 years separated by a 2-year gap pointed out to new solutions developed within performance measurement which influence financial performance in a positive way. The study focused, on the one hand, on selected elements and defined types of performance measurement (owing to the lack of one definition of a performance measurement system), and on the other—solely on financial performance (profit/loss) in the 3 years preceding the study, although, as shown above, the effects can vary. Development and implementation of a performance measurement system leads to a variety of positive effects. It enables the companies to: measure their performance in relation to the objectives of key stakeholders; explain strategic objectives; focus activities on critical processes, resources and changes in the organisation's environment; recognise (positive and negative) changes in performance; identify critical factors which require more attention; and provide a clear foundation for performance evaluation and rewarding employees for their performance. These positive aspects of a good system are a sufficient argument in favour of efforts aimed at implementing such systems. It is, therefore, essential to remove any information, capital, management quality, organisational and personal barriers to implementation of performance measurement systems so that they be: linked to the set of objectives of various stakeholders, sensitive to the changes in the inner and outer environment and flexible to incorporate dynamic change as well as provide accurate, up-to-date and desired information. Of equal importance is their efficiency in the organisational and functional dimensions, and wide acceptance of the implementation among managers and employees of the company. The systems are at the moment an instrument of efficient and effective management in companies (Skoczylas and Waśniewski 2016).

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The Risk of Growth Failure of the SME Sector Companies Operating in the Shadow Economy

Edward Stawasz and Daniel Stos

Abstract The paper presents issues related to the risk of growth failure of SMEs operating in the shadow economy and discusses determinants and paths of business growth. The participation of companies in the shadow economy affects their operations, and thus the processes of their growth. On the one hand, it stimulates the efficiency of companies while, on the other hand, it increases the risk of failure due to the possibility of overestimating the effects of income x through the inclusion of illusory effects in profitability estimation, which results in the emergence of problems in growth management. An analysis of the reasons behind the risk of growth failure of companies operating in the shadow economy was conducted on the basis of 131 Polish SMEs. The research shows that the risk rises with the increase in the share of the shadow economy in the financing of business growth. The risk of growth failure of companies operating in the shadow economy increases due to errors in management resulting from a lack of competencies and experience of entrepreneurs from the SME sector. It does, however, decrease when the use of an anticipatory strategy of growth, but increases when an ad hoc growth strategy is used.

Keywords Growth determinants of SMEs • Risk of growth failure • Shadow economy

1 Introduction

The shadow economy encompasses the undisclosed business activities that run complementary to legal business activities, limited to certain areas of operations. The scale of this economy in 2010–2015 was estimated at approximately 18.5–19.7% GDP in the countries of the European Union, and at 23–24% GDP in

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Poland (Schneider 2015; Schneider et al. 2015). Despite the scale of this phenomenon, studies on this issue have not been particularly intense until now and have mostly concerned the scope of the shadow economy and unscrupulous activities in the economy (Beloled 2005). These have focused to a much lesser extent on explaining the mechanism and behaviour of growth in companies in the shadow economy through the use of the variety of models available to economic sciences currently (Williams and Horodnic 2016; Welter et al. 2015; Hudson et al. 2012; Caca 2010). This statement is especially true for the Polish literature, in which there are a very limited number of works of this nature (Stawasz 2008).

Determinants of the success or failure during the growth of SME are well recognised. They include classic factors related to the entrepreneur, the company, with its strategy and management, as well as the financing of its growth. Business activities of companies in the shadow economy and their impact on business growth have been poorly explored (De Castro et al. 2014). This impact can, however, modify the importance of individual growth factors and affect the end result of growth. This paper formulates the hypothesis that the activities of small companies in the shadow economy can stimulate their business growth but may also increase the risk of growth failure due to the possibility of overestimating the effects of income by the inclusion of illusory effects in profitability estimation. It seems that the management of small businesses' growth under such conditions may require experience and high managerial competence in virtually all the functions and areas of business operation, as well as a well-thought-out strategy of growth and appropriate sources of financing.

The aim of the paper is to present selected issues concerning the impact of the shadow economy on the growth of SMEs. In particular, an analysis of selected growth factors was made. In its later section, the paper discusses the reasons behind growth failures of companies on the basis of 131 Polish SMEs. The final part of the paper presents three paths of growth of companies operating in the shadow economy.

2 Selected Growth Factors of SMEs

The concept of business growth is perceived broadly in the literature and includes quantitative changes (increases or decreases) in the amount of resources involved in business operations, subsequently leading to changes in the scale of activities (e.g.: production, profit, turnover, employment) and changes in the market share and diversification of the structure of business activities (Białasiewicz 2002). Business growth is considered a prerequisite for a company's survival and development in the long term, especially in situations when the markets are rising and the competitive position of a given company depends on an increase in its resources. It is emphasised that the priority of most start-up companies is to survive, and then to grow and reach a medium or large size, with the proviso, however, that this does not jeopardise the stability of the company and allows its owners to maintain control (Kirk 2008).

In terms of growth, companies can be divided into growing (positive growth) and non-growing (no growth or negative growth) ones. In the growing group of

companies, one can distinguish fast-growing companies, when business growth is higher than the average growth recorded by a wider group of companies. Another criterion of growth is the division into internal and external growth. In the process of internal growth, a company expands its own economic potential, in this case, tangible investments into specific assets play a fundamental role. This method of growth is a characteristic mainly of smaller entities with limited financial resources. However, following the path of external growth, a company aims to use the resources of business entities operating in its environment through mergers and acquisitions, as well as through activities in the shadow economy. External growth is generally of an abrupt nature, causing a rapid increase of production capacity, while internal growth is of a more moderate nature, allowing the harmonisation of key operational and financial processes.

Diversification of growth behaviours of new or small businesses is a result not only of the great diversity of the SME sector, but also of the great many determinants and factors that often remain in their complicated relationship with each other, having a diverse significance for the functioning of the wide range of companies (Wasilczuk 2005). The growth process in these companies is characterised by high irregularity, variability and sensitivity to the instability of conditions and circumstances, as well as reversibility. For these reasons, frequent changes in the path of growth of new businesses, or their entering a phase of stagnation or even decline, can be observed (Garnsey et al. 2006). In the literature, there is a consensus that small business growth factors are not universal or set for the different types of businesses, or their objectives and motives, position in the environment and organisational life cycle (Blackburn et al. 2013). In the integrated approaches, the need for a broader perspective on business growth is emphasised, including the analysis of more than one factor and approach. These generally include three growth factors associated with: the entrepreneur and the company, its strategy and management, as well as the financing of business growth (Wiklund et al. 2009).

Growth barriers in the case of SMEs are mostly determined by the entrepreneur. Key company decisions are generally taken by one person—the owner. The entrepreneur's personal characteristics and attitudes, experience and managerial skills determine how a small business is managed and the probability of its growth success or failure. Among the barriers related to the management of a small business, the following ones can be distinguished: (1) a low level of knowledge and skills, as well as low propensity for learning, (2) reluctance to delegate authority, (3) and focus on operational activities (Bartlett and Buković 2001).

It is stressed in the literature that a company in the process of growth gradually introduces changes in its management (Chaston 2010). When the scale of activities increases and the complexity of operations grows, the role of the entrepreneur and the simple organisational structures may not be sufficient for the effective management of growth. Professionalization of management is necessary, which means a greater role for the management team, increased formalisation, and routine operations carried out in accordance with the acquired experience and education associated with higher performance and efficiency (Kelley and Mirriam 2004).

The need for change in management also applies to companies opting to continue growth in the shadow economy. However, in this case, a significant change in the entrepreneur's attitude and behaviour can be much more difficult to achieve (Williams et al. 2009; Torrès 2001). Formalisation of management, the actual introduction of the delegation of authority and a transparent system of control in the company's business activity may be too much for the entrepreneur (due to the fear of high risk, the undisclosed nature of activities outside and inside the company, problems with acquiring specialists, etc.). The shadow economy can therefore hinder the professionalization of management, which increases the risk of growth failure.

When it comes to the issue of growth strategy and the success or failure of growth, there are two parallel processes of creating a growth strategy that may be mentioned: anticipatory and ad hoc. The first is undertaken consciously, and is analytical in its nature. It brings benefits to companies, especially when the concept of growth is implemented comprehensively and consistently. These requirements are difficult to meet, hence the formulation of a business strategy often takes place under the influence of ad hoc, variable, processes. These dominate in situations in which it is difficult to predict the future, when it is not fully clear what the appropriate strategy should be. This type of process usually applies to small-scale, fledgling companies, more responsive to the emergence of unexpected opportunities, problems and successes, which are strongly influenced by the aspirations and intentions of their owners (Christensen and Raynor 2003). This may also apply to companies operating in the shadow economy embarking on projects aimed at their rapid growth in response to perceived market opportunities (Williams et al. 2009; Stawasz 2008). The adoption of the basis for the formulation of a growth strategy may be crucial to the success or failure of growth, as it determines self-sustaining spirals initiated by uncontrolled growth (appropriate or inappropriate) that is a result of an anticipatory or ad hoc process.

3 Real and Illusory Effects of the Shadow Economy as a Factor Influencing the Process of Business Growth

The risk of failure in the process of the business growth of companies operating in the shadow economy is associated with the effects of income from the shadow economy. These result from underestimation of entrepreneurs' income due to the undeclared part of earnings from services rendered. Potentially, the effects of the shadow economy may equal the rate of income tax and undisclosed income:

$$E = duQ \tag{1}$$

where:

E—potential effects of the shadow economy,
d—income tax rate,

u—share of the shadow economy in total earnings,
Q—earnings.

In the later part of the paper, the effects of the activities in the shadow economy are divided into two types: real effects (E_r) and illusory effects (E_i).

$$E = E_r + E_i \tag{2}$$

Real effects are a "risk premium" for operating in the shadow economy and result from the "tax shield" arising from: (1) disclosure of only a part of earnings as revenue, while the remaining part goes to the owner-investor in the form of untaxed income and (2) an increase in the entrepreneur's costs resulting from the owner-investor's fictional (simulated) earnings.

If the rate of undisclosed income allows the entrepreneur to obtain revenues that do not incur losses, then, in addition to undisclosed income, the investor can also obtain disclosed income, i.e. revenues from investments whose source is on the balance sheet profit. In this situation, all the effects of the shadow economy, seen as the sum of unpaid taxes from undisclosed earnings, constitute the real effects of the shadow economy.

If, however, the scale of the shadow economy is so large that disclosed earnings, that is, revenues, do not cover costs, the real effects no longer grow, due to the fact that illusory effects appear. The individual types of effects can be calculated on the basis of data on wages, revenues and costs as follows:

$$E_r = \begin{cases} duQ, & P - K > 0 \\ duQ, & P - k < 0 \end{cases} \tag{3}$$

where:

P—revenues,
K—costs.

There is no point increasing the rate of participation of the shadow economy in business activity over the threshold $u' = (Q - K)/Q$, since, despite an increase in the level of risk, the risk premium E_r no longer grows, stopping at the level $E'_r = d(Q - K)$ (Fig. 1).

In practice, the entrepreneur's balance sheet losses are not a signal for the investor to reduce or eliminate the shadow economy, on the contrary, they can enhance the tendency to increase its size, thus increasing the risk of bankruptcy. Through an increase in the rate of illegal income, the investor attempts to compensate for the losses shown on the balance sheet, believing that the effects of the shadow economy continue to increase by the amount of duQ.

If the scale of the shadow economy is so large that documented earnings, that is, revenues, do not cover the costs, then we are dealing with illusory effects which are not reflected in the income of the owner. Illusory effects are effects that equal the difference between undisclosed income (i.e. unadjusted for the entrepreneur's

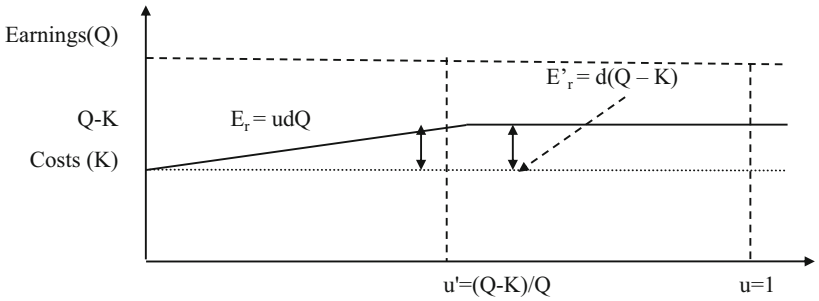

Fig. 1 The impact of the share of the shadow economy in earnings (Q) on its real effects. u′—share of the shadow economy in business activity above which the real effects no longer grow. Source: own elaboration

financial results, whether up or down, for profit or for loss) and the real effects. They enhance the risk of failure in the process of business growth, as they are used for estimating sources of financing growth projects. Therefore, the identification of the circumstances and scale of these illusory effects is highly important in the process of the assessment of the impact of the shadow economy on the risk of failures of growth projects. The scale of illusory effects can be calculated as follows:

$$E_i = \begin{cases} 0, & P - K > 0 \\ d(u-1)Q + K), & P - k < 0 \end{cases} \tag{4}$$

The above-presented considerations were made under the assumption that the entrepreneur does not use external capital. However, this assumption is not realistic, especially when the entrepreneur implements growth projects or when the company's financial situation worsens. In the situation when the entrepreneur uses external capital, activities in the shadow economy must be limited, in view of the need to service debt. By the mere fact of incurring financial expenses (interest, commissions, credit security costs), the upper limit of real efficiency of the shadow economy decreases, due to the emerging financial expenses.

Taking out a loan is associated with incurring additional costs alongside operating costs. These include interest charges, commissions, credit security costs that, in a way, "move back" the optimal share of the shadow economy from the position u′ (before incurring the cost of borrowing) to the position u" (including the cost of borrowing). The company abruptly falls into a state of financial imbalance caused by an increase in the illusory effects.

The role of external capital increases as a company grows, thereby the upper limit of the real efficiency of the shadow economy is reduced. The assessment of the efficiency of the shadow economy by the investor, however, does not change, hence the level of illusory effects increases.

Not recognising the upper limit of efficiency u′[1] in the assessment of the efficiency of the shadow economy, the entrepreneur expands the size of the shadow economy, hoping that this will ensure an increase in the capital which is lacking.[2]

4 The Impact of the Shadow Economy on the Process of Business Growth

The research conducted on 131 Polish SMEs in the years 2007–2012 indicates that activities in the shadow economy are undertaken intentionally (Ropęga and Stawasz 2014). These activities allow the business to overcome any shortage of capital and allow the business owners to gain market and entrepreneurial experience. The prevailing customs in a given industry also have some impact on the decision concerning entry into the shadow economy. The most popular activities in the shadow economy are the employment of a person without the signing of an employment contract and conducting unregistered sales.

4.1 The Impact of the Shadow Economy on Business Growth

The research divided the companies (according to the criterion of employment) into growing and non-growing ones, and, based on their rate of participation in the shadow economy (as measured by the share of unregistered sales in turnover compared to the average in the industry), into companies with a low share (below the industry average) and companies with a high share (above the industry average). All the companies can be specified as operating in the shadow economy, however, to a significantly varied extent. Growing companies with a low share of the shadow economy dominated (44.3% of the sample), while growing companies with a high share of the shadow economy constituted 16.5% of the sample.

The research attempted to estimate the risk of economic failure in the process of growth of companies operating in the shadow economy, measured on a scale of 1–5 in relation to the risk typical of the industry, where 1—means a very low risk and 5—means a very high risk. The average risk of failure in the process of growth was estimated as moderate, higher by 2.3 points than typical industry conditions. A relatively lower risk applies to companies with a low share of the shadow economy. The risk increases when the rate of participation of companies in the shadow

[1]The upper limit of efficiency of the shadow economy u′ means its share in earnings Q, in which the real effects in the shadow economy measured as savings on income tax udQ, grow.

[2]This is confirmed by the results of the research conducted, which indicate that a shortage of capital is considered the primary source of activity in the shadow economy.

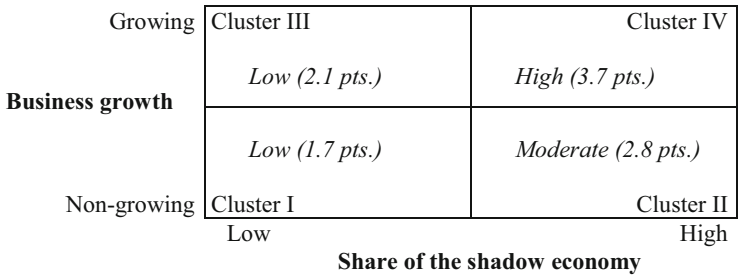

Fig. 2 The distribution of the risk of failure: company growth and their rate of participation in the shadow economy

economy grows, and the highest risk concerns growing companies with a high share of the shadow economy in business activities (Fig. 2).

4.2 The Paths for Growth of Companies in the Shadow Economy

Based on the research conducted, three main growth paths of varying nature in terms of the impact of the shadow economy on real effects of the companies in relation to accounting results can be distinguished.

The first path is the path of stable growth, in all its phases, limited by the rate of internal or sustainable growth. This path is characterised by a stable rate of real effects. Activities in the shadow economy are "under control" and the scale of the shadow economy is adjusted so that accounting results hover around zero. This control, however, is of a "catch-up" nature, which means that a negative result in one period creates the conditions for the reduction of the rate of participation in the shadow economy, which in the next period causes a positive result, and this encourages an increase in the share of the shadow economy, etc.

The second growth path is characterised by a phase of strong unsustainable growth preceded by excellent results in the phase of growth initiation. The real effects in this phase are so positive that activities in the shadow economy reduce the rate of official results, despite there being no balance sheet losses, as the intention to use external capital disciplines the activities in the shadow economy so that official results would guarantee a positive credit rating. The occurrence of failures in this phase may lead to the need to take action in order to "improve" accounting results in relation to real effects, and to temporarily abandon activities in the shadow economy. However, after successful restructuring, the vast improvement in the results prompts an increase in the size of the shadow economy, limited by the need to show "correct" accounting results.

The third growth path is growth that ends in the failure of restructuring and the bankruptcy of a company. Case studies indicate that the probability of this scenario

occurring is greater (the unsustainable growth is quicker, the share of debt in the financing of this growth rises faster, and the results of this growth in the initiation phase are better) when the share of the shadow economy is high. An attempt at undertaking restructuring prompts the company to temporarily reduce the size of the shadow economy, but when the failure of restructuring seems probable, then activities in the shadow economy, in the final stage, may even increase.

4.3 Typical Characteristics of the Analysed Cases for the Three Paths of Growth

The interviews included ten companies operating in the shadow economy. A critical analysis of three cases typical of the three paths of growth was carried out.

Case One

This case concerns a company established in the early 1990s. The initial activity undertaken was in the form of a building materials depot, with a range of goods mostly for agricultural holdings. After 3 years, its business activity was expanded to include the production of simple construction materials.

Growth Strategy

The second half of the 1990s brought a great opportunity to increase sales of building materials produced by the company itself in the fast-growing segment of summer house construction. The company owning the building materials depot and undertaking the production of additional construction material proved to be very competitive compared to other suppliers of such materials. The owner then took the decision to take advantage of an emerging market opportunity by investing in modern equipment for the production of building materials and the means of transport for these materials, as well as increasing the number of employees threefold. The implementation of the prepared ad hoc strategy of rapid growth through market expansion required large capital resources.

Problems with the financing of this business growth and perturbations in cooperation with the bank were the reason for undertaking a repair restructuring and implementing a growth strategy based on a well-thought-out approach for the development of the company. After the period of restructuring, both the commercial part and the newly created production company entered a path of sustainable growth.

The Share of the Shadow Economy in the Entrepreneur's Earnings

The rate of participation in the shadow economy grew greatly, as 30–40% of the produced construction materials were sold in an unregistered way. After the period of restructuring, activities in the shadow economy continued in the commercial company, constituting 10–15% of its turnover.

Income Effects of the Shadow Economy

The entrepreneur used simplified accounting, indicating a small income for taxation purposes, in an attempt to avoid losses from activities shown in official reports.

Operating in the shadow economy, the entrepreneur tried to demonstrate significant profitability of retail, neutralised, however, by the shadow economy in the area of production and sales of building materials. The total, official, profitability of business activities was low, although the income—particularly from the sales of building materials produced in-house—was high.

In the first period of activities, only high, and real, effects of the shadow economy occurred. However, when the financing of activities dwindled and losses occurred in the period of rapid growth, the entrepreneur did not decrease the share of the shadow economy in his business activities and illusory effects appeared on a large scale. By reducing the rate of participation in the shadow economy, it was possible to reduce or even compensate for the financial losses, without tax consequences. The entrepreneur, however, still believed that maintaining the level of shadow economy would yield the effects of reducing the tax burden.

Competencies of the Management

This business activity was undertaken by a young person with a general secondary education and little professional experience, performing both the function of owner and entrepreneur. The competencies of the entrepreneur running the company were limited to his current commercial activities (experience acquired while working in a construction company in sales), whereas in the area of management and finance his experience was low. When the entrepreneur found himself in financial difficulties caused by the bank's termination of the revolving working capital credit agreement and its request of staged credit repayment, he took professional advice.

The Risk Associated with Activities in the Shadow Economy

As a result of investments made, revenues and income (undisclosed and disclosed) grew dynamically, yet the demand for working capital continued to increase. Official financial results, however, were low. The renewal of the revolving working capital credit happened to fall in the unfavourable period of a seasonal drop in demand for building materials and the bank assessed the negative results of the evaluation of the company's financial situation, prepared on the basis of the official accounting data. Fiscal audits also intensified, which increased the risk associated with activities in the shadow economy.

The End Result of the Process

The period of rapid, uncontrolled growth led to a negative financial situation of the company and perturbations in cooperation with the bank. The success of the restructuring plan improved the financial situation of the commercial company and the production company so that they entered a path of stable, sustainable, growth with a small share of the shadow economy in their business activities.

Case Two

The company started its business activity in 1997 in the form of a civil law partnership in the fast-growing industry of technical products. Two co-owners, with a higher technical education, started business activities overseeing the process of supply and installation.

Growth Strategy

The professional approach to business activities on the part of the co-owners resulted in the development of a growth strategy for the company for the years

2000–2010 based on a well-thought-out approach to the development of the company, anticipating a rapid increase in turnover in the domestic market through expanding its market offer. In the year 2000, a joint stock company, which took over the rights and obligations of the existing partnership, was established. Thus, a local company employing a few persons developed into a company successful also in foreign markets. A particularly rapid development process started in mid-2000. Capital for financing the company's rapid growth was obtained in the form of investment bank loans and from issuance of shares. The investments constituted an important element of the prepared strategy of expansion in the domestic and overseas market. As a result of the investments made, tangible assets increased in the years 2001–2008 by approximately three times, and there was also a threefold increase in revenues from sales.

The Share of the Shadow Economy in the Entrepreneurs' Earnings

Initially, the rate of participation in the shadow economy was significant, though it did not exceed 30% of earnings. This level of shadow economy, however, allowed the company to arrange a reasonably efficient system of financial settlements between the co-owners, the product suppliers and the recipients of services. The shadow economy also encompassed part of the salaries of the employees, although all personnel were officially employed. Official purchases, the employees' salaries and the co-owners' consumer income were covered by undisclosed revenues from sales of services. The rapid increase in the size of business activities allowed the reduction of the share of the shadow economy to 10–15% of the total earnings.

After the effective financial and asset-related restructuring, activities in the shadow economy ceased to be important, but were maintained in the small, initial segment of small and medium-sized companies, providing a complementary source of personal income for the two shareholders.

Income Effects of the Shadow Economy

Initially, the low turnover allowed the use of simplified accounting and encouraged the expansion of activities in the shadow economy through non-registered purchases from small producers and sales of some installation-related services. The rate of participation in the shadow economy at no time exceeded 30% of earnings. Despite the significant share of the shadow economy, the declared revenues were much higher than the costs, therefore, both business partners achieved high undisclosed annual income.

When the size of business activities of the joint stock company increased threefold, despite the fact that the share of the shadow economy decreased to 10–15% of the total earnings, the level of undisclosed revenues increased by 50%.

Competencies of the Management

The two business partners that started their business activities in the form of a civil law partnership and after 3 years established a joint stock company were a professional management team with a higher technical education and experience in supervising the process of supply and installation.

Systematically increasing the volume of sales was a result of effective marketing activities supported by analyses as well as consistently implemented growth plans

developed in the process of anticipatory decisions, rather than ad hoc emerging pressures or opportunities. The managers placed a strong focus on innovation by obtaining numerous patents, and introducing into the market products under registered trademarks.

The Risk Associated with Activities in the Shadow Economy

The level of risk of the company's activities in the shadow economy was controlled despite the crisis caused mainly by external factors. During the periods of profitability, the level of the shadow economy was kept under control, and in times of crisis, this form of increasing income was entirely abandoned. Thus, it can be said that, in this case, there were only real income effects and no illusory ones.

The End Result of the Process

The shadow economy, though of a considerable size, was not a factor enhancing the risk of growth failures. The income from the shadow economy was not a source of financing growth and the officially achieved profitability guaranteed positive assessment from external stakeholders.

The company went through the typical growth phases: the initiating of business activities in the form of a civil law partnership, the achievement of early successes, rapid growth in the form of a joint stock company after the development of a professionally prepared strategy, the crisis caused mainly by external factors (the international financial crisis of 2008–2009), and, finally, the stabilisation and continuation of moderate, sustainable growth.

Case Three

This is the case of a company established by a natural person at the turn of the 1980s and 1990s, operating initially in the agricultural and grain processing industry, and then in the meat processing industry.

Growth Strategy

Due to the owner's hard work, his entrepreneurship and high level of negotiating skills (which play an important role and are a crucial success factor in trade), the company quickly gained market outlets in the meat industry. Two years after starting business activities, the owner made the decision to take advantage of the emerging market opportunity in the meat industry by starting the implementation of a large investment project. Market and financial analyses were carried out only superficially. Due to the large, but inadequate to the scale of the project, amount of free company resources derived mainly from business activities in the shadow economy, the owner deliberately underestimated the amount of necessary expenditure and finally obtained investment loans at the level of approximately 70% of the investment cost. The timeline of the project was very ambitious and demanding, calling for a 2-year implementation period. The entrepreneur participated in the development of project objectives, as well as in their implementation to a limited extent, focusing instead on the management of existing activities, and entrusting the implementation of the venture to a project implementation company. The new undertaking was not included in the overall growth strategy of the company. When the project was completed, there was no working capital to conduct the related activities.

The Share of the Shadow Economy in the Entrepreneur's Earnings

From the beginning, activities in the shadow economy were intense, with a share up to 60%. This was made possible by running at the same time a large, profitable farm, which facilitated the legalisation of undisclosed income. The undisclosed income from business activities was ascribed to untaxed income from agricultural activity. Due to the large, though inadequate to the scale of the project, amount of personal free resources, derived mainly from activities in the shadow economy, the entrepreneur deliberately underestimated the size of official expenditure with which he was going to finance the investment loan.

Income Effects of the Shadow Economy

Only in the first period of his business activity did the owner use real income effects of the shadow economy. Due to the large share of the shadow economy, these effects were a significant source of growth financing. As the financial crisis deepened and losses were incurred, the entrepreneur did not decrease, but rather increased, the rate of participation in the shadow economy, believing that he was using the "tax shield", and treated illusory effects as an additional source of investment financing.

Competencies of the Management

The experience of the manager was limited, he had no industry-related competencies, but was characterised by a propensity for hard work and entrepreneurship. Despite his low financial competencies, the entrepreneur did not make use of professional advice and did not employ staff competent in this field, relying on his own "gut feeling". The inclusion of more competent personnel was also hampered by the large size of the shadow economy and the fear of exposing illegal practices.

The Risk Associated with Activities in the Shadow Economy

At a time when official business activities were profitable, although the share of the shadow economy was large, the risk associated with activities in the shadow economy was neutralised by the inclusion of the farm in the financial statements. The risk was revealed only when business activities began to bring losses, the financial crisis caused the collapse of the farm, and tax audits increased.

The End Result of the Process

The project was completed, but there was no working capital to conduct the related activities. Operations were undertaken only to the limits set out by financing provided by the use of short-term obligations. At the time of payment of the first installment of the investment loan, it was clear that the company was heading for bankruptcy. Although restructuring measures had been taken; among other things, a newly-created meat processing plant had been sectioned off as a limited liability company, there was no vision or time for deeper financial and material restructuring. The bank took recovery action, and the court announced bankruptcy liquidation encompassing the entrepreneur's main company and the limited liability company.

The above-presented analysis allows one to indicate the most important characteristics of the typical growth paths (Table 1).

Table 1 The summary of characteristics typical of the three growth paths

Growth paths	Income effects	Competencies of the management	Growth strategy	Business growth	Share of the shadow economy	Risk of failure	Final result
I	Real and illusory	Low, professional business consulting	Ad hoc and anticipatory	Stable	Moderate, over time decreasing to 10%	Moderate	Growth success, stabilisation
II	Real and illusory	High	Anticipatory	Rapid	Moderate, over time decreasing to 5%	High	Restructuring success, stabilisation
III	Real and illusory	Low	Ad hoc	Abrupt, rapid	High, reaching 60%.	Very high	Unsuccessful restructuring company bankruptcy

Path I: sustainable growth; Path II: unsustainable growth; Path III: unsustainable growth
Source: own elaboration

5 Summary and Conclusions

Companies operating in the shadow economy are characterised by features more typical of the traditional, static, entities in the SME sector rather than the fast-growing ones. However, undertaking development activities aimed at rapid business growth is possible in the case of these companies due to their high potential for entrepreneurship, though insufficient equity and low debt capacity are limiting factors. Adopting a growth strategy after breaking through the capital barrier will require, on the one hand, overcoming the fear of taking high risk, and, on the other hand, high professionalism in management necessary in an increasingly complex and sophisticated growing company, especially under the conditions of understandably poor and difficult cooperation with the environment. Professionalization of management, however, can be difficult in view of the specific characteristics of this form of activity (the fear of high risk, the undisclosed nature of activities within the company, and problems with acquisition of specialists).

The analysis of factors associated with pursuing growth under the conditions involving activities in the shadow economy requires further in-depth research. The current results of the analyses conducted allow the formulation of several conclusions and hypotheses:

1. In the SME sector, there are different paths of growth, distinguished by characteristics related to the achieved income effects (real and illusory ones), competencies of the management, implemented growth strategies, the growth pattern, the amount of risk of growth failure, and the end result.
2. Growth actions undertaken with the inclusion of activities in the shadow economy may result in an increased risk of bankruptcy due to the possibility of overestimation of illusory effects.
3. The probability of bankruptcy increases with the size of growth and the share of the shadow economy in financing growth.
4. The risk of growth failure of companies operating in the shadow economy increases in the case of errors in management resulting from lack of competencies and experience of entrepreneurs from the SME sector.
5. The risk of growth failure of companies operating in the shadow economy decreases when they use an anticipatory strategy of growth, and increases when an ad hoc growth strategy is used.

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Implementation of CSR Principles in HR Management in Micro, Small and Medium-Sized Enterprises in the Pomerania Euroregion: A Comparative Analysis

Grażyna Wolska and Agnieszka Bretyn

Abstract CSR practice may draw inspiration not only from academic inquiries, but also from social debates, goals articulated by political leaders and the experiences of other economic entities that carry out their own social responsibility programmes. This article discusses an issue that has fundamental significance both for the economy's prospects and in its practical usefulness, as the art of managing in contemporary conditions. The research addresses issues related to Corporate Social Responsibility (CSR) in enterprises operating in the Pomerania Euroregion (The Pomerania Euroregion is a border region of particular significance. It connects German and Polish territory, and since February 1998, Swedish communities as well. In light of its location, the Pomerania Euroregion is a link connecting Central Europe with Eastern Europe and Scandinavia. From the point of view of further European integration, the east-west and north-south connections formed throughout history on the territory of Pomerania are growing in relevance today, making it possible to gradually achieve the EU's dream of harmonisation of living conditions in the member countries of the Pomerania Euroregion) (Mecklenburg-Vorpommern in Germany and Poland's Zachodniopomorskie Province). Entities operating in the tourism sector, offering accommodation, are analysed in this publication. The purpose of the article is to present the results of research concerning the implementation of CSR principles in the area of investment in employee development by Polish and German micro, small and medium-sized enterprises in the Pomerania Euroregion and to indicate cultural differences in this sphere and their influence on the employer-employee relationship. Taking as the paper's starting point the problem's relationship to investment in employee

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development, the following research hypothesis was formulated: Inspiring employees to develop their skills and to engage in long-term career planning contributes to the intensification of cooperation in regional relations.

Keywords CSR • Euroregion Pomerania • Development • Employee development • Poland • Germany

1 Introduction

The Euroregions set up within a uniting Europe are an important link in cross-border collaboration in the area of at least two countries, most often neighbours. Paradoxically, the Euroregions are quite clearly, and potentially in a multifaceted understanding, an expression of the dialectic of the movable borderland. And this is a dialectic in the Adornovian sense: one which values unidentity over identity, diversity over unity. Because a true community, as Jean-Luc Nancy wrote, is based not on ideas that absorb any kind of individual identity (such as nation, continent, law, a union of states etc.) but on their atomisation, ruling out immanence, meaning absolute identity. For a community—he argues further in the book with the revealing title *The Inoperative Community* (Nancy 2010)—serves its own understanding. The concept of the Euroregion is thus based on precisely this idea of community: the unification of the non-unifying. A poly-contextual community,[1] which operates by various codes: historical, geographical, linguistic. It is precisely these codes that define the Pomerania Euroregion (Mecklenburg-Vorpommern in Germany and Poland's Zachodniopomorskie Province), which rather than a community of Poles and Germans, peoples of the East and West, North and South, ancient and modern legislation etc., is more a poly-contextual community of Pomeranian entrepreneurs, officials, residents and scholars (Wolski 2014).

This prospect of a multi-directional interpretation of the community that is the Euroregion has been reduced in this work to research on the level of collaboration (or its absence) among entrepreneurs who operate in the area of tourism, and to be more precise economic entities (micro, small and medium-sized) that offer accommodation services. Meanwhile, the subject of research on this group of companies was Corporate Social Responsibility (CSR), primarily its influence on cross-border integration of Polish and German enterprises in the Pomerania Euroregion (Mecklenburg-Vorpommern in Germany and Poland's Zachodniopomorskie Province).

[1]This term is taken from Niklas Luhmann, seen as the great theoretician of boundaries. "Policontextuality" in the constructivist concept, a research field that draws on almost all academic fields: from neurobiology through law, economics, history and literary theory, describes a system's ability to use multiple codes. It is a phenomenon whose surprisingly obvious sense is revealed to us whenever someone poses the fundamental (and extremely often fundamantalist) question "Who are you?"

The choice of the subject and scope of the research was no coincidence. It resulted from the researchers' conviction that even though the past decades have been rich in many studies and publications referring to the question of CSR (Lockett et al. 2006; Heslin and Ochoa 2008), this idea still is not universally understood and appreciated, particularly in Poland (Spodarczyk and Szelągowska-Rudzka 2015; Szelagowska-Rudzka 2016). Meanwhile, the initiative that is corporate social responsibility suggests certain solutions for business practices (Wolska and Bretyn 2015). It does not only offer suggestions for how an entrepreneur can harmonise economic thinking with thinking about the good of society, other people, future generations etc., but also how to remain faithful to purely economic thinking, how to fulfil ones duties as an "economic person". Looking at it another way, CSR—similar to keeping track of expenses—ensures greater consciousness, mobilises its practitioners to undertake innovative actions and to establish collaborative efforts.

The idea of CSR concentrates mainly on building relationships supporting all stakeholders who take part in economic undertakings (Bowen 1953; Freeman et al. 2006). In addition to creating positive connections among stakeholders, this concept also encompasses formal and legal factors and environmental protection on a voluntary basis. To be more precise, CSR can be described as a company focusing on seven areas: corporate governance, employee behaviourism, human rights, integrity in client relations, environmental protection, honesty in business and social engagement. In other words, for a company to be described as engaged in CSR, it must meet such basic requirements as investing in human resources, caring for the environment, maintaining relations with the business community that meet ethical and legal norms, and providing information about such actions (Wolska 2014).

In this work, the focus is primarily on the area concerning companies' investments in human resources, based on generally known systems, i.e. the ISO 9000 Quality Management System, the ISO 14000 Environmental Management System and Social Accountability SA 8000 (Wolska and Kizielewicz 2015).

The research and its results allow us to state that the research problem is marked by an interpretive dualism, which calls for it to be discussed, on the one hand, as an undertaking that encompasses analysis indicating the degree to which Polish and German companies are orientated toward aspects of employee development. On the other hand, as a certain clear position presenting the conditions and formation of consciousness in this area in the culture of both nations—Poland and Germany. Of course, these are not unconnected, because as it takes an ever more prominent position in the economic literature, this grouping undoubtedly constitutes a useful summation of the various analyses conducted on this subject. Still, far more significant during the conduct of analyses is the question of their internal coherence and whether they can serve as a point of departure for further, deeper research.

The purpose of this article is to present the results of research on the implementation of CSR principles in the area of investment in employee development by Polish and German micro, small and medium-sized enterprises in the Pomerania Euroregion, and to identify the cultural differences in this area and their influence

on the employer-employee relationship. Taking as the paper's starting point the problem's relationship to investment in employee development, the following research hypothesis was formulated: Inspiring employees to develop their skills and to engage in long-term career planning contributes to the intensification of collaboration in regional relations.

2 Research Methodology

In setting up research that would allow the demonstration of the research hypothesis and the achievement of the main goal, it was determined that first of all, these questions would be presented hypothetically in the structural model (a path model) illustrated in Fig. 1. This model assumes that CSR is a theoretical construct that contains a latent variable,[2] which affects the innovative activities of businesses and their willingness to engage in cross-border relationships. In the model shown in Fig. 1, this is expressed using arrows. It must be pointed out that this model presents questions which will not all be discussed in detail in this work, though it will provide a basis for fundamental research concerning aspects of employee development.

The structural model as a whole can be valued using statistical methods related to modelling of structural equations. The model of structural equations, mainly in light of its helpful and in effect practical version of a multi-dimensional and -parametrical view, allows us to test research hypotheses with very complex relationships among the variables. The strong points of this model are first and foremost the possibility of free depiction of dependency paths among the variables, and the ability to depict a theoretical construct as a delayed variable. But because this method is rather complicated, and most importantly very time consuming, for the sake of greater transparency and legibility the complex model has been divided into smaller partial models, which can be evaluated statistically using linear regression. And thus, for example, we have adopted:

Partial model 1: describes the dependency between the attributes of the company, the country of origin and the introduction of the concept of CSR. In a linear form, we can introduce the following regression comparisons:

(in each specific partial model, and thus 1 and 2, "a" is the constant, while "b1" "b2" are regression coefficients).

[2] A latent variable (also known as a hidden variable) is a variable that is not measured directly by a particular indicator. It is usually a combination of several other variables that are measured directly in the research. In other words, a latent variable is most often a theoretical variable, meaning one that is not measured but is defined on the basis of other indicator variables. For example: Has anyone ever seen with their eyes the conscience, or ethics? No, because these are theoretical constructs. For this reason, by using the appropriate research tools and techniques, scholars attempt to describe these questions, though they are most often only an approximation of certain theoretical constructs (Bühner 2010).

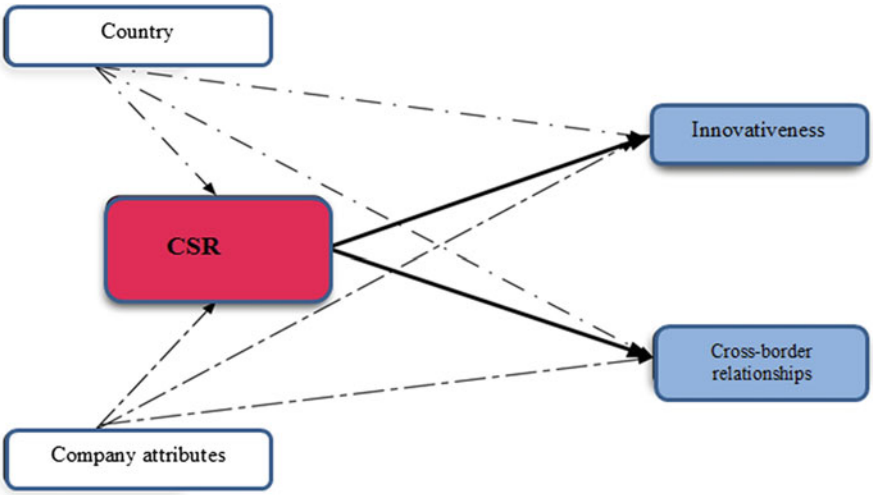

Fig. 1 The structural model

Partial model 1: CSR = a + b1*attributes of the company + b2*country

Partial model 2: presents the dependency between the engagement of the companies in the form of cross-border business and the variables in the form of CSR, the country and the details of the enterprise. In this case the regression equation looks like this:

Partial model 2: Cross - border business = a + b1*CSR + b2*attributes of the company + b3*country

2.1 The Research Concept

In line with the theoretical concept adopted thus far, the work was based on the test research used in formulating the hypothesis (Bortz and Döring 2003). A standard survey was used for information collection. As part of the survey, primarily subjective individual opinions were collected, not objective assessments (Loew and Clausen 2010). The decision to place the stress of the research on subjective evaluations was made because not all respondents are fully knowledgeable on the subject of CSR, and objective assessments require fundamental preparation. This is also why these questions were taken into account during the formulation of the survey. Data evaluation was performed using statistical analysis software (R).

The basis for developing the questionnaire was the structural model. The priority during preparation of the survey was capturing the earlier articulated theoretical modes such as CSR, innovativeness, cross-border business and the structural parameters concerning the country: Germany/Poland, the size and age of the company. During the formulation of the questions, generally known methods of

survey construction were used, which nevertheless were slightly modified to suit the needs of the research area. This applied first of all to questions related to declarations of the introduction of CSR in a company and the related expectations and benefits. The creators of the surveys made great efforts to ensure that the questions in this area didn't suggest the responses, because they realised that respondents often tend to give the answers that they believe the researchers expect. Naturally, this problem cannot be fully eliminated, but we attempted to minimise it by formulating the questions in such a way that they applied to concrete circumstances or activities.

Another problem that appeared during the creation of the surveys was its bilingual nature. Many similar concepts and definitions have different meanings in Polish and German, or are used in a given language in a very specific way. Thus the researchers had to make great efforts to formulate the questions in a clear, comprehensible way. They also attempted, for particular questions, to find concepts and definitions in the two languages that applied as much as possible to the same issue.

The intention of the authors was also to formulate questions as briefly as possible while still making them comprehensible, making it possible to use them during in-person, telephone and online research. During the surveys that were taken, the main focus was on ensuring the survey was checked by employees in terms of its comprehensibility and the time required to fill it out. Particularly during in-person research, it turned out that many theoretical problems related to the idea of CSR were not known to the respondents. This required many explanations from those conducting the research. This became particularly visible in surveys conducted among owners of small and micro enterprises.

2.2 Measurement Models

Insofar as the variables related to the country and the attributes of the company (size and age) can be perceived as relatively objective, i.e. intersubjectively understood concepts, or theoretical constructs that relate to questions such as corporate social responsibility, innovativeness and cross-border relationships (as assumed earlier) turned out to be the subject of subjective assessment among the respondents. As a result, the survey became a certain kind of "test" of the respondents' assessments of their own companies. To summarise, the assessments made by the respondents often differ from the "objective" values regardless of their definition. This is why one usually starts with the assumption that assessments oscillate around the real value, taking into account the normal error distribution (probabilistic test theory) (Bühner 2010).

The considerations described above meant that the questions concerning CSR, innovativeness and cross-border business were interpreted in this research as test scale positions, which together were treated as a source of total value for a given theoretical construct. Still, the question of how far selected questions were actually

useful to adequately describe a given construct requires critical analysis. Thus it was decided that in this case, the most important are analytical operations such as position analysis (selectiveness, difficulty level, verification of assumptions with a normal distribution) and reliability analysis (Bühner 2010).

Assessment of the difficulty of the questions was performed in the research by analysing the frequency distributions and comparison of the average values of the questions. Confirmation of the assumptions with a normal distribution was carried out for each individual question based on a Kolmogorov-Smirnov (K-S) test and for all questions together using Mardia's test.

The selectivity of the questions was checked using part-whole correlation. It is also defined during reliability analysis using Cronbach's Alpha, as a result of which no other calculations were necessary here.

It must be stressed that reliability analysis is usually carried out by applying the Cronbach's Alpha method (Bühner 2010). A Cronbach's Alpha ratio of 0.8 is usually considered good. A value of 0.7 and above is as a rule seen as acceptable. Because the Cronbach's Alpha method is not free from certain distortions, it is generally recommended to verify it by other methods of reliability analysis. For this reason as well, the authors of the work also applied confirmatory factor analysis (CFA).

2.3 CSR

For the purpose of defining the degree of implementation of the concept of CSR in companies, questions were formulated that reflected five elements that are included in the CSR concept (employees, suppliers, clients, relations with the local community and environmentally friendly behaviour). The survey questions were formulated as statements, which the respondents could agree or disagree with, on a scale of 1–5. The gradation was to make it possible for respondents to take informal procedures into account as well. The full measurement model is presented in Fig. 2. The direction of the arrows indicates that the hidden variable describes the shaping of the value of the question, and not the other way around. Meanwhile, the circles indicate the presence of error variables.

To sum up, the deliberations conducted in this section indicate that the total value for CSR can be defined as the sum of particular variables (in this case as a non-averaged indicator) or as the sum of the values of the coefficients—for example from confirmatory factor analysis or using analysis of the main components (an averaged indicator).[3]

[3] As part of the "Social responsibility. . ." project, all elements of CSR were researched, while in this work our attention was directed primarily at employees in Polish and German micro, small and medium-sized enterprises.

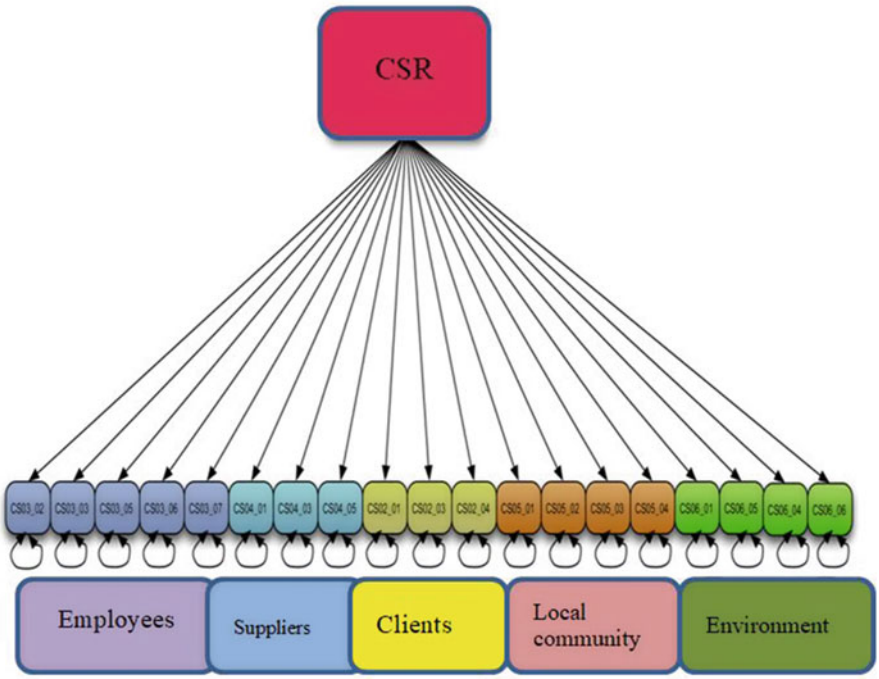

Fig. 2 The CSR measurement model

2.4 Attributes of the Company

As we have said, the research covered micro, small and medium-sized enterprises. Because experience indicates that in the case of this type of research, companies are reluctant to provide detailed information on their commercial and financial situation, the research was limited to registering the size of the company, restricted to the number of employees and the company's turnover. For the purpose of more precisely assigning the data acquired on the size of the companies and their commercial and financial situation, the rules for dividing companies into micro, small and medium-sized that are generally in effect in the European Union were used. Because these rules are generally known among businesspeople, it can be assumed that their responses were reliable.

Considering that some of the questions concerning innovation activities could be related to positive responses for newly formed entities as well, a control question about the year of the company's founding was introduced.

2.5 Scope of Random Sampling

The scope of random sampling results from the model selected and the expected influence of the independent variables. Using power analysis and applying so-called effect sizes, it is possible to describe the essential scope of random sampling that will suffice to confirm the hypothesis of the test. In the case of linear regression, it is possible to use the "f2" effect size described by Cohen (1988). This describes the change in the coefficient of determination "R2" caused by the addition of a given variable and thus the variability additionally explained by this variable. The effect size "f2" is defined thus:

$$\frac{R_{AB}^2 - R_A^2}{1 - R_{AB}^2} \tag{1}$$

with the coefficient of determination R2AB in the full model, and the determination coefficient R2A in the partial model.

According to Cohen, an "f2" value of 0.15 means that 15% variance of the dependent variable can be explained with the help of indicators (independent variables), which is recognised as the average statistical effect.

For the purpose of calculating the range of the random samples, it is customary to start from a test strength[4] at a level of 0.8. This value means that any random sample with a significant relationship at a probability of 80% can also be identified as significant. Next, it is essential to describe the level of significance at which a given hypothesis can be accepted as confirmed. In this case, a value of 5% is usually adopted. Additionally, the number of indicators is taken as another parameter. On the basis of these partial models it can be seen that altogether as many as five predictors must be evaluated, because the attributes of the company are described using at most three parameters (number of employees, turnover, age of the company). After establishing such assumptions, it is possible to designate the necessary range of random samples. The calculations were carried out using G*Power software (Erdfelder et al. 1996), and the necessary size of the random samples was set at 92, assuming that it is necessary to define materiality for all five predictors.

[4]The strength of the test is defined by the likelihood that the zero hypothesis will be rejected when it is false. In other words, it defines the likelihood that an error of another type will be avoided. Thus it can be said that the strength parameter of the test indicates the degree to which our test allows us to make a good decision on the adoption of the research hypothesis—rejecting the zero hypothesis. Tests differ from one another on the basis of their strength. Some tests are stronger, others weaker. The strength of a statistical test is its ability to reveal differences between groups. When comparing two statistical tests, the better one is the one that is stronger, meaning for the same number of observations and the same assumption of the level of significance, it more often rejects the false hypothesis. Thus we move toward being able to use in analysis the statistical tests with the greatest strength, to minimise the risk or taking erroneous decisions in drawing conclusions about the differences, or lack of difference, that are uncovered.

Thus, the purpose was to conduct a minimum of 100 surveys on randomly selected respondents, which were carried out in more or less even proportions (60 micro, small and medium-sized enterprises in Poland's Zachodniopomorskie Province and 53 companies in Mecklenburg-Vorpommern in Germany) (Fig. 3).

The entities were asked to describe their actions related to employee development. The question was formulated as follows: "Please indicate to what degree specific actions in company-employee relations are carried out in your company."

CS03_02 Our company has developed complex rules to limit and prevent risks to employee health.
CS03_03 Our company ensures opportunities for further professional education, or if necessary for requalification, for all of our employees.
CS03_05 Our company encourages our employees to get involved in charitable activities.
CS03_06 In our company there is a system for handling complaints, suggestions and ideas for change from our employees.
CS03_07 Our company supports our employees in maintaining work-life balance, e.g. through flexible working hours.

3 Research Results

3.1 Characteristics of the Research Sample

To give a certain context to the questions raised in the surveys, the results achieved in each section of the work are presented in two forms. All figures and tables show the number of companies answering each question (aside from Figs. 4, 5 and 6), while the comments describing and summarising the research are presented in percentage terms.

The description of the structure of the enterprises subjected to analysis was created based on the following factors: the size of the entity measured by number of employees, level of turnover and length of time in operation.

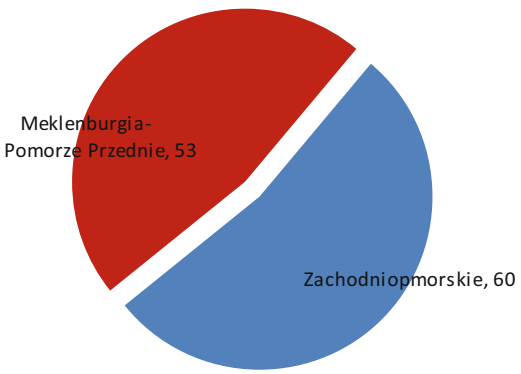

Fig. 3 Number of micro, small and medium-sized enterprises surveyed from Zachodniopomorskie Province and Mecklenburg-Vorpommern

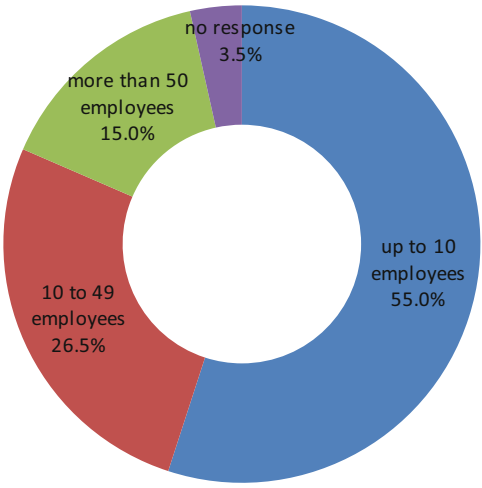

Fig. 4 Micro, small and medium-sized enterprises surveyed in Zachodniopomorskie province and Mecklenburg-Vorpommern by number of employees

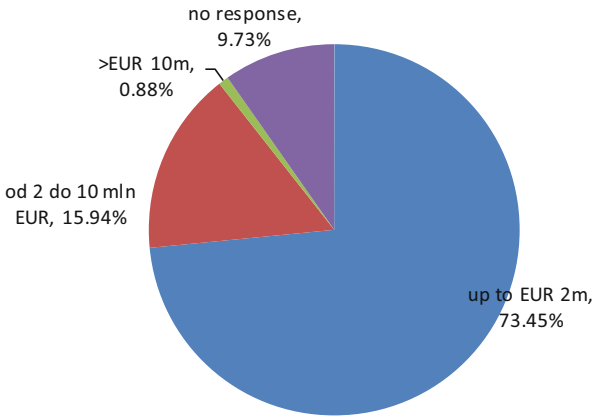

Fig. 5 Micro, small and medium-sized enterprises surveyed in Zachodniopomorskie province and Mecklenburg-Vorpommern by annual turnover

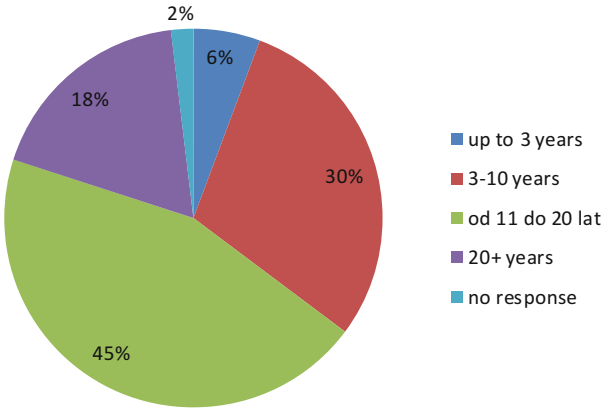

Fig. 6 Micro, small and medium-sized enterprises surveyed in Zachodniopomorskie province and Mecklenburg-Vorpommern by length of time operating on the tourism market

The analysis based on the number of employees indicated that more than half the entities surveyed were micro enterprises, with up to 10 employees. Another 26.5% were small enterprises, with 10–49 employees, while the rest were medium-sized. The breakdown of surveyed companies by number of employees is presented in Fig. 4.

About three-quarters of the companies surveyed had annual turnover of EUR 2 million or less, while about 16% were between EUR 2 million and EUR 10 million. Only 0.88% of surveyed companies indicated that their turnover was more than EUR 10 million. The structure of respondents by annual turnover is presented in Fig. 5.

Meanwhile, the question about the length of operations showed that a clear majority (about 63%) of companies surveyed have been on the market for more than 10 years, 30% from three to 10 years, and 6% have been operating for less than 3 years. The structure of surveyed companies by length of operations is presented in Fig. 6.

3.2 Execution of CSR Actions: Employees. Research Results

The purpose of the research was to measure the level of execution of CSR concepts in the area of the company's employees. The research results achieved from Polish companies were compiled and compared with the results from German companies in Table 1.[5] The responses received from the surveyed entities are presented as average values.

The results from 62% of German entities and 46% of Polish ones showed that they set maintaining work-life balance as a goal. The result of the analyses presented in Fig. 7 demonstrates that 26% of the Polish companies and 7% of the German ones provide no support at all to their employees in maintaining work-life balance.

Figure 8, meanwhile, shows the results of research on the question of training employees to increase their environmental awareness. It turns out that about half the Polish entities said they conduct no such training. The situation is different for German companies, where it can be noted that the structure of responses shows a normal distribution. About 44% of German entities partly conduct training of their employees to increase their environmental awareness.

In summary, it must be noted that in the case of declarative responses by the surveyed entities in this part of the research, it is possible that respondents assessed their actions too highly. Still, even in a situation where the level of responsibility was inflated by respondents, it can be understood that the entities consider issues related to employee development to be important.

[5] A scale from 1 to 5 was used, where 1 was the lowest value, while 5 was the highest.

Table 1 Implementation of CSR activities: employees—average value of responses from micro, small and medium-sized enterprises in Zachodniopomorskie province and Mecklenburg-Vorpommern

	Question	Average (DE)	Average (PL)	t-statistic	p-value
Employees	Our company has developed complex rules to limit and prevent risks to employee health.	3.34	3.54	−0.721	0.472
	Our company ensures opportunities for further professional education, or if necessary for requalification, for all of our employees.	2.98	2.72	0.943	0.348
	Our company encourages our employees to get involved in charitable activities.	2.89	2.77	0.405	0.686
	In our company there is a system for handling complaints, suggestions and ideas for change from our employees.	3.66	3.34	1.057	0.293
	Our company supports our employees in maintaining work-life balance, e.g. through flexible working hours.	3.66	3.20	1.745	0.084

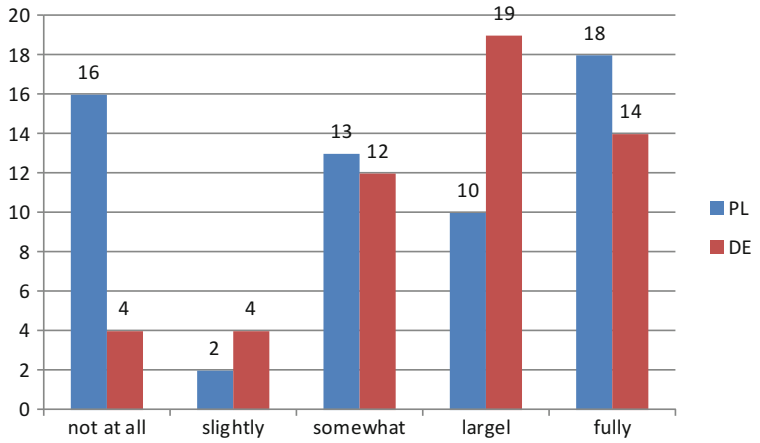

Fig. 7 Our company supports our employees in maintaining work-life balance, e.g. through flexible working hours

The average values of the responses on activities aimed at limiting and preventing risks to employee health showed similar results. Still, it must be noted that about 47% of Polish companies indicated that they completely implement such actions. Meanwhile, in the case of German companies, such activity is often conducted only partially—this response was given by about 38% of the German entities surveyed. The responses are presented in Fig. 9.

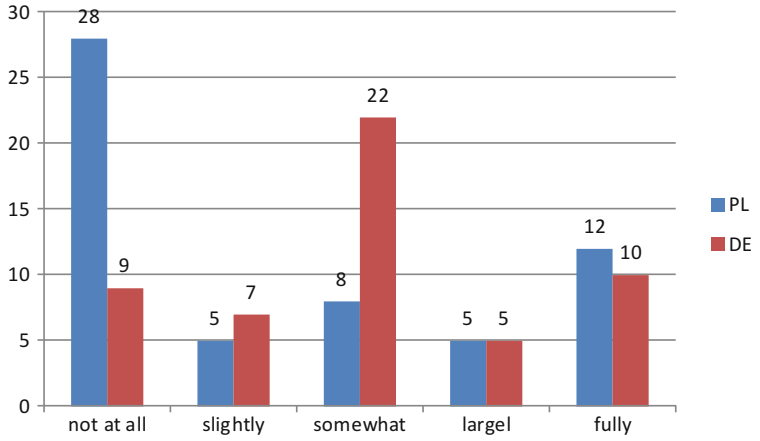

Fig. 8 Our company conducts training to increase employees' environmental awareness

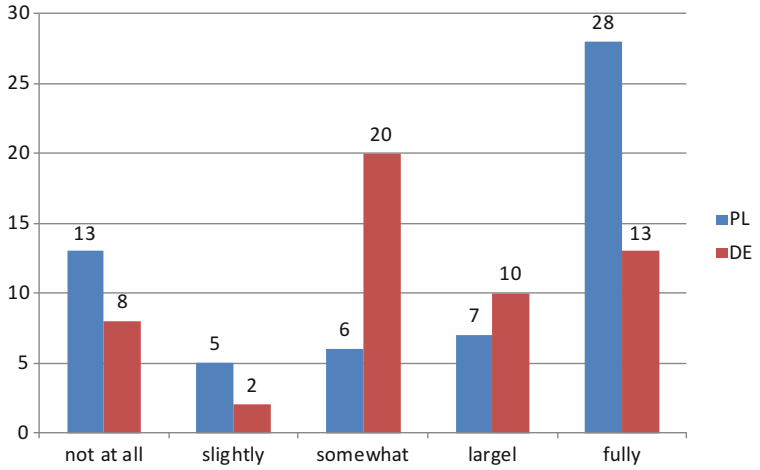

Fig. 9 Our company has developed complex rules to limit and prevent risks to employee health

A significant aspect of social responsibility, which can create tangible value in the workplace, is various types of investment in employees, including through training. Both Polish and German companies gave similar responses in the area of ensuring opportunities for further professional development of their employees. The results for this question are presented in Fig. 10. But it must be noted that in reality about 33% of companies from Poland indicated that they do not conduct such activities at all, and 13% ensure opportunities for professional education only to a small degree. In the case of companies from Germany, the percentage that don't make continuing education of their employees available was about 21%, while 13% acted in this area to a small degree.

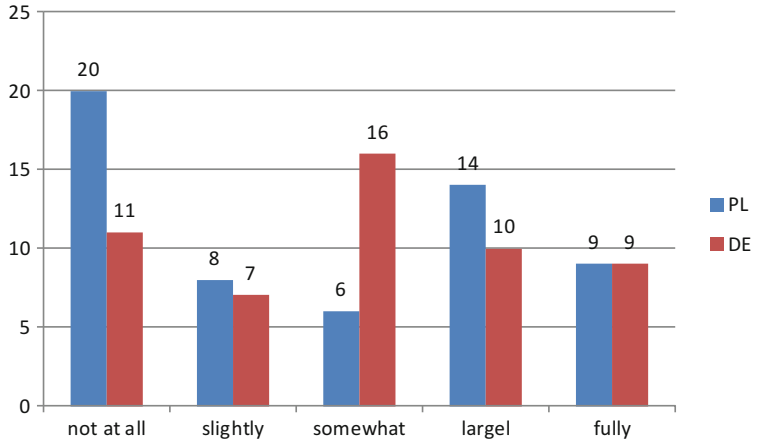

Fig. 10 Our company ensures opportunities for further professional education, or if necessary for requalification, for all of our employees

The results seem to correspond with the results of the comparative research conducted in 2011 in Pomorskie province in Poland and the Kalmar region in Sweden, as well as the results of the 2014 research conducted by the Polish Agency for Enterprise Development (PARP 2015). The 2011 research (Nikodemska-Wołowik 2011) showed that 43.8% of entities in Poland and 34.3% in Sweden did not encourage their employees to develop their skills and long-term career plans (e.g. through training). The research commissioned by PARP in 2014 as part of the Human Capital in Poland project indicates that only 46% of micro, small and medium-sized businesses continuously invest in employee development, and the clear majority do so through occasional, short-term activities. Thus, it can be stated that a lack of activity in this area is a typical characteristic of small and medium-sized enterprises, in which the employer most likely does not perceive advantages from investing in employee development.

The research also indicates that about 33% of Polish entities and 19% of German ones do not encourage their employees at all to get engaged in charitable activity. The structure of respondents' answers in the area of encouraging their employees to join in charitable activities is presented in Fig. 11.

In the area of systems for managing employee complaints and suggestions, the Polish and German companies showed similar responses. The majority of the entities—about 33% of Polish companies and 39% of German companies—reported full implementation of such a system. The responses to this question are presented in Fig. 12.

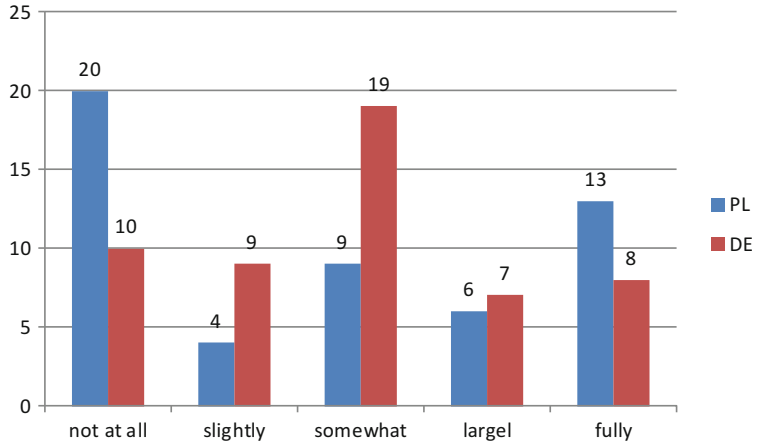

Fig. 11 Our company encourages our employees to get involved in charitable activities

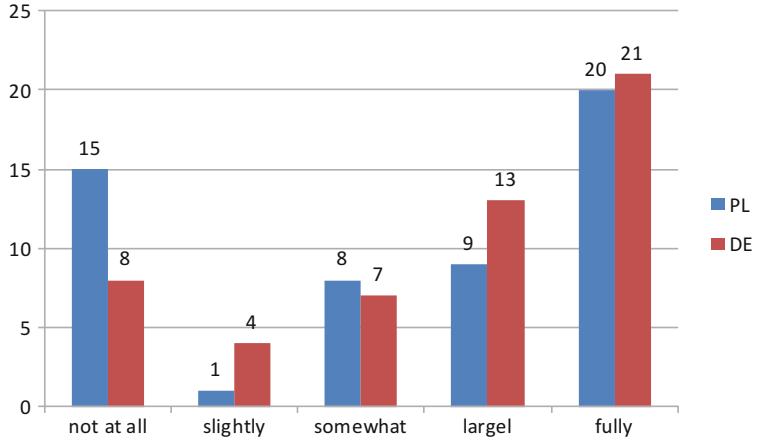

Fig. 12 In our company there is a system for handling complaints, suggestions and ideas for change from our employees

3.3 Partial Model I: The CSR Model

On the basis of the results achieved, using a linear regression, an estimation model was constructed that is intended to show the influence of company size and country of origin on engagement in CSR principles (Fahrmeir et al. 2009).

$$\text{CSR} = \text{a} + \text{b1}^{*}\text{business properties} + \text{b2}^{*}\text{ country}$$

Using a "step" procedure, the following estimation model was created:[6]

$$\text{lm}(\text{formula} = \text{scCSR} \sim \text{LANGUAGE} + \text{UN02}, \text{data} = \text{x}).$$

Coefficients				
	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	3.0406	0.1176	25.858	<2e−16*****
LANGUAGEpl[a]	0.2842	0.1366	2.081	0.04035***
UN02 10 to 49	0.3144	0.1568	2.005	0.04804***
UN02 50 and more	0.5760	0.1941	2.968	0.00385 ****

Signif. codes: 0 '*****' 0.001 '****' 0.01 '***' 0.05 '**' 0.1 '*' 1
Residual standard error: 0.6439 on 89 degrees of freedom
Multiple R-squared: 0.1482, Adjusted R-squared: 0.1195
F-statistic: 5.162 on 3 and 89 DF, p-value: 0.00246
f^2 pol = 0.04

[a]The constant may be interpreted as the average value for German companies employing fewer than 10 people. LANGUAGEpl shows the divergence in the case of Polish companies. The β coefficient (β-Koeffizient) designates that Polish companies show a higher value, by an average of 0.2842. In the case of companies with 10–49 employees, the average value is higher than for the group with 1–9 employees by 0.3144, while in the case of companies employing 50 or more people, the comparable indicator in relation to companies with 1–9 employees is higher by 0.576.

This model allowed us to form the following conclusions:

A positive relationship can be observed between the size of the company (measured by number of employees) and its social responsibility. This means that the larger the entity, the more socially responsible it is, and the greater the scope in which it applies CSR principles. Meanwhile, the company's country of origin has only a small influence on implementation of CSR principles, including in the area of increasing employee qualifications.

3.4 Cross-border Relationships: Employee Flows

The next stage of the research focused on identifying the actions undertaken by the companies in the area of cross-border relationships. It must be noted that the Polish

[6]The variable "LANGUAGE" designates the language in which the questionnaire was filled out (Polish/Germany) and designates the country (a Polish or German company). The variable UN02 measures/designates the size of the company based on the indicator "number of employees" in three categories.

and German respondents answered in divergent ways. In particular in the case of one question ("Our company employs people from Germany/Poland) their responses diverged significantly. In this case, the German companies showed a higher level of responses confirming the employment of people from Poland.

The characteristics of the companies in terms of their innovative activities is presented in Table 2.

As Fig. 13 shows, only about 7% of companies from Poland employ workers from Germany. The situation is different in the case of German companies, among which about 43% employ workers from Poland.

3.5 *Partial Model II: The Cross-border Operations Model*

The empirical material collected allowed the construction of a model explaining the influence of a company's country of origin, size and degree of social engagement on the degree of engagement in cross-border collaboration.

Theoretical model:

$$\text{Cross-border operations} = a + b1^{*}\text{CSR} + b2^{*}\text{business properties} + b3^{*}\text{Land}$$

Table 2 Cross-border cooperation in micro, small and medium-sized enterprises from Zachodniopomorskie province and Mecklenburg-Vorpommern—structure of responses[a]

Question	DE		PL		Odds ratio	Fisher-Test p. value
	Yes	No	Yes	No		
Our company employs people from Germany/Poland	0.43	0.57	0.07	0.93	10.50	0.00
Our company maintains a base of clients/consumers in Germany/Poland	0.21	0.79	0.58	0.42	0.19	0.00
Our company has business partners in Germany/Poland	0.09	0.91	0.35	0.65	0.19	0.00
Our company takes part in joint initiatives/associations with companies from Germany/Poland	0.04	0.96	0.17	0.83	0.19	0.00
Our company supports and engages in initiatives reducing language and cultural barriers between Poland and Germany, for example by training our employees	0.06	0.94	0.25	0.75	0.19	0.01

[a]The two final columns show the "odds ratio" as a Fisher-Test p. Value. The product of the chances for the first cell results from the proportion of responses YES/NO (0.43/0.57)/(0.07/0.93) = 10.5 (Deviation due to rounding). A value close to 1 indicates a small difference. All values show strong deviation. The Fisher-Test value indicates a high degree of significance and confirms the differences between the Polish and German companies.

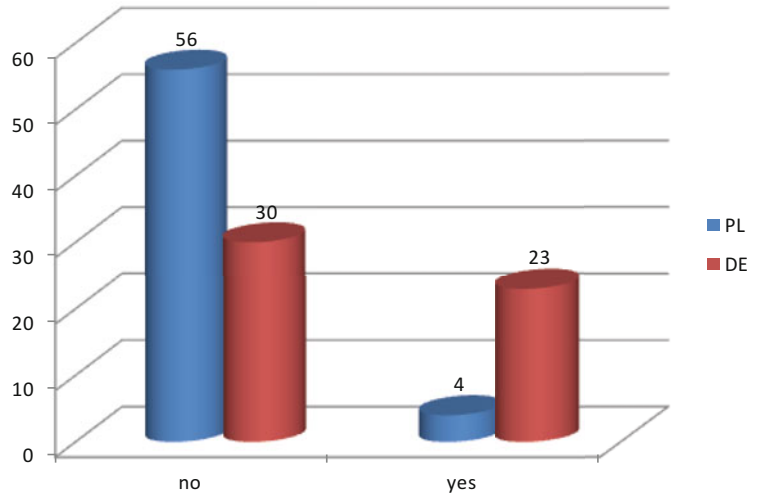

Fig. 13 Our company employs people from Germany (question for Polish companies)/Poland (question for German companies)

Estimation model:

$$\text{lm}(\text{formula} = \text{scCOOP} \sim \text{LANGUAGE} + \text{UN02} + \text{I}(\text{UNAGE\^{}2}) + \text{I}(\text{UNAGE\^{}3}), \text{data} = \text{w}).$$

Coefficients				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	4.360e+00	2.370e−01	18.398	<2e−16 *****
LANGUAGEpl	9.723e−01	2.290e−01	4.246	5.44e−05*****
UN02 10 to 49	7.603e−01	2.709e−01	2.807	0.00618****
UN02 50 and more	1.537e+00	3.300e−01	4.657	1.14e−05*****
I(UNAGE^2)	−2.473e−03	1.130e−03	−2.189	0.03131***
I(UNAGE^3)	4.292e−05	2.324e−05	1.847	0.06814

Signif. codes: 0 '*****' 0.001 '****' 0.01 '***' 0.05 '**' 0.1 '*' 1
Residual standard error: 1.078 on 87 degrees of freedom
Multiple R-squared: 0.3507, Adjusted R-squared: 0.3134
F-statistic: 9.4 on 5 and 87 DF, p-value: 3.445e-07
f^2 pol = 0.19
f^2 CSR = 0.001
f^2 UN02 = 0.24

The model presenting the influence of a company's country of origin, size, scope of operations and degree of social engagement on the scale of engagement in cross-border cooperation allows us to draw the following conclusions: there is a positive relationship between company size (measured by number of employees), country of origin and

scale of cross-border cooperation. This means that the larger the company, the more it is engaged in international cooperation (the more it works with foreign entities). Additionally, Polish companies show greater engagement in cross-border cooperation.

We also confirmed the presence of a small negative, non-linear relationship between the period of a company's functioning (its age) and international cooperation. This means that the longer a company has been on the market, the smaller the scale of its engagement in cross-border cooperation.

Meanwhile, the degree of implementation of CSR principles by a given company has no influence on international cooperation. In a step regression this variable is eliminated.

4 Conclusions

Bearing in mind the need for reliability and transparency in the results of our inquiries, a range of measurement techniques was developed (described in the second and third sections of the work), allowing us to compare the theoretical assumptions with the results by conducting a diagnosis using standard questionnaires. The evaluation made through this analysis provides a basis to state that:

1. The measurement techniques developed to describe the level of implementation of activities that are significant for CSR, employee development and cross-border relationships demonstrate internal coherence and can also be used in other research.
2. Larger entities, defined mainly by number of employees, systematically implement and broaden the range of the concept of CSR, and thus are more socially responsible. This regularity was observed both in Poland and in Germany.
3. The degree of implementation of CSR principles in small and micro enterprises does not translate significantly into active international collaboration.
4. There is a positive relationship between the size of the company (measured by number of employees), the entity's country of origin and the scale of cross-border relationships. This indicates that as in previous cases, the larger the company, the more it is engaged internationally. Nevertheless, Polish companies evinced slightly larger engagement in cross-border relationships.
5. There is a slight negative, non-linear relationship between a company's age and its international relationships, which demonstrates that the longer a company has been operating on the market, the smaller the scale of its international engagement.

The above summary indicates that the basic output variable is the size of the company, and that together with growth in the number of employees and their professional education, the number of actions with significance for the idea of CSR increases. The surveys also allowed us to state that in many small companies, the concept of CSR was unknown, as there was no formally established programme to introduce it; meanwhile, many companies carried out actions that fit within this programme. The results of the research also showed that companies' interest in

introducing the concept of CSR in the Pomerania Euroregion (Mecklenburg-Vorpommern and Zachodniopomorskie Province) is growing, on both the Polish and the German sides. Ever more companies also identify it with credibility, stability, innovativeness and market success.

To sum up, as was stressed earlier, the research conducted both in Zachodniopomorskie Province and in Mecklenburg-Vorpommern indicates that particular tasks that fit within the area of CSR are implemented unevenly by companies. This is related to factors including the quite frequent disproportion that occurs between the condition of the micro and small enterprises, concentrated as they are on a small area, orientated toward relationships abroad, and the level of certain institutional solutions. One consequence of this is the persistent peripheral character of many border areas, which is measured not so much by physical distances as by social and economic distances, which in turn reflect the degree of disintegration of the socio-economic space of the two states. Interpreting these dependencies and making them more precise, it follows that:

- In the case of the declarative character of responses given by entities surveyed, there exists the possibility of an inflated assessment of their own activities. Still, even if the respondents inflated the level of their responsibility, it can be assumed that the entities believe responsibility in the area of market relationships with business partners to be important.
- Despite the declared good knowledge and control of their operations' environmental impact (particularly in Poland), the entities surveyed (particularly in Poland) do not educate their employees about their impact on the environment and do not explain to their employees how they can behave in an environmentally friendly way.
- The entities surveyed do not perceive benefits from investing in employees, particularly in Poland: As many as 1/3 do not offer any opportunities at all for continuing professional education or requalification of employees.

The growth of interest in international collaboration is a natural consequence of the ever greater significance and strengthening of such typical attributes of the contemporary world as the internalisation of economic and social life, and international integration, particularly in its economic dimension. All of these phenomena mean that it is increasingly difficult to set boundaries dividing the so-called internal affairs of particular countries from the area of foreign affairs. Additionally, looking at the development of various components of particular economies exclusively or primarily in a certain limited scope, with the need for international cooperation, through the lens of internal needs and conditions, is less and less justified. This applies to areas including tourist infrastructure, whose development has traditionally been treated as primarily an internal problem of each country, though of course it is connected, to a certain limited degree, with the need for international cooperation.

The slow construction of CSR strategies by companies operating primarily in Poland (in Germany such initiatives were undertaken earlier) translated into low innovativeness and negligible collaboration between the two countries. Still, this

can be compensated for to a certain degree by a broadening of the infrastructure links that encourage the development of local, inter-state social and economic ties. But this is dependent on many factors. Some of them are economic and political. Observation of the processes taking place in the Pomerania Euroregion (Mecklenburg-Vorpommern and Zachodniopomorskie Province) confirms the thesis of slow and delayed evolution in relation to the political events and economic phenomena that conditioned these transformations. Although more than 12 years have passed since Poland's accession to the EU, and the related freedom of movement for people, goods and services, in the relationships between companies in Poland and Germany in the area of tourism services, including those offering accommodation, traces are visible of the earlier lack of connections and the lingering stereotypes that discourage cooperation.

For this reason, intensifying actions related to the concepts of CSR, innovativeness and cooperation of companies operating in the area of Mecklenburg-Vorpommern and Zachodniopomorskie Province in each of its areas, and thus also training and preparation of employees, must be based on three fundamental spheres: institutional, political and social. Meanwhile, the changes taking place in one domain are not irrelevant to what is happening in the rest. Thus, to achieve the desired effects, both short- and long-term, these actions should be based on simultaneous introduction of improvements in all areas of management.

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Implications of Systems and Linear Thinking for Meeting Logistics Needs of Customers

Sławomir Wyciślak

Abstract Finding differences in implications of linear and system thinking for outcomes of organizational activity is the main scientific goal of the article. The mental models of managers result from various thinking patterns and impact efficiency of organization. When it comes to achieving short term goals linear thinking is sufficient but there could be addressed questions how and even why should we overcome potential drawbacks of linear thinking? Having the latter in mind we applied both linear and system thinking in solving the practical problem of meeting logistics requirements of customers. We assumed hypothesis that the systems thinking is reflected with proactive adaptation whereas linear thinking manifest itself by reactive adaptation The applied methods encompass the literature review on linear and system thinking and diagnostic action research. The literature review provides the background on differentiating between linear and system thinking whereas diagnostic action research was applied to verify assumed hypothesis. Findings of our study point to interrelations between flexibility and efficiency. Although reactive adaptation stemmed from linear thinking provides quick wins, could result in unintended consequences. The latter translates into inability to adapt in the longer term. We suppose that our work brings also some impulses for thinking on methodology of action research as it outlines differences in approaching towards linear and system thinking; and provide insights on how to consciously drive causal loops in a business environment.

Keywords System thinking • Complexity • Linear thinking • Action research • Logistics • Supply chain • Flexibility • Agility

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1 Introduction

The embedded mental models of managers impact the efficiency of the organization. This manifests itself by approach towards problems solving and how the short and long term issues are prioritized. Amongst the reasons behind the crisis 2008+ the linear thinking and focus on short term results which reflects the aggressive shareholder value building are of greatest importance. In others words linear thinking paves the way for organization to focus on meeting expectations of short term oriented investors. With the respect to achieving short term goals linear thinking is sufficient. Hence there could be addressed questions how and even why should we overcome potential drawbacks of linear thinking? The answer could be found by investigating how thinking is interrelated with efficiency of organization. Having the latter in mind we applied linear thinking and system thinking in solving the practical problem of meeting logistics requirements of customers.

We assume that comparing how both thinking styles impact the solving of a concrete business problem will let us contribute to recommend suggestions on how to improve the organizational efficiency.

The main goal of the article is to investigate how the linear and system thinking impact the efficiency of meeting logistics needs of customers.

We assumed hypothesis that the systems thinking is reflected with proactive adaptation whereas linear thinking manifest itself by reactive adaptation.

2 Literature Review

Systems thinking provides a means to conceptualize the interaction of the multiple components that make up complex programs. Systems thinking encompasses a wide variety of research and fields of study, including general system theory, system dynamics, complexity science, and systemics (Midgley 2006). Cabrera et al. (2008) believed that the construct of systems thinking as an understanding of the patterns that connect various systems ideas, methods, theories, or models. Synthesis or putting things together is the key to systems thinking (Ackoff 1999). System thinking is a discipline for seeing wholes. It is a framework for seeing interrelationships rather than things for seeing patterns of change rather than statics snapshots. System thinking is a discipline for seeing the "structures" that underline complex situations, and for discerning high and low leverage change (Senge 2006). When applied to human activity systems thinking is an epistemology based upon four basic ideas: emergence, hierarchy, communication, and control as characteristics of systems. When applied to natural or designated systems the crucial characteristic is the emergent properties of scale (Checkland 1999). Following system thinking, improving the performance of the whole, results in improving relationships among the parts. One of the core ideas of system thinking is identification a few key interdependencies that have the greatest leverage on system wide

performance (i.e. leverage points) and shift them in a sustained, coordinated way over time. What is more the unintended and delayed consequences of most quick wins neutralize or reverse immediate gains over time.

Cabrera et al. (2008) covered four universal patterns of thinking that all systems thinking ideas, methods, theories, or models share: making, distinctions, recognizing interrelationships, organizing part-whole systems, and taking multiple perspectives. Feedback loops are a chain of cause/effect variables acting on one another. A positive feedback loop represents growth while a negative feedback loop represents goal-seeking behaviors to fill a perceived gap (Coyle 1999). A plus sign in the middle of the loop indicates a positive feedback loop meaning that the total number of minus signs is a positive number. If the sign in the middle of the loop is a minus, there are an odd number of negative signs in the feedback loop (Burke 2006). Using feedback loops with links between interacting components provides a means to untangle and make more explicit the complex workings that take place within a program.

Linear thinking in understood as viewing causality running in one direction. There is a direct connection between problem symptoms and their underlying causes. It is also believed that a policy that achieves short-term successes ensures long-term successes. As for the strategy tackling many independent initiatives simultaneously improves all the parts. What is more improving the performance of the whole requires improving the performance of its parts.

The underlying difference between linear and system thinking is that system thinking embraces causal loops. A positive feedback loop represents growth while a negative feedback loop represents goal-seeking behaviors to fill a perceived gap (Coyle 1999). A plus sign in the middle of the loop indicates a positive feedback loop meaning that the total number of minus signs is a positive number. If the sign in the middle of the loop is a minus, there are an odd number of negative signs in the feedback loop (Burke 2006).

3 Methodology

The applied methodology is an effect of including a few factors. First of all, the relations between ontology and epistemology. For example, we could address questions as follow: is what do we see constructed by our cognition or world we observe is an objective reality? or what are our cognitions patterns? do we approach a world we study by following system or linear thinking? how do we approach complexity—by applying keep it simply stupid rule or seeking complicated patterns within complexity?

Including in our thinking interrelations of basic epistemological and ontological aspects we decided to deploy a method of research that follows the diagnostic action research requirements.

Action research diagnosis is a collaborative effort between practitioners and the researchers. The researchers concentrate on establishment of a sound theoretical

framework, a scientific hypothesis that might explain behaviors in the social problem space. The practitioners, relying on their intimate familiarity with the problems, help eliminate unreasonable hypothesis and unlikely theoretic constructs. (Baskerville 1997).

Problems that face the diagnostic action research are actually problems that face social science research. In reality action research shares these problems with the other methods. There are three dilemmas in action research:

- Ethics: personal over involvement with research,
- Goals: the two taskmasters in social research (subject and science)
- Initiatives: the practical pressures that interfere with the conduct of "a disinterested pursuit of knowledge" (Rapoport 1970).

Scientists who employ other methods, even survey research also know three dilemmas. These are not peculiar to action research, but could be stronger in action research.

On the other hand action research has been linked closely to systems theory from its inception. These ideas recognize that human activities are systemic and that action researchers are intervening in social systems. Checkland not only used the action research extensively in developing the soft system methodology but action research concepts for gaining professional knowledge permeated the soft systems approach itself (Baskerville 1997). In this sense action research could be perceived as an approach towards analyzing "complexity in complexity" which is sometimes called complexsophistication.

What is more we assume that having an option of observing and participating in a real business life case builds an opportunity to get in-depth view on researched processes and omit disadvantages of anonymously filled surveys. Having an opportunity of impacting, participating, observing business processes we overcome the drawbacks of questionnaires and interviews, within which in many cases we can benefit only from the one feedback loop. On the other hand the study will miss the confirmation and potential validation by other peers. However due to the accelerating pace of change in a business life, up to date insights could make contribution to the theory within layers where one feedback loop research techniques are not able to provide outputs or these outputs are limited. What is more the questionnaires miss the repeated feedback and in depth understanding of practical aspects of researched topics. We overcome this obstacle gaining the repeated and insightful feedback from stakeholders by impacting and participating in observed processes. In order to build a methodology we made assumptions both within ontology and epistemology areas (Fig. 1).

The in-depth coverage of embracing causal loops methodology is on Fig. 2.

General system theory, cybernetics, dynamic systems, non-linear dynamics theory, systems methodology are the components of the system approach (Schwaninger 2006). The history of system approach could be interpreted in terms of efforts on solving complex problems.

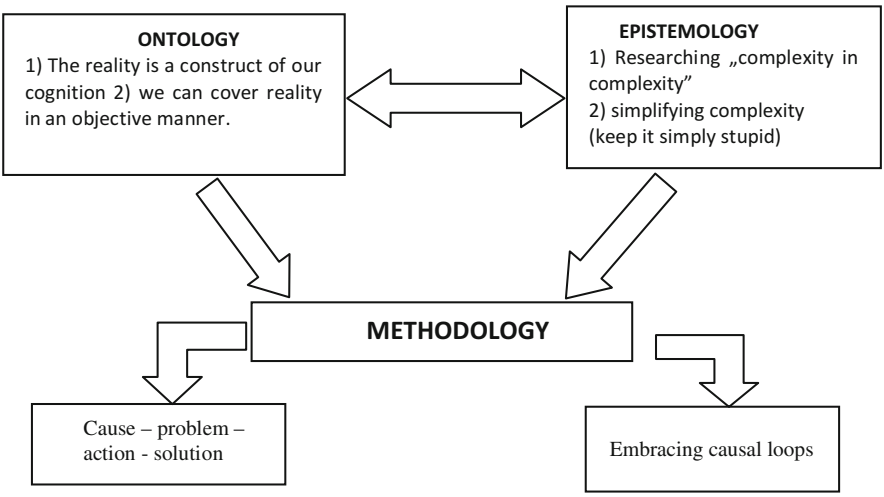

Fig. 1 Methodology resulting from the assumed ontological and epistemological interrelations. Source: Own

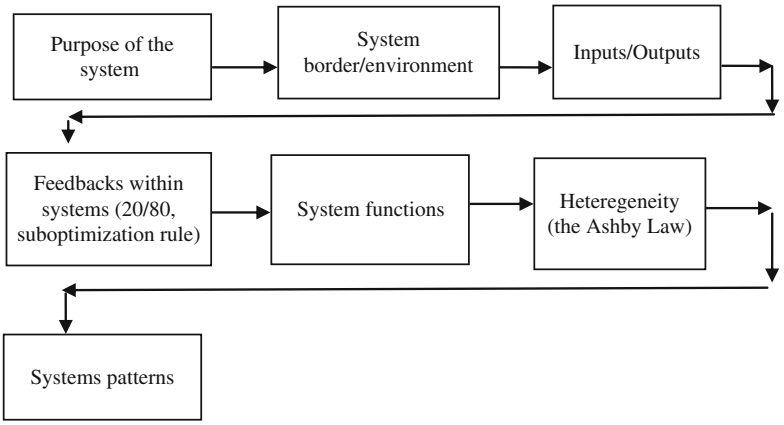

Fig. 2 The methodology of research following system thinking. Source: Own

Activities on meeting logistic needs of customers build the complex adaptive system which to cover following steps are necessary: defining the purpose, outlining borders, understanding inputs and outputs.

The feedbacks within systems we cover by applying the 20/80 and suboptimizaton rules. The 20/80 rule reflects the nonlinearity phenomena whereas the suboptimization rule underlines harmonization of activities within the system. The heterogeneity law should translate into ensuring stability of the system. But the essence of applying the system thinking is to discover system patterns by synthesizing of agents behavior.

We made efforts to follow a scientific regime and make sense of sense making. With the respect of this we played the educational role for practitioners (Baskerville 1997).

The opportunity of action research and participating in the real business environment results in our reflection on differentiation between linear and system thinking. Both approaches allow us to cover the same problem differently.

We followed the action research approach and covered the plan-act-observe-reflect steps but the expectations of practitioners focused on delivering fast results. So then the phases of plan and act were prioritized and the phases of observe and reflect only accepted by practitioners to this extent which translates into meeting short term goal driven expectations meaning building the tool for logistics segmentation of customers (Fig. 3).

The stakeholders we approached represented various functions—logistics, customer service, customer development; different countries, and work levels. After the first spontaneous phase within which we contacted the broad scope of stakeholders, we focused on building relationships with limited number of stakeholders that turned out to be the most helpful and supportive. The roles they played in the company' hierarchy reflect only to limited extent their knowledge and expertise. However, even they focused on the short time results, and thinking that follows the cause—problem—action—solution mode. In order to be aligned with the stakeholders expectation we focused on plan and act operations and consciously reducing the phase of reflection. But the implications of the latter build the second phase of action research. We did observation activities but only to this extent which helps us to plan and act.

The second part of the action research encompassed the full cycle of causal loops. We focused on influencing of stakeholders thinking, showing the implications of oversimplification of problems solving and influence the shift in attention to structural changes. The stakeholders we focused on build the community around the meeting logistics needs of customers.

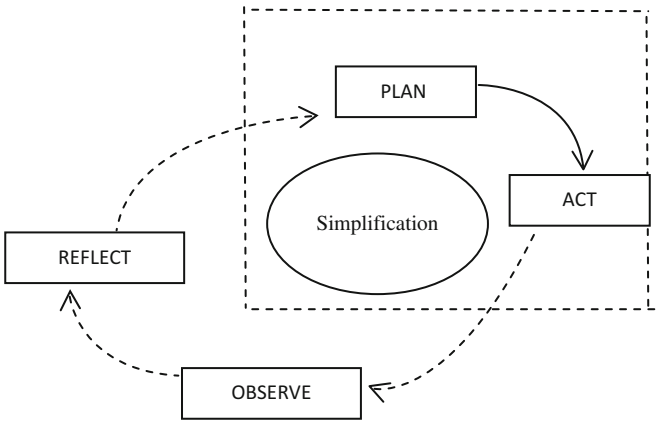

Fig. 3 The general scheme of the first part of research. Source: Own

Within the second part of research we build three causal loops—simplification, complexsophistication, and next practices.

Our role was on linking the causal loops in the way we could impact thinking of stakeholders to balance amongst simplification, comlpexsophistication and seeking next practices.

4 Linear Thinking Applying

When it comes to logistics, the way of thinking of customers is based on the two main criteria: space and time. As a result, both the ratio of SKU/m2 reflecting space criteria and shelf life mirroring the time criteria drive the logistics requirements of customers.

The shelf time of products translates into logistics needs of customers in terms of lead time, delivery frequency, the number of urgent orders, on-time delivery, order placement, SKU preparation, logistics labeling, delivery quality (measured by ratio of claims/delivery notes).

The ratio of SKU/m2 on the store shelves of customers results in following logistics requirements of customers: order size, pallet heights, sandwich pallets, picking ratio.

Qualitative and quantitative ranges of logistics result from the factors as follow: the negotiation power within the relations with supplier, stock management strategy meaning if and how long do they want to keep stock in warehouse or in transit and geography which manifests itself by distances, temperature, terrain and other weather conditions (Table 1).

The first link between logistics needs of customers and suppliers' response is the way how customers make orders, and how it translates into logistics complexity and logistics costs. Order fragmentation is the consequence of growing logistics needs of customers, and is one of the indicators of logistics complexity within a supply chain. The order fragmentation is reflected by: Orders invoiced/month, Kilograms/orders, SKUs/orders. The number of orders invoiced per month translates into a need for higher number of trucks and more operations including transport planning and consolidation of loads. While including the tons (kilogram)/order ratio, logistics profile of products should be analyzed. For example, margarine is chilled and heavy; whereas tea is an ambient, light product, and ice cream—frozen, and light product. The logistics profiles of products translate into different requirements for size of trucks, temperatures of delivery, etc. For example, trucks for frozen products are of smaller capacity due to/the place needed for a refrigerator. SKUs/order ratio mirrors orders' homogeneity (defined as the percentage of full pallets in an order). The modes of deliveries encompass distribution centre of customers, direct customers' shop deliveries, and customers' cross dock. Delivering directly to

Table 1 Factors affecting logistics needs of customers, and qualitative and quantitative ranges representing logistics needs of customers

	Logistics needs	Qualitative and quantitative ranges
Shelf time	Lead time	24–72 hours
	Delivery frequency	22–25 per month
	Urgent orders ratio	0.5–10%
	On-time delivery	0.5–2 hours
	Order placement	Telesales call center, Vendor Management Inventory, fax, Mail, 100% Electronic Data Interchange
	Stock Keeping Unit preparation	Milk rounds without orders Separated by Stock Keeping Units and shops Separated by Stock Keeping Unit Full pallets only
	Logistics labeling	Consumer Unit SSCC label per SKU, Label per Pallet; No special labelling
	Delivery quality (claims/ delivery notes)	2–5% <2%
SKU/ m2	Order size	Case; Case—2 pallets; 2−10 pallets; full trucks
	Pallet heights	1.5–1.8 metres
	Sandwich pallets	Yes/No
	Picking ratio	Case, layer, full pallets

Source: Own

shops means higher complexity levels comparing to delivering to the distribution centre of customers. Temperature levels also impact the model of delivery. The temperature regimes include ambient, chilled, and frozen modes. If deliveries follow various temperature regimes, it means high logistics complexity. This is because of different requirements for trucks, depots, and modes of deliveries. Peaks in sales over month endings (after the 27 days of the month) translate into need for a higher number of trucks.

The second link between logistics needs of customers and suppliers response is the level of customers' needs fulfillment. Delivery time, order management, delivery quality are the crucial components of customers service required. Lead time, delivery frequency, urgent orders ratio, on-time delivery, and delivery frequency translate into delivery time parameter within the logistics service level required (Table 2).

Plotting the complexity and logistics service level required into a matrix results in categorizing high-low logistics complexity and high-low customer service needs. High logistics complexity in line with high logistics service required are mirrored by the agile model. Both low logistics complexity and low logistics service constitute the lean model. Low logistics complexity and high customer service required result in the collaborative segment. This is because of need for collaborative approach including offering discounts to customers for large orders. High customer service required means either high logistics complexity or paying customers for consolidation of orders. This also means that customers tackle logistics complexity souring from own capabilities. Customers classified in right bottom rectangle—

Table 2 Parameters of logistics complexity and logistics service

Logistics service	Logistics complexity
Delivery time	Orders invoiced/month
Order management	Kilograms/orders
Delivery quality	Stock Keeping Units/orders
	Delivery points
	Peaks in sales
	Collaboration
	Temperature levels

Source: Own

Table 3 Parameters reflecting logistics complexity of drugstores and discounters

Logistics complexity	Drugstore	Discounter
Orders invoiced/month	68	1389
Kilograms/orders	12,000	4390
SKUs/orders	37	8.77
Delivery points	3	16
Peaks in sales	25%	23%
Collaboration	n/a	n/a
Temperature levels	Ambient, chilled, frozen	Ambient, chilled, frozen

Source: Own

called "difficult"—dispose about the large power in supply chain, own advanced logistics capabilities, and force suppliers to accept their requirements. These are reasons behind the combination of high complexity and low logistics service required.

Translating customers logistics segmentation into practical outcomes includes two examples. Drugstores and discounters reflect two very different variants of retail channels and seem to be the appropriate ones to highlight the idea of customers logistics segmentation (Table 3).

Whilst the logistics needs of drugstores and discounters are very similar in terms of delivery time, order management and delivery quality, in terms of logistics complexity they differ significantly from each other. Drugstore is attributed to a collaborative segment, whereas a discounter is classified under an agile segment.

5 System Thinking Applying

Purpose of the complex logistics adaptive system is meeting logistics requirements of customers. A set of activities dedicated to meeting logistics requirements of customers as a complex system. The next stage of the procedure is covering the boundaries of the system. Taking into account the cooperation within the

supply chain the boundaries between system and its boundaries are ambiguous and inconclusive. What is more, the objectives of the company should be oriented towards the outside, the scope of an external impact the company is extended. The constituting of boundaries means creating a difference in the sense that internal relations are less complicated than the external ones (Wycislak 2016).[1]

When it comes to inputs, we assume that, respectively, the ratio of SKU/m2 and shelf life trigger the logistics requirements of customers. The shelf time translates into logistics requirements of customers in terms of lead time, delivery frequency, on-time delivery, order placement, SKU preparation, logistics labelling, delivery quality. The ratio of SKU/m2 affects order size, pallet heights, picking ratio, deploying of sandwich pallets. In terms of outputs—meeting of logistics requirements of customers is measured by Customer Case Fill On Time.

The feedbacks within a system are reflected by suboptimization principle, and manifests itself by sales peaks. The latter is a result of certain patterns in behaviour of the sales staff due to the pressure on meeting monthly targets. As customers are aware of the latter, they wait for the months endings in order to get the highest possible discounts. As a result, customer service needs to secure additional resources for work on entry and validation of orders. Consequences are twofold direct—higher costs and indirect—increase in the number of employees mistakes. Logistics also need to secure additional transportation capacities from the spot market, which translates into higher costs. Transport Service Providers even run of capacities and are not able to ensure the proper service levels. What is more, the trucks utilization is low which means also higher levels of carbon emission. Need for additional warehousing capacities is mirrored by more resources to commit. As the additional temporary resources are primarily secured by employment agency, new employees are not skilled enough, and the training is time consuming. Consequently, productivity is on the downward spiral, and costs in opposite on the upward spiral.

The principle of 20/80 implies that we should focus on 20% of customers generating 80% of turnover. In this sense, it is reasonably to differentiate services towards customers. The latter is also strictly connected with the Ashby law which is reflected by the quotation:

$$\mathrm{Vr} \geq \mathrm{Vd} - \mathrm{V\,o}$$

Vr variety of potential responses
Vd variety of problems
Vo variety of outcomes tolerable by the essential variables

Consequently the variety of logistics services both predicted and existing ones should be higher than variety of logistics requirement of customer. In other words, to predict logistics requirements of customers and to be prepared to what customers would want, and proactively manage over the customers' expectations.

[1]The topic of complex adaptive logistics system was also discussed in Wycislak (2016).

Our observations of the implications of the Ashby law on the differentiation of the logistics services enables us to distinguish four options: lean, standard, agile, super agile solutions. For example, in terms of lead time we can differentiate four options: lean: 48 hours, standard: 4 hours, agile: 12 hours, super agile: 6 hours; respectively for picking it is full pallet: lean; layer: standard; cartoon: agile; single item: super agile.

Taking into consideration—logistics complexity, logistics costs and logistics trade terms on the microscopic level, we can distinguish four patterns of behaviour on the macroscopic level. In the first step, we observe the quick wins that are results of high potential of costs savings. This reflects the lean approach. However, after exploiting low hanging fruits, the meeting of logistics of customers is achieved either by higher complexity or higher logistics trade terms. Complex-sophistication should involve lean, agile, super agile and standard approaches. However, the pressure on costs reduction results in the discontinuity changes like setting up logistics centralized control tower or implementing digital solutions including digital freight matching. This new emerging order means new possibilities for quick wins, however (Fig. 4).

These emerging patterns occur in the iterative way as quick wins have limited potential, and there is thinking on structural changes that are reflected with discontinuity and as a result new order. The moment of discontinuity is however only to understand by applying system thinking (Figs. 5 and 6).

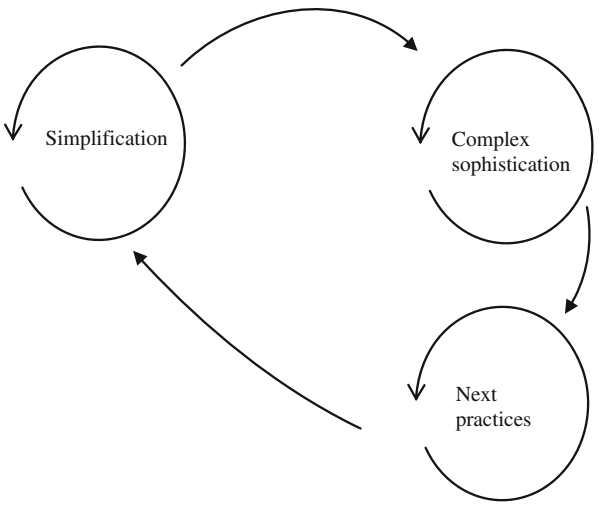

Fig. 4 The general scheme of the second part of research. Source: Own

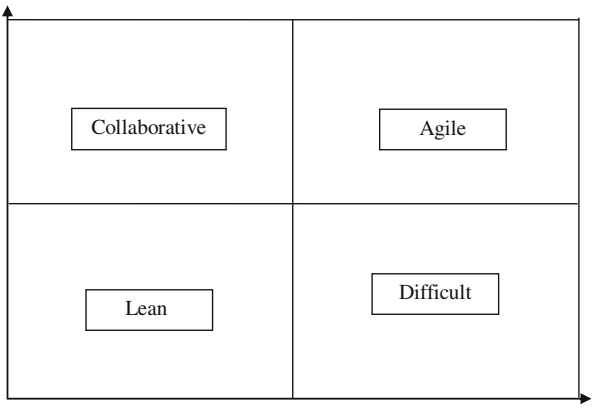

Fig. 5 Customers logistics segmentation. Source: Own

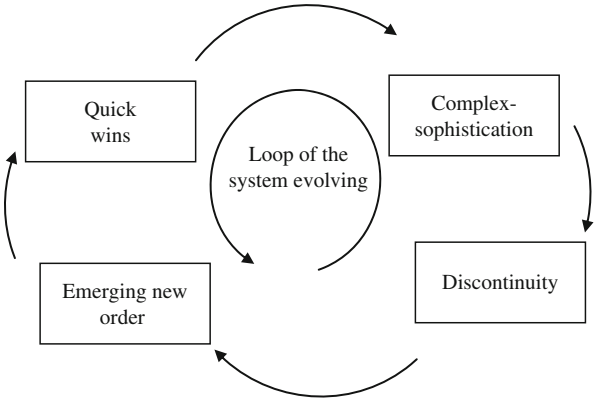

Fig. 6 Patterns of behaviour in the complex adaptive logistics system. Source: Own

6 Discussion and Conclusion

Deploying linear thinking manifested itself by covering reasons behind logistics requirements of customers, and then mapping logistics needs of customers, building the segmentation of customers by including two criteria logistics service and logistics complexity.

On the other hand applying system thinking resulted in covering the differentiated ranges of logistics services embracing four options: lean, standard, agile, super agile. What is more we distinguished four patterns of behaviour on the macroscopic level: quick wins, complexsophistication, discontinuity, emerging new orders.

The different outputs of linear and system thinking resulted from differences in causality, time, responsibility and strategy which is highlighted on the Table 4.

Table 4 Differences between linear and system thinking for meeting logistics needs of customers

	Linear thinking	System thinking
Causality	SKU/m2 and shelf time drive directly the qualitative and quantitative ranges of logistics needs of customers.	Logistics needs of customers are determined by interdependencies among system elements that are indirect, circular, and non-obvious. The casual loops among sales department, customer service and customer development impact the qualitative and quantitative ranges of logistics needs of customers.
Time	Focusing on quick wins	Quick wins in the short term provide unintended and delayed consequences which then translate into emerging new orders in terms creating logistics control tower, outsourcing of logistics operations.
Responsibility	Sit and wait if unexpected factor occurs, and waiting for recommendation from top level.	Proactively impacting customers and securing the position of supply chain integrator.
Strategy	Tackle many independent initiatives simultaneously which results in work overlapping.	Identification of interdependences among logistics, customer service, customer development, sales.

Source: Own

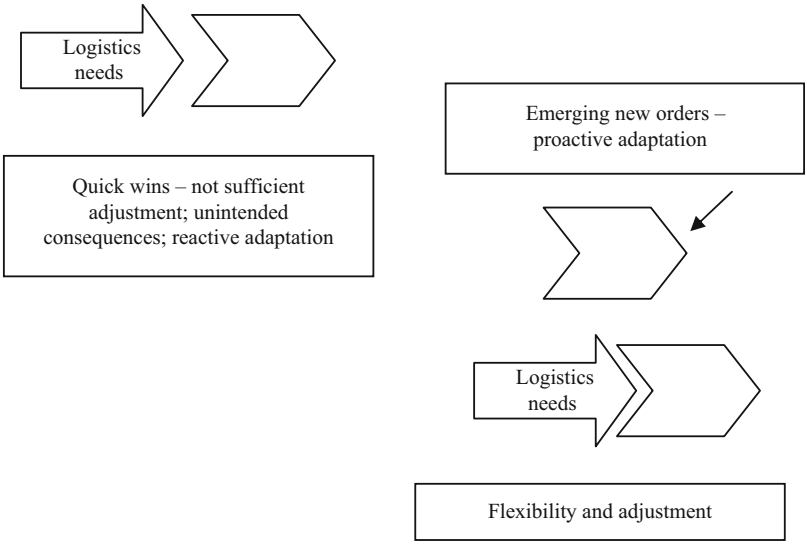

Fig. 7 Proactive and reactive adaptation in meeting logistics needs of customers. Source: Own

Findings of our study point to interrelations between flexibility and efficiency. Although reactive adaptation stemmed from linear thinking provides quick wins, could bring to unintended consequences translating into inability to adapt in the longer term.

Flexibility could be perceived as reactive and proactive organization activities in terms of time, content, scope that are better tailored to the turbulent environment than existing ones (Fig. 7).

Our study also brings the implications for the methodology of action research with two phases approach and consciously driven causal loops.

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Effective Organizational Communication: The Results of Empirical Studies in Poland

Magdalena Zalewska-Turzyńska

Abstract Internal communication is important because it is a tool to manage people. Effective communication and teamwork is essential for the delivery of high quality products or services. Here, effective communication should bring about an effect in efficient work, economical products and frugal organization management. Therefore, there is an assumption that if the communication pattern is adjusted to organization type, internal communication is effective. Two hypothesis were settled in this paper. H1: There is consistency between the communication pattern of superiors (managers) and the communication pattern of subordinates (employees). H2: There is consistency of the communication pattern to organization type for superiors (managers) and subordinates (employees). The conducted research shows partial, a rather low agreement between directors' (managers') and employees' communication, as well as low consistency of organization types and communication patterns. The research leads to a rejection of both hypothesis. Further research is recommended to establish the level of organizational effectiveness of consistent and inconsistent companies (both human and organizational ones).

Keywords Communication • Communication behavior patterns • Managers • Employees • Consistency • Organization

1 Introduction

Communication in an organization refers to communication and interaction among owners, managers, employees –in short, all members of the organization. There are many terms for communication within a company—internal communication or organizational communication, which is also called internal relations (Cutlip et al. 2006) or internal public relations (Kreps 1989; Kennan and Hazleton 2006). No matter what the name, there are two perspectives for researching organizational communication. It is either "a phenomenon that exists in the organization" (Deetz

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et al. 2001, p. 5) or "a way to describe and define the organization" (Deetz et al. 2001, p. 5). The first approach treats an organization as a platform on which "communication happens", while for the second, communication is the main process by which employees exchange information, create relationships, and give meaning to "construct" the culture and values of an organization.

Internal communication is important because it is a tool to manage people. Effective communication and teamwork is essential for the delivery of high quality products or services. Of course, effective communication (as such) may mean several things—adjustment of sender and receiver, lack of communication barriers, rapid and properly selected feedback and others. But effective organizational communication shifts the considerations to the area of teams and organizations. Here, effective communication should bring about an effect in efficient work, economical products and frugal organization management. Therefore, there is an assumption that if the communication pattern is adjusted to organization type, internal communication is effective.

Two hypothesis were settled in this paper.

H1: There is consistency between the communication pattern of superiors (managers) and the communication pattern of subordinates (employees).

H2: There is consistency of the communication pattern to organization type for superiors (managers) and subordinates (employees).

2 Review of the Literature

For the purpose of research, three main types of organization were settled on. This was defined on the basis of the division of labor, power-sharing and coordination patterns of the organizational processes. It allowed to distinguish three types of organizations: *traditional, prevalent and forthcoming* (Kołodziejczak 2012, pp. 8–25). These names for the organization types might be considered clumsy, since they may suggest frequency of occurrence, a link to time or, perhaps, anticipation but a better version was not found. Nevertheless, these names for organization types are not connected either to time or to place.

Organizations of the *traditional* type are based on a hierarchical structure, power is centralized, degree of formalization is high, it is characterized by formal communication and expanded control. There is a relatively low degree of variability of environment for this type of organization.

Principles of the *prevalent* type of organization are: an intermediate structure, organization processes, power is decentralized, the degree of formalization is average, variation and transitive functions of organizational roles is allowed as well as the autonomy and self-control of employees is admissible. Prevalent type organizations operate in a turbulent organization environment.

Forthcoming type organizations are based on organic networking structures, power is distributed, organizational solutions are designed *ad hoc*, there is

variability and transitive functions and organizational roles, organizational communication is based on advanced technologies, emphasis is put on self-organization of work, consulting and mentoring. This type of organization functions in conditions of intensified globalization and integration processes. (Kołodziejczak 2016, pp. 25–28).

On the other hand, three types of communication patterns were identified for the purpose of this study—traditional, opportune and networking.[1] The basis for differentiating the communication types were three dimensions—the initiator of the communication process, usage of technology that helps to communicate indirectly in a simultaneous or asynchronous way and a grapevine type of communication (horizontal, vertical and diagonal network).

2.1 Traditional Communication

The employee is treated as a tool, often a highly specialized one. His duty is to flawlessly perform the assigned tasks in the manner imposed by his manager. Therefore, in the first dimension, the initiator of the communication process is more often a superior—to settle an issue to achieve a goal or give instructions. The assumption and manager's attitude is that the employee does not need to know the wider context of the work or the organization's plans for the future (Widhiastuti 2012). The messages managers send often refer to short-term, perhaps even one-day time horizons. As the information flows down, it becomes more precise at each level of the structure, with the greatest number of details at the lowest organizational level. As it moves up, the communicate becomes less detailed and provides only a general character or takes the form of a summary (Bartels et al. 2010). The message and any information communicated up are related to the fulfillment of duties and obligations, the degree of progress, problems with work, finished jobs, or the lack of raw materials or tools etc. This type of internal communication should tell superiors how closely employees understand and follow the instructions (Langley 1988; Thackeray and Neiger 2009; Longenecker et al. 1999).

In the dimension of grapevine for traditional communication, as a rule, communication is vertical and work-related (Dutton et al. 1994; Downs and Adrian 2004; Goldhaber 1993). Only the manager is directed to make a decision so only he should have adequate and complete information for this purpose. Subordinates, playing roles unrelated to the decision-making processes, initiate the process of communication only when they are uncertain how to perform operations at their workstation (Fletcher 1999; Okumus 2003). Excessive transfer of information to employees is considered a burden for the employee and a cost for the company.

[1]The conducted research brought plenteous amount of data. Therefore, only some of it was presented: Zalewska-Turzyńska (2012, 2016a, b).

Workers and lower-level managers have limited access to information (a cascade of information) (House and Rizzo 1972; Schuler 1977; Oakland et al. 2002).

Horizontal communication occurring among employees placed at the same level is sharing the information primarily for the coordination of activities, to support the completion of tasks. This type of communication within the organization is voluntary, in the sense that the employees are willing to communicate, as they see a mutual benefit which is not imposed by the hierarchical relationship of work (Ashforth and Mael 1989).

As far as the dimension of technology is concerned—all team members are in the same place and time—this is mainly direct communication. Sometimes communication is carried out by means of a computer. Nevertheless, the rules remain unchanged—the computer is treated as a tool not a different communication channel.

To sum up, traditional communication is devoted almost exclusively to clarifying how tasks should be performed in a short time horizon (sometimes extremely short) and specifying the method of performing the task, therefore it is initiated mainly by a superior. The communication is mainly vertical communication, rarely horizontal. Traditional communication is usually simultaneous, directed. Technology is supportive, not a main tool for communication (e.g. graphs for presentations).

2.2 Opportune Communication

Teams communicate to do their job and to coordinate projects. Although it is necessary to inform people about any proposed changes for them to understand wider perspective and support them, active, top-down communication alone is not sufficient to ensure success (Levasseur 2001). Communication here is task-related and also occurs between people on an equal and different footing in the hierarchy (Postmes et al. 2001; Postmes 2003). Therefore, in the dimension of initiating the communication process, it is the person who has a direct impact on an organization's level of task fluffiness (Spillan et al. 2002), no matter what the organization structure is. In other words, the initiator of the communication process is not limited—it may be manager, employee or team mate depending on the needs (de Waal 2004; Okumus 2003; Stone 2006).

In the grapevine dimension there are a variety of solutions: top-down, bottom-up, horizontal information exchange, and lateral.

Teams and their members communicate directly or indirectly but usually synchronously (e.g. by means of a computer network or telephone) every employee is at their workstation during working hours. However, employees tend to prefer direct interpersonal communication to communication where they need more information on ongoing organizational issues (Cameron and McCollum 1993).

Summarizing, opportune communication is initiated by a team member—a manager or co-worker—according to needs, conducted between team members,

and is dominated by lateral and horizontal communication rather than vertical. IT tools are in everyday use to help to coordinate organization performance. There is simultaneous and asimultaneous communication, the time is the same but the place may be different.

2.3 Networking Communication

Employees are the most crucial resource for an organization, the main advantage in competing on the market and the key difference between organizations (Zingheim et al. 1996). They are a source of innovative business ideas as they share concepts in the organization through communication.

In the dimension of initiating the communication process, these employees use a diametrically different communicative pattern and competences to those employed in traditional organizations. Each team member introduces information to the information network, where it is stored and can be updated and commented on at any time. Team members are not required to be in the same place or time, but if this is necessary, defined team members agree on a meeting time to perform direct communication.

If a person (whether employee or manager) encounters a need for information, he can instantly obtain the missing information through personal contact, phone calls or e-mails. Similarly, developed ideas, methods of improvement and solutions can be immediately conveyed to the right people. Unfortunately, the rapid increase in the amount of information is sometimes reflected in a dramatic decline in its quality. Networking employees have to be able to filter information—an attractive multimedia communication or message is often empty in content (Chaffee and Metzger 2001; Hanson et al. 2008).

In the dimension of technology, tools of remote communication and control can be used (Castells 2013). The organization gives up direct control over their employees (freedom of time and place of work) and workers are able to work according to their preferences—it is important of course to perform and complete tasks on time. An employee is an inventor instead of being the executor, and does not perform ordered production tasks within a clearly designated 8 hours (Stromer-Galley 2000; Shaw and Gant 2002; Nowak et al. 2005; Walther 1996).

To sum up the features of networking communication, it is initiated *ad hoc*—when any member of the organization needs information or communication; it occurs according to a hierarchy but is also separate from it. It allows people to work remotely, because it lets them solve most problems and issues without personal meetings. Anyone who needs to takes part in the communication process by means of technology, it being perceived as best (fastest, more convenient) in the situation.

3 Method[2]

The project was financed by the National Science Center (NCN), decision number DEC-2012/09/B/HS4/02722. Data were collected from October 2014 until December 2015, from which time data analysis was conducted. The project ended on September 2016.

For-profit companies operating in Poland were researched. This study focused on organizations employing at least 50 people in industry—trade, production and services—according to country statistics. The empirical research was divided into two stages, in the first stage a questionnaire was addressed to managers responsible for the personnel policy of the company i.e. the HR director or the director of the appropriate department of human resources management in the company (in the case of organizations without HR, the owner or director of the company participated in the survey) to establish the type of organization and communication pattern. Henceforth, the name HR director will be used to differentiate this group of respondents from middle management from stage two. The second stage was directed to employees (middle management and workers) to establish their communication patterns. The number of questions asked was similar for both groups to avoid the effect of fatigue on the respondent.

In order to increase the inclination to participate in the survey, several different forms of encouragement were used—direct calls (initiated contact with over 5200 companies), invitations electronically sent to managers responsible for personnel policy in companies (e-invitations were sent to 7130 companies), and, finally, traditional correspondence invitations addressed directly to the CEOs of companies (traditional letters were sent to 745 companies). A significant obstacle in receiving information about the organizations was the structure of the research procedure—companies that agreed to take part in the first phase had to consistently agree to the second phase as well. In the end, 297 companies took part in the study.

Interviews with managers responsible for the personnel policy in the company were carried out by means of two methods: Computer-Assisted Telephone Interviews (CATI)—the default method (274 interviews)—and Computer-Assisted Web Interviews (CAWI) (23 interviews).

The contact method was tailored to the respondents' preferences. The questionnaire was designed according to the mix mode method, which allows comparable results to be obtained regardless of the contact method. Both methods used item rotation in order to avoid the effects of freshness or fatigue.

During the first phase of the research, contact was made with more than 12,000 companies that met the criteria. 297 interviews were successfully completed with people responsible for the HR policy from the various organizations and preliminary approval to carry out the second phase of the study was received.

The study was conducted on a representative sample of enterprises employing at least 50 employees. The sample was chosen randomly according to several criteria,

[2]The method was also shown in the article: Zalewska-Turzyńska (2016a, b).

such as: employment (medium/large) and type of industry (trade, industry and services). The responsiveness of individual groups of companies was diverse, and the sample was characterized by the over-representation of trades and the under-representation of services. Due to this, the structure of the sample was aligned to the structure of the population of medium and large enterprises in Poland through the use of analytical balances.

The second phase of the survey was carried out on a limited sample of 40 research subjects chosen from the group surveyed in the first stage. To join the sample, the company had to provide surveys from a minimum of 20% of their employees. Companies that provided a smaller percentage of completed questionnaires were excluded from the analysis. The second phase of the research was directed at employees on contracts. The selection procedure attempted to reach and invite every employee to join the survey. At the enterprise level, the sample was sufficient. Employees were informed about the survey and encouraged to take part in the research. There were two entities responsible for this. There was a research agency (which prepared information materials to promote the research and explain its purpose) and a partner company (whose team was assessed). The partner company committed to distributing information about the survey via all available communication channels typical for the company, such as intranets, the Internet, announcements (bulletin boards, showcases), direct communication (during meetings with employees) and other typical solutions for individual organizations. Workers completed a questionnaire using one of two methods—it was either an online survey (in the case of employees with access to a computer, questionnaires were sent as a link to their e-mail addresses) or a paper survey (in the case of workers who did not have access to a computer, e.g., manual workers, production workers). The company supplied an adequate number of printed questionnaires as well as a sealed box for workers to put their questionnaires in. The first method gave feedback from 1322 surveys, the second 952. Both methods had ensured the confidentiality and anonymity of the research.

4 Results

The tool for data analysis was the SPSS program. Due to the characteristics of communication patterns, they were treated as qualitative data. Tests based on the Pearson Chi-square (phi and Cramér's V) were conducted. In the case of the presented outcomes, there is statistical significance ($\alpha = 0.05$; $p < 0.001$; $n_1 = 289$ and $n_2 = 2274$) unless stated otherwise. The study was conducted on a representative sample of Polish enterprises employing at least 50 people.

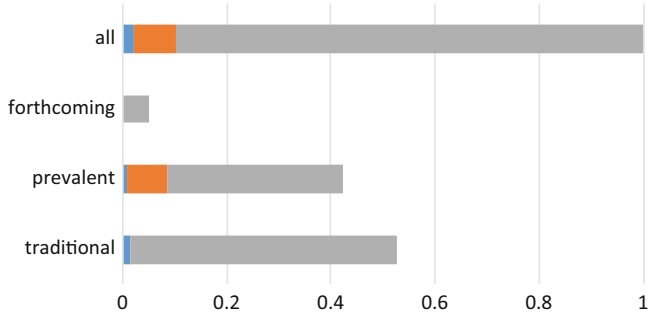
In terms of the distribution of the organizations type of *traditional, prevalent and forthcoming*, these resulted in the following findings: organizations with traditional characteristics—45.6%, organizations of prevalent characteristics—41.1%, and organization showing evidence of forthcoming—7.2%. There is also a group with mixed characteristics, that is, organizations having the characteristics of all three

types, without the explicit dominance of any of them—6.1%. Mixed type organizations were excluded from further analysis—there is the lack of possibility of interpretation in the case of a settled hypothesis. A mixed type of communication does not bring any useful conclusions for the organization. Both mixed categories require more in detail research.

The expected outcomes were that communication pattern is consistent to organizational type—traditional communication happens in traditional organizations, opportune communication in prevalent organizations and networking communication in forthcoming organizations. At first glance, the outcomes were surprising. Communication pattern and organization type were not consistent. The dominant type of communication is opportune, whilst organization type—traditional. The details are presented below (Fig. 1).

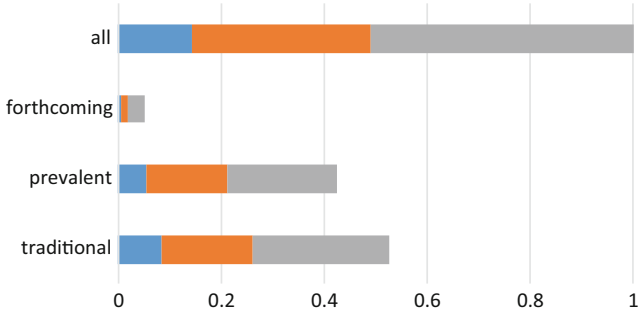
In the case of HR directors, the networking communication type and organization forthcoming type organization is highly consistent. In the case of prevalent type organizations, the dominant type of organizational communication is still networking, and even in traditional type organizations the dominant type of communication pattern is networking. This shows that in the opinion of directors—regardless of organization type, the communication pattern in dimension of initiating the process is networking (Fig. 2).

The employees are not as unanimous as their superiors. There is consistency on the dominant type of networking communication in dimension of initiating the communication process in forthcoming organization types. Unfortunately, there is very low consistency in the case of traditional organization types and traditional communication patterns. In all organization types the dominant communication pattern is anything but traditional (Fig. 3).



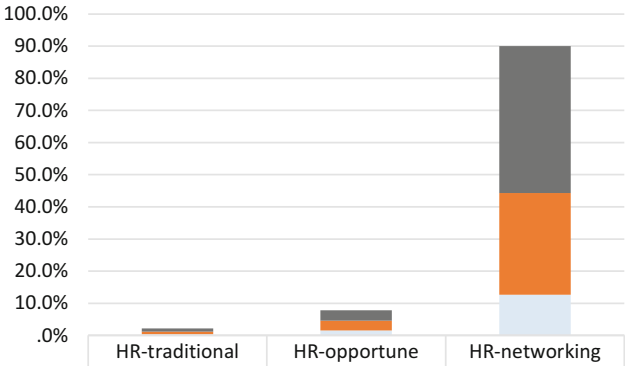
	traditional	prevalent	forthcoming	all
traditional	0.014375562	0.007637017	0	0.022012579
opportune	0	0.079514825	0	0.079514825
networking	0.51212938	0.336477987	0.049865229	0.898472597

Fig. 1 Dimension: initiating a communication process in relevant organization types—the HR director's point of view [$n_1 = 289$]



	traditional	prevalent	forthcoming	all
traditional	0.084086799	0.053345389	0.005424955	0.142857143
opportune	0.175406872	0.159584087	0.013562387	0.348553345
networking	0.265370705	0.212025316	0.03119349	0.508589512

Fig. 2 Dimension: Initiating a communication process in relevant organization types—employee's point of view [$n_2 = 2212$]

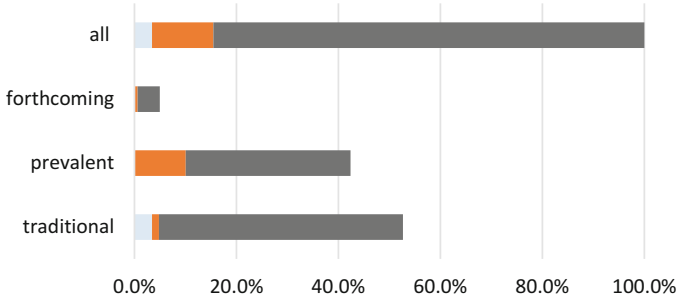


	HR-traditional	HR-opportune	HR-networking
employee-networking	.9%	3.3%	45.7%
employee-opportune	1.0%	3.0%	31.7%
employee-traditional	.3%	1.5%	12.7%

Fig. 3 Initiating a communication process in relevant organization types—manager-employee comparison [$n_1 = 289$, $n_2 = 2212$]

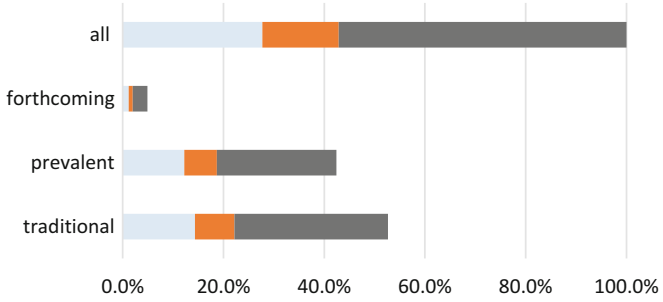
The data are surprising. 2.2% of HR directors consider the traditional way of initiating the communicating process while employees prefer so in 14.5%. Moreover, 90.0% of HR directors choose networking type communication in the dimension of initiating the process, while almost half of employees concur—49.9%. Consistency is on the level of 45.7% here. Consistency of the dimension of traditional type communication is close to zero—0.3% (Fig. 4).

Once again, HR directors consider the networking communication pattern in dimension of the usage of technology as dominant. Regardless of organization type,



	traditional	prevalent	forthcoming	all
traditional	3.5%	0.0%	0.0%	3.5%
opportune	1.3%	10.1%	.6%	12.0%
networking	47.8%	32.3%	4.4%	84.5%

Fig. 4 Usage of technological tools (direct-indirect, synchronous-asynchronous) for communication—the HR director's point of view [$n_1 = 289$]

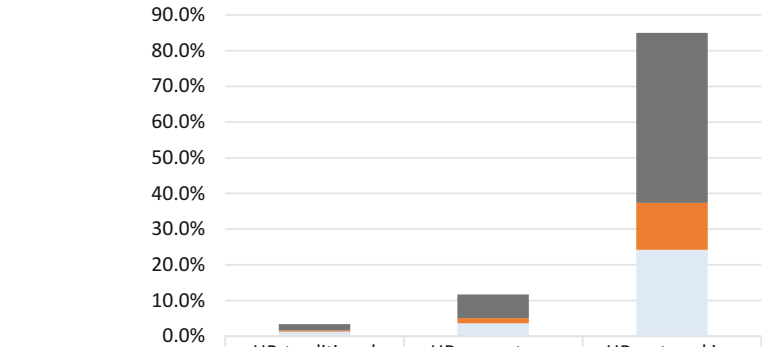


	traditional	prevalent	forthcoming	all
traditional	14.3%	12.2%	1.2%	27.7%
opportune	7.9%	6.4%	.8%	15.1%
networking	30.5%	23.8%	2.9%	57.1%

Fig. 5 Usage of technological tools (direct-indirect, synchronous-asynchronous) for communication—employee's point of view [$n_2 = 2212$]

the communication pattern is the same, networking. Traditional type communication occurs only in traditional types of organization, it does not happen in prevalent and forthcoming organization types. This consistency could confirm the hypothesis, but, unfortunately, the dominant type of communication in the case of technological tools in traditional organizations is considered to be networking by HR directors (Fig. 5).

Employees see the usage of technical tools differently. It appears stable—no matter the type of organization, the structure of communication type is similar,



	HR-traditional	HR-opportune	HR-networking
employee-networking	1.8%	6.6%	47.6%
employee-opportune	.3%	1.4%	13.1%
employee-traditional	1.3%	3.7%	24.2%

Fig. 6 Usage of technological tools (direct-indirect, synchronous-asynchronous) for communication—manager-employee comparison [$n_1 = 289$, $n_2 = 2212$]

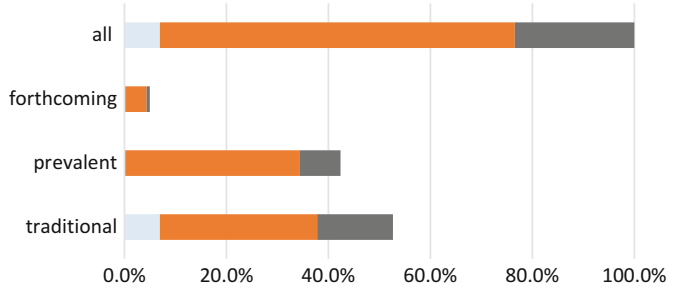
mostly networking, with the smallest part being opportune communication type (Fig. 6).

HR directors consider networking type communication in the dimension of technological tools as dominant—84.9%, next is opportune—11.7%, then traditional—3.4%. Employees in the same dimension of technological tools are not so radical—55.9% consider networking type communication as most frequently used. There is the difference in perceiving the usage of technology for communication. The second frequently used type of communication by employees is traditional face-to-face communication pattern—29.2%, opportune is the less frequently used type.

This is a very good result, 47.6% of HR directors and employees consider networking communication type. In the case of opportune type communication, more employees choose differently (10.3%), consistent is 1.9%. In the case of traditional type communication, the consistency is greater than a third (although the percentages are low (1.3–3.4%) the total consistency percentage of HR directors and employees in the dimension of technology usage is 50.3% (Fig. 7).

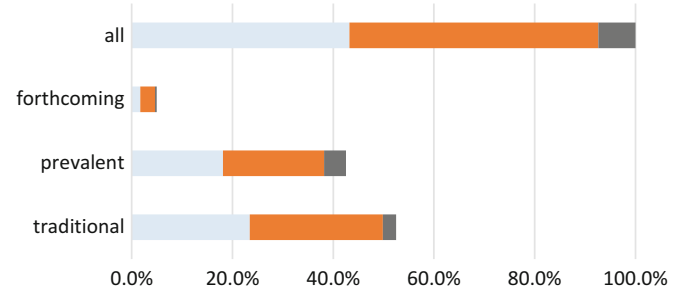
HR directors consider opportune communication type in the dimension of grapevine as dominant no matter what the organization type. This gives consistency for prevalent organizations. Moreover, traditional communication occurs only in traditional organizations (Fig. 8).

For employees, the dominant type of communication in the dimension of grapevine is opportune, but the difference is not as strong as in the case of HR directors. There is strong competition from traditional communication type for the dominant, opportune one (Fig. 9).



	traditional	prevalent	forthcoming	all
traditional	7.0%	0.0%	0.0%	7.0%
opportune	30.8%	34.4%	4.4%	69.6%
networking	14.9%	8.0%	.6%	23.5%

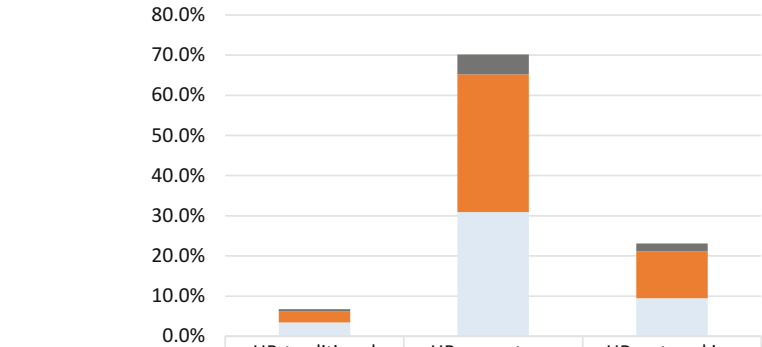
Fig. 7 Type of communication grapevine—the HR director's point of view [$n_1 = 289$]



	traditional	prevalent	forthcoming	all
traditional	23.4%	18.1%	1.7%	43.2%
opportune	26.4%	20.1%	2.9%	49.4%
networking	2.7%	4.3%	.4%	7.4%

Fig. 8 Type of communication grapevine—employee's point of view [$n_2 = 2212$]

Most HR directors valued the opportune communication pattern highest—70.2%, the second is networking pattern—23.1%. The difference between the first and second position is clear, of 2/3 rate. Traditional communication (mostly vertical) happens in 6.7% of cases according to HR directors. Although opportune type communication is also considered as most popular by employees—the subsequent positions are in opposition to HR directors' opinion—that is, the second is traditional—43%, the third is networking—only 7.3%. Moreover, the difference between the first and second position is marginal (only 4.8%) These data are striking: 23.1% of HR directors think that they communicate in networking type and only 1.9% of their employees are of the same opinion. There is a platform for



	HR-traditional	HR-opportune	HR-networking
employee-networking	.4%	5.0%	1.9%
employee-opportune	2.8%	34.3%	11.6%
employee-traditional	3.5%	30.9%	9.5%

Fig. 9 Dimension: Type of communication grapevine—manager-employee comparison [$n_1 = 289$, $n_2 = 2212$]

communication failure here. Fortunately, opportune communication is the most consistent.

The percentage of agreement according to communication pattern in an organization is considerably low—the highest is for opportune type—34.3%, then traditional—3.5%, the lowest is networking—1.9%. To sum up, the communication patterns of communication grapevine for HR directors and employees are consistent at 44.2%.

5 Conclusion

In two of the three dimensions—initiation of the communication process and usage of technology—HR directors consider networking type communication as dominant, in the third dimension—grapevine type—opportune type communication is considered by HR directors as dominant. The data pointing to this domination are extremely compelling, with a strong majority. At the same time, it is highly inconsistent with organization type. Even in traditional organizational types the dominant communication pattern is anything but traditional.

Employees' opinions are not so categorical. Although the dominant type of communication process in the dimension of initiating is networking, the distinction is visible but not as strong as in the case of superiors. The consistency with organization type is marginal Technological tools for employees are used in about half of contacts, and this has a low consistency with organization type. Grapevine dimension also shows a rather low consistency with organization type.

The conducted research shows partial, a rather low agreement between directors' (managers') and employees' communication, as well as low consistency of organization types and communication patterns.

The research leads to a rejection of both hypothesis. Further research is recommended to establish the level of organizational effectiveness of consistent and inconsistent companies (both human and organizational ones).

The results of this research raise more questions than they answers. Why do HR directors perceive communication as less traditional than their employees? What is the reason for this difference? These questions lead to a desire to conduct further research using a participant observation method to verify the answers given by survey participants with researchers' observations. Another assumption emerges over the communication tools used by people in everyday life which may be implemented by an organization. This is the intrinsically linked human habit of using technology to communicate, to search and in research for information when it is needed through the use of indirect and asynchronous tools. This is of course only a suggestion, but the next step is to verify these questions and assumptions, and to attempt to answer any questions arising.

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Independent Economic Regulation for Efficient and Fair Business: Case Study of Utilities Sector in Slovakia

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Abstract Independent economic regulation is one of the key preconditions to establish rules of the game enabling and encouraging efficient and fair business. Problematic independence, leading to unfair, unpredictable and politically influenced regulatory decisions, increases costs of compliance with such institutional framework, which negatively influences the overall efficiency of economic activities. The aim of this paper is to discuss the problematic independence of economic regulation, illustrated on a case study on a regulatory office in Slovakia, and to provide concrete suggestions how the independence of economic regulation can be improved in its de jure as well as de facto dimensions. The case study deals with the recent case of Slovakia's Regulatory Office for Network Industries that in late 2016 and early 2017 served as a good example of problematic independence of economic regulation both from politicians and the business sector. The case highlights the main system deficiencies in all relevant contexts, from legislation through its implementation and enforcement, to political, business and overall culture. Therefore, the case serves as a valuable learning basis, on which we build recommendations for improvements of independence of economic regulation, that are so much needed not only in the national context, but also in the context of most CEE economies.

Keywords Regulation • Independence • Independent regulatory institutions

1 Introduction

As sports need objectives and competent referees, the world of business also needs its objective, independent and competent regulator. Economic regulation considerably influences key economic attributes such as investments, employment, productivity, and efficiency. Several empirical studies have confirmed that, for example, competitive favourable regulatory environment positively influences the standard of living (Bouis and Duval 2011; Bourlès et al. 2010; and Sutherland et al. 2011).

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Many theoretical works, empirical studies and international institutions deal with the question of good regulation (e.g. Gilardi and Maggetti 2010; Christensen and Laegreid 2006; Guidi 2015; Koske et al. 2016).

OECD (2014) recommends to respect the following seven principles for the governance of regulators:

1. Role clarity—clear definition of roles and a regulator's position in legislation.
2. Preventing undue influence and maintaining trust—independence from politicians and business sector, maintaining trust.
3. Decision making and governing body structure for independence regulators—creating independent structure for a regulator's decision making and operations to maintain integrity and decisions in public interest, and to prevent potential conflict of interests.
4. Accountability and transparency—as counterbalance to a regulator's autonomy.
5. Engagement—a regulator needs to understand the regulated areas, so there should be mechanisms for involving business sector and other stakeholders to increase public and stakeholders' trust and improve the quality of outcomes.
6. Funding—funding should not have an influence on a regulator's decision. A regulator should have sufficient resources for fair and efficient fulfilment of its goals.
7. Performance evaluation—a regulator should be aware of consequences of its regulatory activities and decisions. Thus, they should be reviewed through performance indicators.

Regulation must be set to support competition and encourage businesses to innovate and improve efficiency, but, at the same time, not to create unnecessary burdens for business. Also, it needs to be executed in transparent and efficient manner.

2 Independence and Independent Regulators

What helps an efficient and fair business is the regulator's independence and regulation that resists pressure from politics and business. Independence is a crucial factor that prevents influences on regulatory activities and enhances trust in the regulatory system. Trust in the regulator's competency and integrity is at least as important as the legal framework containing independence assurances. If regulatory decisions are independent, they are in favour of consumers even in cases when such decisions concern large and powerful business entities. Blocking influences from politicians and regulated entities enables the regulator to adopt fair and independent decisions.

Creation of independent regulatory institutions originates in extensive experience of different economies that guarantee that certain values (most common example would be central banks) should be detached from a direct influence of politicians and entrusted to independent institutions, as these are not influenced by

political motivation related to election cycles, but focused on medium- and long-term goals and implement regulations on expert basis. Several studies (e.g. OECD 2003) suggested that independence of economic regulators is considered a key precondition of efficient regulation. In a study by KPMG (2007) a political independence was perceived as the third most important factor affecting regulation. The most important factors were expertise in legal and economic analyses, which also relates to creation of a specialized regulator.

A regulator's independence has several dimensions, such as institutional and intellectual, but also de jure and de facto independence. Under the institutional independence, we consider especially the importance of defining independence from business sector, politicians and in terms of financing (Zemanovičová 2013). Functional independence (neutrality, impartiality, decision making independent from interests of involved parties) should secure all businesses equal position in front of public authorities. Political independence assumes delegation of particular competencies to unelected experts, if an expertise is a key criterion for a regulator's operations. Independent decision making means considering only legislative and economic factors, while abstaining from political demands or regulated industry's interests.

However, there is no single model, as formally independent regulators separated from executive power might be less independent than a regulator formally incorporated in existing structures (Kovacic and Mariniello 2016). Despite this institutional setting variability, there are certain principles that strengthen independence and thus are considered ~~as~~ best-practices that should be followed. According to the EC important aspects of independence as explicitly identified in the Communication include (EC 2014):

- merit-based, transparent appointment procedures and clearly defined objective grounds for dismissals of the top management;
- sufficient and stable resources with a budgetary autonomy;
- rules on conflicts of interest and incompatibilities.

Even though it is important to formally establish the regulator's independence (de jure), it is not sufficient, especially in case of economies where independence is not supported by administrative and political culture (Thatcher 2005; Gilardi and Maggetti 2010). De facto (real, informal) independence can either increase or also decrease the level of independence defined in legislation (Kovacic 2011; Jenny 2012). De facto independence is derived from unwritten rules (social, cultural, political) as well as from the regulator's trust and reputation. It can be reviewed based on various factors, such as a leader's personality, political culture, age of the institution, frequency of the regulator's decision changes or their non-acceptance from political reasons.

One of the important attributes is the context in which regulation is set, such as unwritten political and administrative rules, or culture of independence. For example, if the prime minister (literally) tears the regulator's decision in front of media into pieces and encourages citizens to disrespect it, it is an extreme example of political interference and decrease of the regulator's trust.

According to some authors, regulatory institutions are more de facto independent in countries where more so-called veto players able to restrict the power of the government are present (Maggetti 2007). Veto players are individual or collective actors who have to agree upon changing the status quo in legislation or policies (Tsebelis 2002). Gilardi (2001) distinguishes two groups of veto players: (1) institutional and (2) partisan. Institutional players are for example the president or the parliament. Partisan players are e.g. political parties that form a coalition. According to Tsebelis (2002), also trade unions, central banks or courts can act as veto players, depending on the particular context.

Age and track record of regulatory institutions is considered by several authors as factor positively influencing its de facto independence. There is a certain dynamic in relationships between a regulator and the government and their establishing can take its time (Maggetti 2007). Therefore, older institutions might have an advantage that their independent status is established and accepted. History and track record of a regulator's operations and its decision-making practice will affect whether it is able to gradually gain trust in its competency and independence. However, there are also cases when the independence has been called into question. A successful enforcement record of an agency can strengthen significantly its de facto independence by enhancing its reputation and its status in the society (OECD 2005; Ottow 2015).

Finally, the personality of the leader and top management might influence the independence of a regulatory institution. According to Zemanovičová (2013) institutional independence is strongly influenced by management's ability to utilize independence guarantees, as well as personality, personal authority, resolution and leadership skills of its leader. These can be reflected in how clearly the institution signalized that political influences on its decisions are not acceptable. Therefore, a leader of such independence institutions should be a persona whose integrity and previous tract record will guarantee that he/she would withstand the pressure from politicians or business sector.

2.1 Reasons for Independent Regulation

According to the principal-agent theory the elected representatives (principals) delegate part of the agenda to independent regulators (agents) as these have better capacity to handle it. In some expertise-intensive and complex fields the elected representatives do not have sufficient competencies and their motivation can be of a short-term nature due to an election cycle. Delegating such agenda will enable the elected representatives to focus on more general aspects of public policies and setting the rules. Developing these theories, e.g. the ally principle explains that principal is more likely to provide high level of freedom to an agent if they share common preferences (Ennser-Jedenastik 2016).

The reasons for appointing independent regulators are mainly:

- Expertise—decisions in comprehensive and technically complex areas with long-term effects require specialized knowledge and understanding of sectors and markets. These can be established better in specialized institutions. Talbot (2004) describes a structural separation and creation of a specialized (single-purpose) institution.
- Credible commitment—the theory of credible commitment explains that politicians are driven by their own interests and tend to prefer short-term solutions over the long-term ones, that are generally in public interest. However, certain policy areas require commitments that are independent of the election cycles. This theory positively perceives regulators and considers them more trustworthy compared to politicians. Regulatory authorities are isolated from political influences and election commitments, have longer time span compared to politicians, so they can increase the credibility of commitments. A credible commitment problem arises when a policy maker who preferred a certain policy option at one point in time may change preferences at the time when the decision needs to be implemented (OECD (2016)). In order to increase the long-term impact of public policies, policy makers limit the choices of future policy makers by delegating authority to independent agencies which are supposed to be less influenced by the changes in politics (Gilardi 2008). Lack of credible commitment decreases motivations to invest particularly in sunk assets as these investments are generally irreversible and thus very sensitive to changes in the regulatory context (Burns and Riechmann 2004). Lack of credible commitment increases incentives for rent-seeking on the part of political actors as it creates room for manipulation of the regulatory context (Baudrier 2001).
- Relocation of blame—regulatory bodies enable politicians to avoid unpleasant situations, such as public blame if the regulator is forced to adopt unpopular measures that are necessary from the long-term perspective.
- Flexibility and stability—an independent regulator can secure stable and predictable regulatory environment and react more flexibly to changing conditions. Political uncertainty refers to the risk of a change in the existing government by a new one with different preferences (Moe and Caldwell 1994).
- Effectiveness and efficiency—higher expertise, focused specialization, decision-making based solely on considering legal and economic arguments enable higher efficiency. As a result, independent regulatory bodies show higher performance, which in turn leads to higher performances of markets (Gilardi and Braun 2002). Accordingly, Talbot (2004) argues that one of the reasons for creating an independent regulator is performance management and ability to set performance targets. However, there is a chicken-and-egg problem in relation to effective enforcement and advocacy on the one side and independence on the other: lower independence deprives the agency of the tools necessary for effective enforcement and advocacy; poor enforcement and advocacy in turn, reduce the perceived legitimacy of the agency and induces lower independence (OECD 2016).

In general, arguments in favour of independent regulators significantly prevail in the literature. Nevertheless, there are also two most frequently stated problematic issues linked to independent institutions:

- More problematic advocacy—if the regulator is separated from the government structures, it might have less space to influence the government to consider e.g. competition or regulatory aspects in the adopted policies. If the regulation is incorporated into hierarchically organized public administration, a regulator might have greater space for communication with the government, as circulation of information and overall communication are easier.
- Democratic deficit—in case of regulatory institutions independent on political power there is a discussion on their legitimacy, as they, in fact, are not subject to democratic election and political responsibility. Democratic accountability is based on an assumption that politicians who have been entrusted a political power, are accountable to their votes directly through elections and indirectly through an institutionalized control. However, there is no such assumption for independent institutions. Thus, it is necessary that accountability issues are addressed.

2.2 *Balancing Independence: System of Checks and Balances*

Independence of institutions should not be understood absolutely, as it does not mean they are outside any control. A regulator should be independent enough to take decisions without being influenced by politicians or business sector, but the long-term strategy and policy goals should correspond with broader national priorities established by the elected representatives in the government and the parliament. However, rulemaking and rule enforcement are being separated. We may talk about dividing responsibilities to political responsibility for political targets and regulatory setup that have been given majority in the elections and technical responsibility of experts whose task is to adopt concrete decision and apply the respective regulation.

In addition, to create a system of checks and balances, it is necessary to establish an accountability system. Independence and accountability are two sides of one coin (OECD 2014). According to Kovacic a Mariniello (2016) it is optimal if the regulator is, on one hand, autonomous from political influences in investigation and decision-making, but, on the other hand, accountable for application of its competencies and spending of public resources. Accountability is important to preserve the independence in long-term perspective. However, it also works the other way round. As argued by Monti (2014), reporting and accountability help to preserve and strengthen independence. According to OECD (2016), independent regulatory institutions should be accountable to (1) executive and legislative power, (2) regulated entities, and (3) general public.

There are several tools for controlling the independent institutions:

1. Judicial review of decisions. Review of decisions is entrusted to the judiciary. Neither general public nor the government are able to take this role, as it requires specific knowledge from the fields of legislation and economy (Jenny 2012). Final independence of the regulator is determined by the independence of judiciary system. The judiciary is required to possess expert and frequently also very specific knowledge, so it is crucial to create preconditions for competent, independent and trustworthy judgements, e.g. by creating specialized courts or providing training to judges. There are different models of specialized courts (e.g. Competition Appeal Tribunal in the UK or Supreme Administrative Court in the Czech Republic) or general courts (e.g. in the US).
2. Transparency and proactive disclosure of all information related to a regulator's activities and decisions enable the stakeholder control. It is important to issue reasoned decisions and make them publicly available. This will also make it more difficult to capture an agency which is open to the scrutiny of all stakeholders (Jenny 2012). Legislation usually regulates the obligation to publish resolutions, annual reports, or to submit reports to the government and the parliament. However, the regulator might also strengthen its trust by publishing further information, such as guidelines, working procedures used in decision-making, or by frequent public performances of the leader explaining the adopted resolutions and procedures, or by organizing public consultations before programming the regulatory measures.
3. Ex post performance evaluation—On the performance of economic regulators, the indicators can offer a key contribution to analyse the relationship between governance arrangements and the overall performance of a sector or industry (for example, as measured by investment or productivity).

   In this context, an example of good practice would be New Zealand where regulators in the area of electricity (Electricity Authority and the Commerce Commission) regularly publish performance information. According to the Electricity Industry Act 2010 regulators gather performance data that are made available to the public in user-friendly way. The online portal supports education, publishes guidelines, model contracts etc. Both regulatory institutions are obliged to produce annual reports in the defined structure. A regulator's performance is evaluated using the pre-defined goals and development following the strategic priorities, and is also made publicly available.

The decision on criteria to evaluate a regulator's efficiency definitely requires deep study. In fact, it would be problematic to determine empirically and compare which decision is in fact more effective (Guidi 2011).

3 Case Study from Slovakia: Regulatory Office for Network Industries

Our case study challenges the independence of economic regulation in Slovakia, namely in case of its Regulatory Office for Network Industries. The case study is dated to the most recent case that took place in late 2016 and the beginning of 2017. In the first part, we briefly describe the character, tasks, position and governance structure of the regulatory office. Then, we introduce the case related to resolution on increase in charges for electricity and gas distribution leading to significant increase of utilities' prices for households. In our opinion, it is the exemplary case illustrating the questionable independence of the regulatory body. In the following part, we discuss the de jure and de facto independence on the regulatory office, by comparing the requirements for independence with the actual legislation and de facto situation.

3.1 Utilities Sector Regulator in the Slovak Republic

The Regulatory Office for Network Industries (hereinafter referred to as "RONI") performs its mission pursuant to the Act No. 250/2012 Coll. on regulation in network industries, and thus through determining the prices and conditions of their application in network industries, and the conditions for the regulated activities performance. The regulated activities cover (RONI 2017):

- generation, transmission, distribution and supply of electricity and the related services,
- performance of the short-term electricity market administrator's activities,
- production, transport, distribution, storage and supply of gas and the related services,
- production, distribution and supply of heat,
- production, distribution and supply of potable water by public water supply system,
- diversion and purification of sewage through public sewerage system,
- abstraction of surface water and energy water from water flows, utilization of the hydro-potential of the water flows.

The Slovak legislation on regulation in energy industry follows the 3rd Liberalization Package of the European Union for the internal electricity and gas markets. The Third Package has been transposed to the Slovak legislation as of 1 September 2012, and thus in the form of new acts on regulation in network industries and on energy. The legislation on regulation of network industries covers a broad spectrum of generally binding legal provisions from the industries of electricity, gas, heating energy and water management. RONI has been issuing

executive (secondary) legal provisions in the form of Ordinances and Decrees (RONI 2017).

The key legislative document for RONI is the Act No. 250/2012 Coll. on regulation in network industries, as amended. RONI is a state body that is formally independent from government power and regulated entities. It is represented by the chairman of the office (hereinafter referred to only as "chairman") and the council, which consists of chairman of the council and other six council members. The chairman manages council's activities, mainly by calling and facilitating the meetings.

3.2 The RONI Case

In late 2016 and early 2017 Slovakia saw a laud doubt and rumour about the RONI case with several consequences. The RONI chairman left his position after the prime minister's pressure, who himself faced discharging in the parliament. Several criminal complaints have been made, and the case got enormous media coverage.

In 2016, the prime minister publicly promised citizens to decrease prices of utilities (due to dropping prices on global markets), even though, according to legislation, such competencies belong to the regulator (i.e. RONI). At the end of 2016 RONI issued a resolution that quite substantially increased the regulated prices especially through increase in distribution charges (not charges for energies themselves). In January 2017, households received gas and electricity invoices with significantly higher prices compared to the previous year. The Prime minister in his reaction in front of TV cameras recommended them to "tear the invoices into pieces". Subsequently the RONI chairman, J. Holjencik, reconsidered the decision after the ultimatum given by the prime minister—either the original decision is cancelled, or legislation changes related to RONI will be pushed through the parliament. In pursuance of this intervention, RONI set the gas and electricity distribution charges back to previous rates. Several law experts objected that such step is not legally possible. However, it happened despite the law saying that "the chairman of the office in the performance of its competence shall act independently from instructions of public authorities, municipal authorities, other public authorities and other persons". As a result, the "independent" position of the regulator gained ironic connotation. The saying "independent as Holjencik" became very popular in media. As was noted above, due to political pressures, J. Holjencik left his position.

The RONI chairman has also been accused of conflict of interests. The government increased the RONI's budget by additional 1.8 million euros to execute an extensive control in utilities distribution companies, that should have contributed to considerable decrease in regulated prices. According to information presented in media, some of the controllers could have had connections to the "JHS" company closely linked to the former RONI's chairman. According to article in "Trend" business magazine (Kollárová 2017), back in 2008, already before being appointed

as chairman, J. Holjencik founded a company "Jozef Holjencik Systems—JHS". However, he did not quit his involvement and activities in the company after becoming RONI's chairman. Media have published an audio recording from the meeting, where J. Holjencik recommended the representatives of regulated companies to have their assets revalued, and the regulatory office will then increase their prices for water supplies and sewage. JHS was reasonably suspected of having profited from this situation.

The case caused significant reactions. Police started investigations based on information related to overpriced utilities. The opposition proposed to discharge the prime minister, and opposition MPs even submitted a claim to the General Prosecutors Office related to prime minister's interference with the regulatory office's activities.

If the above-mentioned information prove true, the political as well as functional independence of the regulator will be called into question. Anyhow, the doubt about the regulatory institution itself already undermines the regulator's trust.

3.3 Assessing the Independence Parameters of RONI

In the previous work, we already focused on defining the indicators of independence and its particular dimensions—political, functional, de facto and de jure independence (Zemanovičová and Vašáková 2016). In this paper, we attempt to illustrate how such parameters have been fulfilled in case of RONI (Tables 1 and 2).

Based on the analysis above (Table 1) we may sum up that, in the Slovak Republic, the basic formal assurances for an independent position of the regulator have been established. However, the de facto independence is more problematic. If we build on indicators that we have developed for measuring the de facto independence (Zemanovičová and Vašáková 2016), we shall conclude that in case of RONI, its real independence is questionable. In Table 2 we present the assessment of selected de facto independence indicators.

4 Findings and Discussion

The RONI case clearly demonstrates that regulators might face strong external pressures. Therefore, establishing regulators' position in a way enabling them to face such pressures (from politicians or business sector) shall be in the best public interest. Also, an independent regulatory authority should be headed by a person with an incontestable expertise and integrity, selected in a transparent and open nomination and appointment process.

As far as de jure independence in Slovakia is concerned, the basic preconditions are embedded in the legislation. A regulator's formal independence has been

Table 1 RONI: de jure independence

De jure independence	RONI
Status of an institution. Independence of an institution is greater if it is not a part of direct government administration hierarchy.	According to the Act No. 250/2012 Coll. on regulation in network industries, as amended (hereinafter in this table referred to only as "the law"), the regulatory office is an independent institution, as according to §4 (2) The office in the performance of its competence shall proceed impartially and independently. Neither public authorities, municipal authorities, other public bodies nor other persons may affect the office in the performance of its competence. According to §5(8) The chairman of the office in the performance of its competence shall act independently from instructions of public authorities, municipal authorities, other public authorities and other persons.
The process of chairman's selection and appointment. Independence is greater if the selection is based on a transparent process including a public hearing. Independence is low if the appointment is based on agreement of political parties.	The office is headed by the chairman who is appointed by the President of the Slovak Republic based on the proposal of the government. Thus, in fact, the chairman's appointment is based on political parties' agreement. In its proposal resulting from the recent case, the government wants to take the competency of appointing the chairman for itself.
How is the leader of the institution defined? Are there any requirements on expertise, experience in the field of competition, and personal integrity?	According to the law, namely §7 (7), the requirements are: (a) second degree university education in technical, economic or law specialization and no less than 10 years of practice in network industries or pricing or in the creation of concepts in the power sector, of which 5 years in a managing position, or third degree university education in technical, economic or law specialization and no less than 7 years of practice in network industries, in pricing or in the creation of concepts in the power sector, of which 5 years in a managing position, (b) having capacity to take legal acts in full, (c) integrity.
Possibility to recall the chairman. Independence is greater if the reasons are clearly stated in legislation.	The performance of position of the chairman of the office shall terminate (a) upon expiration of the term of office, (b) upon resignation, (c) recall from the office, (d) by death or having been pronounced dead (§5 (9)). The law explicitly lists reasons for recalling the chairman: (a) was condemned, by a valid and effective court ruling, for a willful criminal offence or for a negligent criminal offence directly related to the performance of its office,

(continued)

Table 1 (continued)

De jure independence	RONI
	(b) was relinquished, by a valid and effective court ruling, of its capability of taking legal actions or its capability of taking legal actions was restricted by a valid and effective court ruling, (c) the chairman of the office 1. became a member of managing, supervisory or inspection bodies of regulated entities, 2. began to pursue business in network industries, 3. began to perform the office of a deputy of the National Council of the Slovak Republic, a member of the government, position or membership in the body of a municipal authority, 4. has a property interest in the business of regulated entities, (d) fails to perform his/her office for a period longer than two consecutive calendar months, this shall not apply if the chairman of the office is temporarily acknowledged as unable to work for illness or injury, (e) acted in the performance of its competence in conflict with subsection 8 (The chairman of the office in the performance of his/her competence shall act independently from instructions of public authorities, municipal authorities, other public authorities and other persons.). (12) The president of the Slovak Republic shall recall the chairman of the office also if the person close to him/her under Section 116 of the Civil Code is an employee of regulated entities, has a property interest in the business of regulated entities, pursues business in regulated activities in its own name or in the name of another, or through an association of persons or is a member of managing, supervisory or supervisory bodies of regulated entities.
Mandate length. Independence is greater if the mandate exceeds the election period, without the possibility of repeated appointment.	The term of the chairman's office is 6 years. The same person may be appointed as the chairman of the office not more than for two consecutive terms of office. (§5)
Collective/monocratic decision-making. Independence is greater if the decision-making processes are collective.	According to the law §18 decisions on appeals against decisions of the office shall be made by the council. However, chairman of the office is at the same time also the chairman of the council (§5). It is very problematic that the same person, J. Holjencik, was the chairman of the office as well as its council.

(continued)

Table 1 (continued)

De jure independence	RONI
Process of selection, proposing and appointing the regulatory office/s council members. An open selection process is optimal.	The president of the Slovak Republic shall appoint council members, except for the chairman of the council, upon proposal of the National Council of the Slovak Republic and the government in such a manner so that three council members be appointed upon proposal of the National Council of the Slovak Republic and three council members upon proposal of the government. No open selection process took place. Membership in the council, except for the chairman of the council, shall expire (a) upon expiration of the term of office, (b) upon resignation, (c) by a recall from the office, (d) by death or having been pronounced dead (§7 (16)).
Are there any requirements on council members? Is the experience with regulation required? Council members should have expert experience in the area of regulation.	According to the law (§7 (7)) a council member may be a citizen of the Slovak Republic, who meets the following qualifications: (a) second degree university education in technical, economic or law specialization and no less than 10 years of practice in network industries or pricing or in the creation of concepts in the power sector, of which 5 years in a managing position, or third degree university education in technical, economic or law specialization and no less than 7 years of practice in network industries, in pricing or in the creation of concepts in the power sector, of which 5 years in a managing position, (b) having capacity to take legal acts in full, (c) integrity. According to §7 (11) a council member shall in the performance of his/her competence act independently from the instructions of public authorities, municipal authorities, other public authorities and other persons.
Reviewing the decisions. Resolving appeals without influences of politicians is important to secure the independence.	Appeals against the second stage decisions of the office may be filed to judiciary.
Is there a system for announcing meetings of office's leaders and employees with the decision power with politicians? In case there is such a system, it supports transparency and independence.	There are no information that such practice has been implemented by the regulatory office.
Means of financing. Clearly set financing rules and financing from multiple sources strengthen regulator's independence.	RONI is funded from the state budget.

Table 2 RONI: de facto independence

De facto independence	RONI
Decisions and operations of the institutions are not under the influence of the government or political parties.	The Prime minister directly stepped into the regulator's decision-making, which led into changes in the regulatory decisions.
Do politicians have direct/indirect influence on selection of the chairman? Are there any doubts about chairman's/deputy chairman's independence? The independence shall be supported by open and competitive selection process and publication of its criteria.	Politicians do have influence on selection of the chairman. There had taken place no open selection process before J. Holjencik's appointment. Accordingly, so far there have been no indications that a new chairman of the regulatory office shall be chosen in the open selection process.
Expertise and experience in the field of competition prior to appointment. Are they published?	Besides the requirements defined in the legislation, no other information on candidates' or selected chairman's expertise are being published.
How did the position of chairman/deputy chairman terminate? Was it upon expiration of the term of office, recall from the office or resignation?	Due to the political pressure and pressure from media, the office's chairman resigned in early 2017.
Does the real term of the office correspond to the period set by the legislation?	The term of office ended earlier due to political and media pressure.
Qualification and integrity of the decision-making officials (chairman, deputy chairman, members of the council).	Media presented several information that call into question the chairman's integrity (see Sect. 3.2).
Do political parties have an influence on appointing the members of the council? Mechanism of their appointing.	Politicians have an influence, even though also political opposition has its voice in the part of selection process that takes place in the parliament. §7(3) The president of the Slovak Republic shall appoint council members, except for the chairman of the council, upon proposal of the National Council of the Slovak Republic and the government in such a manner so that three council members are appointed upon a proposal of the National Council of the Slovak Republic and three council members upon proposal of the government.
Long-term stability of the budget. No significant changes usually signalize greater independence.	The 2016 budget was increased by additional 1.8 million euros allocated to execute a control in distribution companies. Media informed about using part of these resources in favour of JHS company (a company closely connected to the former chairman of the office).

evaluated rather positively also by OECD (2016). However, according to our opinion, the legislation needs certain further improvements. Thus, we propose to:

– Modify rules of the chairman's and council members' selection process—implementing open and transparent selection process, including public

presentation of candidates' vision. As OECD suggests, in order to dispel any sense of undue proximity of board members to the government it is important to ensure that nomination and appointment processes are transparent, and based on objective and qualitative criteria. Independent nomination committees can be an effective means of ensuring management impartiality (OECD 2016).

A good example here is the Germany's regulatory office "Bundesnetzagentur". Its leader is appointed by the government based on the recommendation of the advisory council comprising of 16 members of parliament's lower house (Bundestag) and 16 members of parliament's upper house (Bundesrat).

In Great Britain, the regulatory Board of the Competition and Markets Authority) members' selection process is supervised by the Secretary of State and the Commissioner for Public Appointments, whose task is to ensure meritocratic selection and avoid influence of personal or political patronage. The process of hiring civil servants is regulated by the Civil Service Commission.

- Separate functions of the chairman of the office and the chairman of the council. Although the council with a competence to take decisions in an appellate proceeding is a collective body, such change would be, in our opinion, helpful, as it is more complicated to influence decisions of more members of the council in favour of political or business interests. Due to the plurality of its members, a multi-member board is considered to have a greater potential to resist capture and pressures. As such, a multi-member board is seen more capable of bringing a greater level of independence than a single member board (OECD 2005, in Kovacic and Mariniello 2016). However, the problem in case of Slovakia's RONI is that the appeals against regulatory decisions of the office are assessed and decided upon by the council of the office, which is headed by the same person as the office itself. Thus, if the same person holds both positions (i.e. chairman of the office and chairman of the council), the decision-making in the appellate proceeding is hardly independent.
- Limit the chairman's mandate to one term of office only—non-renewable terms are preferable as otherwise the appointed person may tend to please the appointer in order to be re-selected (Monti 2014, in Kovacic 2011). According to the Act No. 250/2012 Coll. on regulation in network industries, as amended, the same person may be appointed as the chairman of the office for two consecutive terms of office. We propose to cancel this clause, and, as an alternative solution, to consider prolonging the term of office, but only on condition that the selection process is open and transparent.

As illustrated also by the presented RONI case, formal independence of regulatory office is not sufficient. The real-life situation proved that even under such conditions, the de facto independence might be problematic, and both functional as well as political independence might be called into question. Therefore, in our opinion, it is inevitable to establish the de facto independence. To strengthen the de facto independence in case of RONI, we suggest to:

- Introduce a system of announcing meetings of office's representatives and officials with the decision power with entities from business sector. The regulator's communication with politicians and regulated industry has to be transparent in order to preserve the regulator's trust and eliminate potential conflict of interests. If any consultations with the government are needed, they should be announced in advance. A good example is the Germany's Bundesnetzagentur—an independent regulator in electricity, gas and telecommunication sectors. It is an independent institution with legislative guarantees of independence in regulatory decisions and application of regulatory legislation. In exceptional cases it may accept guidance from the government related to the long-term strategy, but such recommendations have to be open and published.
- Increase transparency and strengthen accountability. As we presented above, independence has to go hand in hand with accountability. As the independent institutions possess relatively high competences, including the rights to impose high penalties, accountability mechanisms have to be established. The key question with this respect is building and preserving the regulator's trust, so its decisions would be trusted and respected.

In Slovakia, representatives of the business sector raised several objections against the regulator's transparency. For example, they complained that the process of commenting regulatory proposals is too short and takes place in unsuitable terms, e.g. proposal of the regulatory policy for 2017–2021 was to be commented during the Christmas holidays. Also the European Commission considered the RONI's regulatory process's transparency as insufficient, and it recommended Slovakia to apply several standards used by the European Commission, such as minimum duration of consultations (EC has set it to 12 weeks). Similar practice is applied by the British regulator OFGEM or Austria's E-control.

In case of RONI we suggest not only to increase transparency, but also the answerability—i.e. the obligation of a decision-making entity to publicly explain and justify its decision, prove that it is legitimate and justified, and that it corresponds with the entrusted competencies. We also find organizing hearings with relevant stakeholders before introducing the regulatory measures appropriate.

Annual reports, parliamentary hearings and fiscal auditing are other mechanisms of accountability for regulatory agencies, as they publish basic relevant information. However, it is important that these reports and information are analysed by experts able to judge the quality of regulatory outcomes. Besides the experts within government structures, the regulated sectors, or economic analysts, also academia should be involved.

As it was already mentioned above, an important element for controlling the economic regulation is the possibility of regulatory office's decisions' judicial review. Therefore, it is also important to pay attention to improving the quality of judicial review.

Strengthening the culture of independence and advocacy—a regulator might be perceived as independent even if not all legislative guarantees of formal autonomy are provided, but only if it is situated in an economy characterized by a long

tradition of respecting the independence of economic regulation. Therefore, in our opinion, informal rules and culture of independence are also important aspects that need to be considered. Slovakia belongs among countries where independence is hardly accepted, and often only symbolic, as politicians aim to preserve strong overall influence, and do not understand advantages of independent position of a regulator. Politicians' reactions to RONI case did not appeal for greater competency, independence or transparency, but, vice-versa, they led to attempts to institutionalize the governments' intervention. However, in this perspective, the point of an independent institution is becoming lost. Thus, we consider opening expert discussions on topics related to economic regulation and need for independent regulators on multiple forums, such as research and academia, business, government, as well as general public, especially important.

Active involvement in international networks might contribute to an exchange of information, know-how, adoption of best practices and using argumentation. Various evaluation reports by international institutions can also be considered as "soft accountability".

5 Conclusion

The most recent "RONI case" is a textbook example showing that within the nowadays political and business context, countries like Slovakia (we believe that due to common heritage of the transforming period to standard market economies, similar cases might arise also in other CEE countries) face serious challenges to secure independent economic regulation. Although, as shown in the presented case study, de jure independence might be established in the legislation to a reasonable extent, de facto independence is frequently called into question due to signals of influence from and connections with politicians and/or business sector. As a reaction to the analysed case, we have identified the key gaps in the mechanisms establishing independence of the regulatory office, and suggested what improvements should be made to strengthen this independence. Of course, these steps will not work on their own. They are important preconditions, but simply not sufficient to solve the overall unfavourable situation. The implementation and enforcement of such measures depend on many interconnected phenomena, such as political culture, business culture, developed expertise in economic regulation, efficient and reliable judiciary system, as well as awareness and interest of general public. Only under these conditions, economies might establish independent economic regulation for efficient and fair business.

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Towards Reporting for Sustainable Development

Anna Zgrzywa-Ziemak

Abstract The paper is focused on the issue of reporting for sustainable development. Two terms—sustainability reporting and integrated reporting, used in relation to reporting for sustainable development, are defined. They are discussed in the context of different, partly conflicting, approaches to business sustainability. It was shown that more and more often reporting frameworks refer to sustainability and sustainable development, but none of them supports a holistic approach to business sustainability (for which the organization has a potential to contribute to sustainable development of the world). Most of reporting standards are the manifestation of the win-win approach to business sustainability (which in reality makes the role of the organization unclear in the sustainable development). Particularly worthy of attention is the GRI's Framework. It seems to be constructed by the holistic-altruistic values that condition the organizational participation in sustainable development. However, in business practice, this standard is the manifestation of individualistic-egoistic values. The GRI's Framework shows that there are conditions (other than the reporting standard itself), which have to be investigated. The paper is a part of the current discussion about whether (if any) sustainability and integrated reporting create transparency about organizations' sustainability commitment.

Keywords Business sustainability • Sustainability reporting • Integrated reporting • GRI

1 Introduction

The sustainable development of the world is considered as one of the greatest and most urgent challenges that humanity is facing today (Washington 2015). Although the sustainability and sustainable development are global concepts, the role of business is recognized as especially significant in progressing a sustainable world outcome. In the early 1990s, the concept of sustainability was virtually absent in

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theory and practice of management (Gladwin et al. 1995). Today, business sustainability (BS) is considered as an emerging new paradigm or mega trend in management (Senge et al. 2010; Lubin and Esty 2010; Zucchella and Urban 2014; Dyllick and Muff 2016). Sustainable development is also indicated by managers[1] as a major force to be reckoned with—one that will have a decisive influence on the way of thinking, acting, managing and competing in the short and long term (Hopkins et al. 2009). However, it is very difficult to define what sustainable development mean in an organizational context. Although there are various approaches to the BS present in the management practice and discussed in the literature, they do not allow for the formulation of a single, unambiguous theory of BS (Dyllick and Muff 2016; Zgrzywa-Ziemak 2016).

An important part of BS research is examining a range of practices related to sustainability accounting and accountability (Milne and Gray 2013; Bebbington and Larrinaga 2014). According to Unerman et al. (2007), sustainability accounting and accountability have the potential to be a powerful tool in the management, planning, controlling and accountability of organizations for their social and environmental impacts, as the financial accounting was for economic aspects of the organization. Still, the developing of sustainability accounting practice is recognized as not to be straightforward (Bebbington and Larrinaga 2014).

The paper is focused on the specific aspect of sustainability accounting—the reporting. Bakker argues that non-financial reporting has reached a critical turning point and is now heading towards the mainstream (WBCSD 2016 Report). Sustainability reporting is gradually becoming a standard to most international organizations[2] (Hąbek 2013; Baldinger 2014). Although it is still mostly voluntary activity, there is a trend towards mandatory non-financial reporting (e.g. EU Non-Financial Reporting Directive 2014/95/EU). Two main terms—sustainability reporting and integrated reporting are used in relation to reporting for sustainable development, sometimes even alternately. The paper is part of the current discussion about whether (if any) sustainability and integrated reporting create transparency about organizations' sustainability commitment (Milne and Gray 2013; Adams 2015; Flower 2015). The paper aims to discusses the terms—sustainability reporting and integrated reporting as distinct phenomena in the context of different, partly conflicting, approaches to BS.

[1] Hopkins et al. (2009) interviewed leading MIT scholars and thinkers, more than 50 sustainability thought leaders and corporate CEOs around the world and more than 1500 corporate executives and managers about their perspectives on the intersection of sustainability and business strategy.

[2] According to research carried out by KPMG, in 2013 nearly three fourths of 4100 surveyed organizations from 41 countries, operating in 15 different sectors, developed corporate responsibility or sustainable development reports, and more than half of them developed annual reports.

2 Business Sustainability Approaches

Business sustainability (BS) is recognized as a complex, multi-faceted phenomenon, integrating some, often contradictory, conflicting aspects (Hahn et al. 2015). There are attempts to identify the BS levels, to formulate sustainable business models, to determine the concept of increasing the advancement in the BS and to build theories of sustainability management (Stubbs and Cocklin 2008; Amini and Bienstock 2014; Zucchella and Urban 2014; Dyllick and Muff 2016). But sill most managers remain with their intuitive understanding of the concept of sustainability, focusing on selected, often random issues related to the sustainability, and most organizations do not have any of the strategic guidelines, programs or projects for sustainability (Hopkins et al. 2009; Ihlen 2015). Also, approaches to BS presented in the literature do not allow for the formulation of a single, unambiguous theory of BS.

Some researchers recognize the creation of the long-term shareholder value as the essence of BS, where social and environmental concerns are important in the context of opportunities and risks, benefits, and costs, that are crucial for building this value (RobecoSAM 2015). BS refers here to the survival and development of the organization as a system (Clifton and Amran 2011; Ihlen 2015). This approach is appropriate for a reductionist way of perceiving reality, dominated by the logic of parts, which is narrow, short-term and static. Social and environmental issues are seen as separate from the business core. The main assumption is concerning the causal relation between social and environmental engagement and economic results (Gao and Bansal 2013). The other assumption is concerning the desire to avoid any tensions between the dimensions of the BS, needs of different stakeholders, temporal and spatial perspectives (Hahn et al. 2015). This perception of the essence of BS closely correlates with the research of Ihlen (2015). He points out that many corporations leave the narrative of arguing, that they are trying to work towards sustainable development. They claim that they are a sustainable corporation, because of achieving specific results and/or taking specific actions in the areas of social and environmental areas. However, these areas abstract from their actual participation in sustainable development.

Radically different perspective is presented by those, who see the organization as a mesoscale social artifact in need of consideration as a possibly potent means of approaching sustainable development (Parrish 2007, p. 848). According to Dyllick and Muff (2016), the truly sustainable organization creates a significant positive impact in areas, which are critical and relevant for society and the planet. It can be said that organizations should offer such products and/or services, and act in such a way that in the long run will contribute to the creation of healthy and liveable societies and the preservation and restoration of the environment. In this context, although the organization has to generate a profit that allows reconstruction of its potential and its further development, the overriding objective of the organization be a commitment to the development of the wider socio-ecological system (Senge et al. 2010). In this approach, the concept of sustainable development is appropriate

for a system wider than an organization. Individual organizations can simply contribute to the large system in which sustainability may or may not be achieved (Jennings and Zandbergen 1995). This approach can be described as an integrative approach (Gao and Bansal 2013). It is characterized by the logic of the whole, which is wide, long-term, dynamic. Social and environmental issues are an integral part of business activity, dominated by the prospect of the dynamic interdependence of all dimensions of the BS (economic, social and environmental). There is also a parallel consideration of needs of different stakeholders (current and future), different perspectives of time and space (specific to all dimensions BS). Moreover, tensions (between stakeholders, BS dimensions or temporal perspectives) are treated as normal and potentially beneficial.

Both approaches to the understanding of BS differ not only because of the accepted cognitive logic (reductionist versus integrative) but also because of extremely different axiological position. According to the typology proposed by Papuziński (2013), there are two sustainable development axiologies: individualistic-egoistic and holistic-altruistic. First, individualistic-egoistic is characterized by individualism, egoism, acknowledgment of the primacy of rights over good, and the vision of human being as an individual. Second, holistic-altruistic is characterized by altruism, acknowledgment of the primacy of good over right, and the vision of human being as a person. Papuziński (2013) clearly points out that individualistic-egoistic axiology does not allow for the implementation of the principles of generational and intergenerational justice, rather carries the risk of achieving short-term benefits at the expense of the community. It isolates human from the values and goods that merge the community, which may result in an excessive focus on material needs. It shies away from involvement in common issues concerning minimization of losses and maximization of social benefits. Finally, it can lead to excesses in the name of human rights. The holistic-altruistic axiology gives a chance to resolve the issue of modern existential world, as it postulates: recognition of another person's welfare over one's own, reduction of consumption (moderation, temperance, asceticism) and solidarity with others, focus on the spiritual aspects of quality of life (not material), integration of human values and goods that merge the community, priority for things important for the community, recognition of welfare as a source of law, and the law as a guardian of it.

As a result, there are two extreme approaches to BS: instrumental and holistic, which should be regarded as clearly contrary in the axiological dimension.

However, as presented in Fig. 1, BS concepts represent also intermediate approaches. The prevailing is the win-win approach, the essence of which is simultaneous, synergistic, systematic provision of economic, social and environmental benefits (Gao 2008; Sekerka and Stimel 2011). The win-win approach focuses on finding cost-effective areas for the organization, which are at the same time beneficial socially and/or environmentally. This trend is fitted by, for example, the concept of shared value by Porter and Kramer (2011) and the concept of sweet spots by Savitz and Weber (2006). It is an approach that largely adopts an integrative cognitive logic. For example, there is a domination of emphasis on integrating social and environmental issues with the basic activities of the organization

		Axiology of sustainable development*	
		individualistic -egoistic	holistic -altruistic
Cognitive logic	reductionist	Instrumental approach	*Ad hoc* approach
	integrative	Win-win approach	Holistic approach

* *The axiologies of sustainable development are mutually exclusive*

Fig. 1 Business sustainability approaches

(strategic and operational), on the interdependence of all dimensions of the BS, on cooperation within the organization and between the organizations. However, proponents of this approach do not seem to recognize that conflicts between aspects of economic, environmental and social management of the organization are the rule rather than the exception. Sandoval (2015) also emphasizes that economic dimension is clearly placed before the others in the win-win approach. According to Crane et al. (2014), this approach avoids a deeper reflection on the systematic responsibility of the organization, it does not require a change of moral attitude, and it is based on the current assumption of proceeding by own interest (the authors discuss the concept of Porter and Kramer (2011)). According to Hahn et al. (2015), focusing on solutions within the paradigm of win-win masks the significant and potentially positive participation of organization in the sustainable development of the world. This approach does not constitute a solution to an identified contradictions. Although it takes (to some extent) an integrated perception of reality, it remains an individualistic-egoistic sustainable development axiology.

The approaches to the concept of BS, which are distinguished in practice and theory, were outlined. There is no reference to all significant differences between them and all trade-offs characterizing each of them. This brief analysis helps to emphasize that all the methods, techniques, and tools developed for the formation of the BS have their context resulting from the approach to the BS.

3 Sustainability Reporting

There still is no single, generally applicable definition used to disclose organizational performance regarding sustainable development (Hąbek 2013, p. 20). There are several initiatives related to the notion of sustainability reporting or sustainable development reporting, including UNEP/SustainAbility framework, Global Reporting Initiative's framework, the ACCA awards, and business case for measuring, managing and reporting environmental, social and economic impacts

(Milne and Gray 2013). Most of them are based on an organization's impact on social development, environmental protection, and economic development, so on triple-bottom-line (TBL) popularized by Elkington (1997) and his consultancy sustainability.

Sustainability reporting may be understood as a practice to deliver information to external and internal stakeholders as regards organizational economic, environmental and social performance (Hąbek 2013; Hahn and Kühnen 2013). According to WBCSD[3] sustainable development reports are public reports providing internal and external stakeholders with a picture of corporate position and activities on economic, environmental and social dimensions. Heemskerk et al. argue that such reports attempt to describe the company's contribution toward sustainable development (Heemskerk et al. 2002, p. 7). Sustainability reporting also go beyond the sheer determination of organizational performance indicators and involve information as regards managerial practices pertaining to aspects specified within each category of indicators and within the context of corporate operations, corporate strategy, and profile (Hąbek 2013; GRI 2013). Bakker (WBCSD President and CEO) emphasizes that understanding what to report and how to report bring business a long way towards achieving sustainable development as an output of daily operations, and that it helps making more sustainable companies more successful (WBCSD 2016 Report, p. 2). RobecoSAM[4] defines corporate responsibility reporting[5] as the process by which a company can gather and analyze the data it needs to create long-term value and resilience to environmental and social change (de Boer 2014, p. 9). Both concepts are examples of individualistic-egoistic axiology approach to BS. The ultimate goal of the organization here is to maximize the value of the owners. Only needs of the current stakeholder of the highest authority and legitimacy are taken into consideration, there is the clear superiority of the economic perspective when social and environmental issues are recognized and integrated with strategy and operations. The non-financial reporting, in this case, is not for sustainable development, it is an impression management tool to improve a company's reputation, to respond to other companies, industry, and legislative pressures, to cope with chosen stakeholders expectations and to be more resource-efficient (Hahn and Kühnen 2013; Ihlen 2015).

[3]World Business Council for Sustainable Development (WBCSD) is a global, CEO-led organization of over 200 international companies (founded in 1992). WBCSD's mission is making more sustainable business more successful. (http://www.wbcsd.org/Overview/About-us, 25/03/2017)

[4]RobecoSAM (founded in 1995) is an investment company focused exclusively on sustainability investing and it offers asset management, indices, engagement, voting, impact analysis, sustainability assessments, and benchmarking services. Together with S&P Dow Jones Indices, RobecoSAM publishes Dow Jones Sustainability Indices (DJSI). Each year (since 1998) RobecoSAM provides the ESG analysis of about 2900 listed companies called Corporate Sustainability Assessment (CSA). (RobecoSAM 2015)

[5]In the Sustainability Yearbook 2014 the term corporate responsibility reporting was used in relation to Corporate Sustainability Assessment.

A different approach is declared by Global Reporting Initiative (GRI)[6] (GRI 2013). It is emphasized that the underlying question of sustainability reporting is how an organization contributes or aims to contribute in the future, to the improvement or deterioration of economic, environmental and social conditions, developments, and trends at the local, regional or global level and that reporting only on trends in individual performance (or the efficiency of the organization) fails to respond to this underlying question (GRI 2013, p. 17). Although a sustainability report is defined here as report that conveys disclosures on an organization's impacts—be they positive or negative—on the environment, society and the economy, it is also emphasized that reporting should help organizations to set goals, measure performance, and manage change in order to make their operations more sustainable (GRI 2013, p. 3). In this context, GRI's framework may be considered as a manifestation of a holistic-altruistic sustainable development axiology as the ultimate goal of the organization is to commit to the development of the wider socio-ecological system. It is very promising as the GRI's framework is currently regarded as a global standard, the most widely used and the most influential relating to sustainability reporting. The summary information about G4 Guidelines is included in Table 1.[7] The G4 Guidelines formulate principles for developing report content and quality, and standard disclosures. According to G4 Guidelines, the organization should report no less than 92 performance TBL indicators: economic, environmental and social. The GRI's framework—G4 Sustainability Reporting Guidelines will be investigated more deeply.

The GRI's framework does not provide a definition of sustainability, sustainable development or sustainability principles. It strongly supports triple-bottom-line (TBL) thinking, so there is an assumption that it is consistent with sustainability or sustainable development. However, Milne and Gray (2013) argue that the GRI's frameworks social, economic and environmental representations are both partial and incoherent. They are partial because the full range of social and environmental actions and interactions is too difficult to produce acceptable indicators and also some indicators are too demanding to be accepted by member organizations (Milne and Gray 2013). They are incoherent in the sense that there is no apparent overarching theory that guides the selection of indicators and ensures the relations between one to another and between the issues of concern and the entity (Brown et al. 2009; Milne and Gray 2013). Furthermore, the GRI' framework has a focus on environmental and social issues while covering only a few economic indicators leaving those more detailed and pronounced for obligatory financial reporting. Hahn and Kühnen emphasize that only those reports that simultaneously include all three dimensions of sustainability can truly be regarded as 'sustainability

[6]The GRI is an international non-governmental organization (founded in 1997). GRI's mission is to empower decision makers everywhere, through our sustainability standards and multi-stakeholder network, to take action towards a more sustainable economy and world. (https://www.globalreporting.org/Information/about-gri/Pages/default.aspx, 25/03/2017)

[7]All elements—principles and disclosures—of the report are defined in: GRI 2013.

Table 1 G4 Sustainability Reporting Guidelines (GRI 2013)

Aim of reporting	*The aim of G4* is to help reporters prepare sustainability reports that matter, contain valuable information about the organization's most critical sustainability -related issues, and make such sustainability reporting standard practice. *Sustainability reporting is to*: • help organizations to set goals, measure performance, and manage change to make their operations more sustainable; • make abstract issues tangible and concrete, thereby assisting in understanding and managing the effects of sustainability developments on the organization's activities and strategy. G4 also offer an international reference for all those interested in the disclosure of governance approach and of the environmental, social and economic performance and impacts of organizations.
Definition of the report	A *sustainability report* conveys disclosures on an organization's impacts—be they positive or negative—on the environment, society and the economy. A sustainability report is a *standalone report*.
Intended audience	*All stakeholders* The G4 is developed through a global multi-stakeholder process involving representatives from business, labor, civil society, and financial markets, as well as auditors and experts in various fields; and in close dialogue with regulators and governmental agencies in several countries.
Content of the report	Principles for defining report content: • stakeholder inclusiveness • sustainability context • materiality • completeness Principles for defining report quality: • balance • comparability • accuracy • timeliness • clarity • reliability General standard disclosures • Strategy and Analysis • Organizational Profile • Identified Material Aspects and Boundaries • Stakeholder Engagement • Report Profile • Governance • Ethics and Integrity Specific standard disclosures • Disclosures on Management Approach • Indicators

reporting' while one-dimensional reports are merely sustainability-related because they cover only isolated aspects of sustainability (Hahn and Kühnen 2013, p. 7). As a result, the GRI's framework represents a reductionist way of perceiving reality. It is a solution far from the BS holistic approach, but rather *ad hoc* approach (see

Fig. 1). *Ad hoc* BS approach is manifested by organization's involvement in various social and environmental separated initiatives with the lack of integration between them. The short- and long-term perspectives and different needs of stakeholders, are perceived as competitive, not taken into parallel consideration.

Finally, it is worth recalling the analysis of Flower (2015). He distinguishes two conditions which must be met by organizations to publish complete, correct and comparable information relating to sustainability: a body should publish reporting standards which, if applied by organizations, would assure that the organizations' reports were complete and comparable, and organizations, in preparing their reports, should apply these standards correctly and consistently (Flower 2015, p. 10). According to him G4 Guidelines' balanced mixture of general principles and specific reporting requirements may assure that the organizations' reports are comparable and complete. However, the second condition is not met sufficiently. Flower (2015) presents a significant body of research proving that organizations in sustainability reports do not report events of high significance at all or present them in the way to reduce their importance.[8] On the one hand, the effectiveness of assurance process arises as an important issue. On the other, although the GRI's framework is a manifestation of a holistic-altruistic sustainable development axiology, in reality, it may be used to support individualistic-egoistic attitudes.

4 Integrated Reporting

There is an increasing trend towards integrated reporting (Hahn and Kühnen 2013; Burke and Clark 2016; Perego et al. 2016). According to Adams and Simnett (2011), integrated reporting is a reporting approach that promises to be holistic, strategic, responsive, material and relevant across multiple time frames. Eccles and Krzus (2010) claim that integrated reporting can help drive organizational change towards more sustainable outcomes.

Several integrated reporting initiatives have emerged in different regions of the world, but three of them are the most influential: King Report on Corporate

[8]For example Boiral (2013) analyzed the sustainability reports of 23 organizations, all graded A or A+ indicating that they fulfilled all the requirements of the GRI's Guidelines. Boiral et al. searched the external sources for information about the selected organizations relevant to their sustainability performance (expert reports, research articles, NGO's research, government publications, court decisions etc.). The researchers identified 116 events, 54% were not mentioned in the sustainability reports (although GRI has formulated dedicated metrics for all of them), and only 10% of the events were reported in a satisfactory way.

Governance for South Africa (2009),[9] One Report by Eccles and Krzus (2010)[10] and the International <IR> Framework (2013).

High hopes were associated with the <IR> Framework as it was initiated by The International Integrated Reporting Council (IIRC)—a global coalition of regulators, investors, companies, standard setters, the accounting professionals, and NGOs.[11] The view was expressed that integrated report may provide a more holistic, multi-dimensional and lucid representation of the business than the current reporting model (Owen 2013). In 2011 IIRC released the discussion paper and the sustainability was visible as an important issue in developing a new approach to reporting (IIRC 2011). There was a reference to holistic perspective (incl. sustainability): "Integrated reporting combines the most material elements of information currently reported in separate reporting strands (financial, management commentary, governance and remuneration, and sustainability) in a coherent whole, and importantly: shows the connectivity between them; and explains how they affect the ability of an organization to create and sustain value in the short, medium and long term." (IIRC 2011, p. 6). There was also an indication that integrated reporting provides a clear and concise representation of how an organization demonstrates stewardship and how it creates value, now and in the future (IIRC 2011, p. 6).

However, in <IR> Framework released by IIRC in 2013 there are no references to sustainability, apart from that the integrated thinking and reporting will act as a force for financial stability and sustainability, and that integrated reporting integrate all reports and statements together (incl. a sustainability report) (IIRC 2013). Adams (2015) argues that addressing the sustainability issues is not the main purpose of <IR> Framework, but she perceives the framework as the early stage of widespread promulgation of a different way of thinking about corporate success and reporting. Milne and Gray (2013) claim that <IR> Framework is exclusively investor focused and it has nothing substantive to say about either accountability or sustainability. The intended audience of <IR> Framework are providers of capital.

[9]Integrated reporting means a holistic and integrated representation of the company's performance in terms of both its finances and its sustainability (after Dumay et al. 2016, p. 182). South Africa is still the only place where integrated reporting is mandatory for listed companies. There is a recommendation to create sustainability reports according to the GRI's Sustainability Reporting Guidelines.

[10]Integrated reporting establish the essence of One Report as integrated reporting of financial and nonfinancial information (after Dumay et al. 2016, p. 182). The concept was developed in: Eccles, R., Krzus, M. (2010). One report: Integrated reporting for a sustainable strategy. Hoboken, NJ: Wiley & Sons (Eccles and Serafeim 2014).

[11]The IIRC was founded at the initiative of two leading organizations in the field of accounting for sustainability—the Prince's Accounting for Sustainability Project (A4S) and the GRI. In 2009, The Prince of Wales convened a high level meeting of investors, standard setters, companies, accounting bodies and UN representatives including A4S, International Federation of Accountants, and the GRI, to establish the International Integrated Reporting Committee (IIRC), a body to oversee the creation of a globally accepted integrated reporting framework. In November 2011, the Committee was renamed the International Integrated Reporting Council.

Flower (2015) indicates that final framework is a result of interests of the council of IIRC dominated by accountancy profession.

Table 2 include the summary information about <IR> Framework. The key notion of the <IR> Framework is value creation. The value creation is related to the organization itself (not society, present or future generations), or as Flower (2015) argues, it is value to investors. Value manifests itself in increases, decreases or transformations of the capitals. <IR> Framework supports understanding of the broad base of capitals (financial, manufactured, intellectual, human, social and

Table 2 The International <IR> Framework (IIRC 2013)

Aim of reporting	<IR> Framework aims to: • improve the quality of information available to providers of financial capital to enable a more efficient and productive allocation of capital, • promote a more cohesive and efficient approach to corporate reporting that draws on different reporting strands and communicates the full range of factors that materially affect the ability of an organization to create value over time, • enhance accountability and stewardship for the broad base of capitals (financial, manufactured, intellectual, human, social and relationship, and natural) and promote understanding of their interdependencies, • support integrated thinking, decision-making, and actions that focus on the creation of value over the short, medium and long term.
Definition of the report	*<IR>* is a concise communication about how an organization's strategy, governance, performance, and prospects, in the context of its external environment, lead to the creation of value over the short, medium and long term. *<IR> is a stand-alone* report or be included as a distinguishable, prominent and accessible *part of another report or communication*.
Intended audience	*Providers of financial capital primarily* Integrated reporting benefits also all stakeholders interested in an organization's ability to create value over time, including employees, customers, suppliers, business partners, local communities, legislators, regulators, and policy-makers.
Content of the report	*Guiding principles:* • strategic focus and future orientation • connectivity of information • stakeholder relationships • materiality • conciseness • reliability and completeness • consistency and comparability *Content elements:* • Organizational overview and external environment • Governance • Business model • Risks and opportunities • Strategy and resource allocation • Performance • Outlook • Basis of presentation

relationship, and natural) and their interdependencies, which is crucial in the context of sustainable development. However, organizations are not obligated to report comprehensively on all the categories of capitals, unless it is important for the organization itself, required by legal regulations or expected by stakeholders (IIRC 2013). Additionally, Flower's (2015) in-depth analysis of the <IR> Framework proves that it does not assure that the organizations' reports were comparable and complete, because it does not require the organizations to report on the full impact of their activities on stakeholders, society, and the environment, and it leaves far too much discretion to the firm's management. The research of Stacchezzini et al. (2016)[12] on early adopters of the <IR> Framework provide the conclusion that the use of the Framework is a mean to manage public impression on corporate behavior, not a tool to manage sustainability in an integrated manner. Stacchezzini et al. (2016) argue that the IIRC may need to offer additional guidelines about how organizations should describe their sustainable value creation process, especially to include quantitative indicators and forward-looking information. However, it seems that the <IR> Framework is so deeply rooted in individualistic-egoistic axiology, that it is impossible to consider developing the Framework in this direction. It is a manifestation of win-win BS approach.

5 Discussion

Organizational reporting for sustainable development is still in the development phase. Cho et al. (2015) emphasize that there is a significant gap between BS 'talk and practice'. On the one hand, more and more often organizational reports refer to sustainability and sustainable development, on the other, the issues like footprints, carrying capacities, equity, social justice are not addressed, and the role of organizations in transition toward a less unsustainable world remains unclear (Milne and Gray 2013; Cho et al. 2015).

Changes in organizational reporting practice toward reporting for sustainable development are crucial, but they face important challenges. Firstly, the reporting for sustainable development is very complex. Organizations continue to struggle with the problem of measuring non-economic results (Baldinger 2014; Unerman and Chapman 2014). The characteristics and dynamics within the social and environmental dimensions differ in important ways from those in the more familiar economic dimension. Unerman and Chapman (2014) argue that a key factor that facilitates accounting measurement, aggregation and comparison of many different economic transactions and events is a consensus on the commensuration of these economic impacts regarding financial, monetary measurement. It is still a challenge of commensurating the social and environmental impacts of organization's

[12]Stacchezzini et al. (2016) analyzed 54 out of 79 reports available on the IIRC website before 30 April 2014, they selected the reports with a specific section about value creation processes.

activities (Unerman and Chapman 2014). Separated dimensions are extremely different phenomena, have no comparative scales, and their weights are not comparable (Ihlen 2015). There are also significant differences in time orientation between different BS dimensions. In the case of economic dimension, the short-term, mainly financial orientation is prevalent when social and environmental dimensions are related to long-term, mainly qualitative orientation (Gao and Bansal 2013).[13]

Secondly, the relations and interactions between social, environmental and economic impacts, between different stakeholders, in short-term and long-term are also complex, dynamic and unpredictable. Most of the sustainability-related reporting avoid the complexity connected with multidimensionality, reporting the performance separately for each dimension. Between dimensions there are significant, often unsolvable conflicts (Hahn et al. 2010). They are not and cannot be mutually supportive, and, as a management goal, their equal achievement is impossible (Norman and MacDonald 2004 after Milne and Gray 2013). There is still a lack of coherent theoretical basis of the multidimensional character of BS and reporting for sustainable development, taking into account the distinctiveness of each dimension and the relationship between them (including the occurring tensions).

Additionally, sustainability reporting should disclose the degree of satisfying the needs of current and future stakeholders, and also satisfying the needs of organizational stakeholders without 'robbing' others. The following problems arise here: which groups should be considered as stakeholders, how to manage complex processes of taking into account the needs of different stakeholders, how to cope with conflicts of interests between current and future stakeholders. Potential future stakeholders have a minor impact on the organization today, and their claims are less urgent than satisfying current stakeholders needs. Only the legitimacy of the relationship between these stakeholders and the organization can support addressing their needs. It is difficult to assume that actual stakeholders will verify their current claims to satisfy their future needs or others' needs in the future. The involvement of organizations in developing livable and healthy communities requires also recognizing the needs of those stakeholders who are weak, often socially excluded and therefore poorly represented. Particular doubts raise in addressing the 'interests' of the natural environment (Gibson 2012). The stakeholder theory does not cope with all these challenges, but addressing these issues is crucial for BS and reporting for sustainable development theoretical basics development.

Finally, in the discourse on the nature of BS two contradictory sustainable development axiologies are intertwined: individualistic-egoistic and holistic-altruistic. Papuziński (2013) argues that only holistic-altruistic axiology gives a chance to resolve the existential problems of the contemporary world. As it was

[13]Gao and Bansal (2013) indicate that purely financial measures implemented to environmental issues, lead to narrowing the scope of potential solutions and to… shortening planning horizon.

indicated in the article, there is a sustainability reporting standard developed in line with holistic-altruistic axiology—GRI's Guidelines, however, in business practice this standard is used to support individualistic-egoistic approaches.

It is partially a consequence of the voluntarity of sustainability reporting—most of the information voluntarily disclosed in sustainability reports sheds a positive light on organizational impacts, proves how sustainable the organization is (Hahn and Kühnen 2013; Milne and Gray 2013; Ihlen 2015). However, the cause here is the assumption of win-win approach that there is no conflict between financial success and sustainability, rather that they are mutually supportive (Savitz and Weber 2006; Porter and Kramer 2011). According to Ihlen (2015), the assumption that there is no dilemma existing between meeting business goals and achieving sustainability is wrong. There is a growing body of arguments and data concerning unsustainability of the contemporary world (Worldwatch Institute 2015; WWF 2016). Sustainability reporting would more correctly be described as reporting on unsustainability, as few (if any) describe the gap between the current model and what could be called truly sustainable (Landscare Research 2007, p. 7 after Milne and Gray 2013). However, it is hard to expect that organizations would voluntarily, openly disclose information as to how much they are unsustainable.[14,15] The mandatory sustainability reporting is indicated as a solution here (Cho et al. 2015). Sustainability reporting is at an early stage of development, still crucial problems are unsolved (as discussed above). There is also considerable risk of corporate opposition to implementing mandatory solutions or, as in the case of <IR> Framework, the risk that they would be developed under the great influence of actually dominant reporting standards, based on individualistic-egoistic approaches.

In the paper it was shown that more and more often reporting frameworks refer to sustainability and sustainable development, but none of them supports a holistic approach to business sustainability, for which the organization has a potential to contribute to sustainable development of the world. Most of reporting standards are the manifestation of the win-win approach to business sustainability, which in reality makes the role of the organization unclear in the sustainable development. Figure 2 illustrates that existing standards, which are indicated as related to reporting for sustainable development, do not support a holistic approach to business sustainability.

Particularly worthy of attention is the GRI's Framework. It seems to be constructed by the holistic-altruistic values that condition the organizational participation in sustainable development. However, in business practice, this standard is used by the individualistic-egoistic values. The GRI's Framework shows that

[14]For example Brunsson (2007) and Abrahamson and Baumanrd (2008) suggest that organizations are bound to engage in organized hypocrisy when managing conflicting stakeholders' demands (after Cho et al. 2015).

[15]For example, Hawrysz and Foltys (2016) prove that in Poland even public sector organizations do not have internal mechanisms of environmental responsibility.

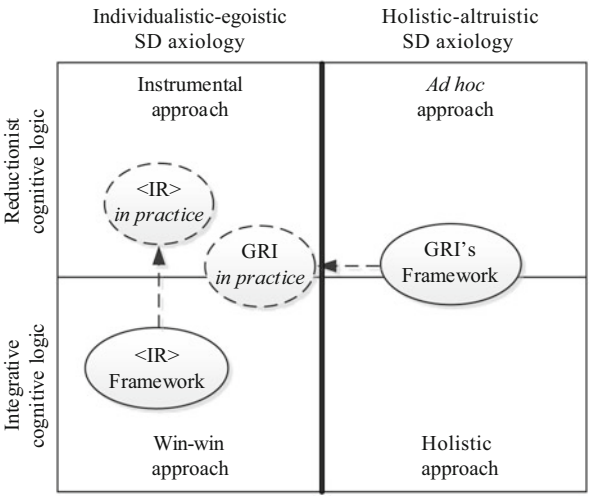

Fig. 2 Sustainability and integrated reporting in relation to business sustainability approaches

there are conditions other than the reporting standard itself, which have to be investigated (incl. external factors like prevailing economic system constraining the choices of individual organizations). The development of *the integrated reporting for sustainability* is extremely important, but it still requires theory building to enhance the understanding of complex nature of BS and reporting.

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