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DRIVERS OF STRATEGY AND R&D DISCLOSURES

CZYNNIKI WPŁYWAJĄCE NA UJAWNIENIA STRATEGICZNE I BADAWCZO-ROZWOJOWE

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Summary: The paper contributes to the literature on voluntary disclosure of strategy and R&D issues. It refers to disclosures made in the annual reports and at the corporate websites of 69 Polish IT companies. It examines the association between the voluntary disclosure index and company age, size, ownership dispersion, board size, financial performance, leverage and growth prospects. The empirical evidence provided by the research study confirmed that the level of strategy and R&D disclosure was dependent on company age. It was also validated that the larger companies and these listed on the primary market revealed more information on strategy and R&D issues. The study gave evidence that if market capitalization of the company was higher as compared to peer entities managers provided more narratives about the strategy and R&D activities.

Keywords: IT companies, multiple regression, strategy and R&D disclosure.

Streszczenie: Artykuł wnosi wkład do nurtu literatury z zakresu dobrowolnych ujawnień. Odnosi się do ujawnień strategii oraz kwestii badawczo-rozwojowych (B + R) w raportach rocznych oraz na stronach internetowych 69 polskich spółek informatycznych. W artykule został zbadany związek pomiędzy indeksem dobrowolnych ujawnień a różnymi zmiennymi, obejmującymi: wiek i wielkość spółki, rozproszenie akcjonariatu, wielkość zarządu, rentowność spółki, poziom zadłużenia oraz perspektywę wzrostu. Wyniki przeprowadzonych przez autorkę badań empirycznych potwierdziły, że poziom ujawnień strategii oraz kwestii B + R był zależny od wieku spółki. Ponadto spółki większe i te notowane na rynku podstawowym dostarczały więcej informacji tego rodzaju. Wyniki wskazały również, że spółki o wyższej wartości rynkowej były bardziej chętne do dzielenia się informacjami o strategii i działaniach B + R.

Słowa kluczowe: spółki informatyczne, regresja wieloraka, indeks ujawnień strategicznych i badawczo-rozwojowych.

1. Introduction

Managerial dilemma regarding decision on what should be disclosed and what should be concealed from investors in annual reports attracts interest of many researchers. They are trying to weigh up the pros and cons of being transparent instead of being convert. The problem is closely intertwined with the opposing forces encouraging or discouraging disclosure and the level of regulatory intervention provided by the appropriate institutions. On the one hand, these opposing forces relate with the potential benefits for the capital markets, on the other, they reveal an issue of commercial sensitivity of secret information [Belcher 1996]. Nevertheless, it is also necessary to understand the sectoral conditions, activity field and technological opportunities of the specific business sector just before making any in-depth analysis.

World IT sector which incorporates the most influential IT companies has been growing in terms of R&D expenses since many years. According to 2016 R&D Investment Scoreboard about 85.3% of 278 IT companies listed on the 2500 World R&D Ranking reached 30% three-year mean R&D expenses growth. These companies dedicated approximately €68 billion to R&D activities in total in 2015, which gave €288 million per company. The average R&D intensity ratio amounted to 18.9% whereas the average profitability ratio was negative and equal to –0.5% although more than half of companies were profitable. Interestingly, the remaining IT companies (13.3%) which observed a decrease in three-year mean R&D expenses level recorded marginally lower mean R&D intensity ratio (16.6%) and slightly higher negative mean profitability ratio (–2.4%), although about 70% of entities in this group were profitable. The Top 10 leaders in this ranking included six companies from US (Alphabet, Microsoft, Oracle, IBM, Facebook, Yahoo!), one from Germany (SAP), two from China (Baidu, Tencent) and one from Japan (Fujitsu). The leaders spent almost €45 billion on R&D activities in 2015, which amounted to 56% of total R&D expenses included in that ranking. Though the ranking covered 278 companies from 25 countries all over the world it lacked the companies coming from Eastern and Central European countries.[1]

High R&D expenses incurred by companies belonging to IT sector as well as quickly developing IT technologies may contribute to higher market barriers to entry for younger potential IT market players. The question, however, appears is it really the case. Kittlaus and Clough [2009] argue that software companies need relatively little initial capital and investments in comparison to traditional industries which develop and manufacture physical goods. "Anyone can start a software company – but not necessarily make it succeed […] but the famous garage start-ups are not just a myth" [Kittlaus, Clough 2009]. In this context IT companies should be more

[1] It is worth remarking, however, that Polish IT company – Asseco Poland – appeared on 1000 EU R&D Ranking in 2015 with R&D expenses which amounted to €19.3 million.

reserved in providing sensitive information on the market, particularly if they are not effectively protected by intellectual property (IP) rights.

This paper contributes to the literature on voluntary disclosure of strategy and R&D issues in annual reports and at corporate websites by Polish IT companies. It examines associations between the voluntary disclosure index and a set of factors, including: company age and size, ownership dispersion, board size, corporate performance, leverage and growth prospects. The paper is divided into five sections. Firstly, it elaborates on a theoretical framework by referring to agency and signaling theories. Secondly, it delivers justification for hypotheses development and testing. Thirdly, it presents a research design, i.e. the examined sample, the methodology of constructing a disclosure index and the independent and variables used in OLS regression model. Finally, the empirical evidence and concluding remarks are provided.

2. Theoretical framework

The strong acceleration of technological progress and the substantial increase in R&D investments – specifically in high-tech IT sector – caused that disclosures of strategy and R&D issues have grown in importance and drawn more and more attention of investors for the last years. However, managers may be indecisive about the actual extent of voluntary disclosure due to relatively low market barriers to entry, extremely high competition and specialists' fluctuations in IT sector as compared to other industries.

Disclosure practices are theoretically explicated by agency theory [Jensen, Meckling 1976] and signalling theory [Trueman 1986]. According to agency theory the owners of a company (principals) delegate the task of managing the company to the managers (agents). A separation between the principals and the agents may cause a conflict of interest when the agents neglect the interests of principals and make decisions directed at reaching own benefits. It is possible due to opportunistic attitudes of the managers and the superior information that they possess in comparison to investors. Such predominance leads to information asymmetry problem which hinders efficient capital allocation and may result in illiquidity of capital markets [Diamond, Verrechia 1991]. Higher level of voluntary disclosure is expected to mitigate that problem and reduce information asymmetry as well as decrease bid-ask spreads and enhance the liquidity of shares traded on the stock exchange [Leuz, Verrechia 2000].

Signalling theory refers to information asymmetry as well. Aboody and Lev [2000] addressed that problem in the context of R&D intensive organizations. They provided evidence that the insider gains in R&D-intensive companies are significantly larger than insider gains in companies deprived of R&D activities. Hence, signalling theory underlines the existence of incomplete information on the marketplace that interferes an equilibrium between insiders and outsiders or sellers and buyers [Spence

2002]. The theory clarifies why managers are eager to disclose more information than what is generally expected. Consistent with the theory voluntary disclosures are provided in order to balance the information gap and additionally ascertain a positive signal about the value of the company [Trueman 1986; Magness 2010].

This paper elaborates on voluntary disclosure of strategy and R&D issues by Polish IT companies. The area of strategy disclosure is discussed in the literature both in the context of financial reporting quality [Santema, Van de Rijt 2001; Santema et al. 2005; Ungerer 2013; Ungerer, Vorster 2015; Holt et al. 2015; Dyczkowska 2015, 2016] and reputation management [Whittington, Yakis-Douglas 2012]. Although, R&D disclosure is a crucial strategic area of business activity in high-tech industries it has not been sufficiently explored in Polish conditions in the context of its determinants and impacts. There is also a lack of consistent regulations and clear guidelines of what should be disclosed. The Polish Accounting Act pursuant to the provisions of § 49.2.3 determines that a management report should provide information on important R&D achievements, however it does not state clearly what is the minimum of information required. Therefore, the extent of R&D disclosure depends on managerial discretion which is shaped by several internal and external factors.

The problem of R&D disclosure has been remarked and highlighted in many empirical research studies carried out by: Entwistle [1999], Gu and Li [2003] Jones [2007], Merkley [2014], La Rosa and Liberatore [2014] and Nekhili et al. [2016], whereas factors affecting both strategy and R&D disclosures were examined by Napoli [2013] on a sample of R&D intensive companies listed on the Milan Stock Exchange. Napoli [2013] validated three hypotheses: (1) firms with higher R&D intensity make more R&D disclosure; (2) firms with higher R&D intensity make more disclosure of their strategy; (3) younger firms make more disclosure about their strategy.

3. Hypotheses development

The goal of this paper is to examine the existence and the character of relations between the voluntary strategy and R&D disclosure index and a set of factors deriving from previous research studies. In order to reach that goal, I developed the following hypotheses:

H1: There is a negative association between company age and strategy and R&D disclosure index.

The company age is a commonly used variable in the empirical research studies on determinants of voluntary disclosure [Gu, Li 2003; Bukh et al. 2005; White et al. 2007; Cordazzo, Vergauwen 2012; Napoli 2013]. Lang [1991] remarked that young companies are overwhelmed by uncertainty about future earnings. Another point is that young companies are not so frequently followed by financial analysts as compared to large and more experienced entities and accordingly it may cause

information asymmetry problems. Therefore, supplementary non-financial information is perceived to be particularly useful for investors. Moreover, voluntary disclosures may contribute to more accurate value estimation of young companies [Amir, Lev 1996] than financial figures concerning past earnings [Kim, Ritter 1999]. Gu and Li [2003] validated a hypothesis that younger companies disclose more about their innovation activities. They evidenced statistically relevant negative association between the company age and total disclosure index of innovative activities as well as between the company age and partial indices, including disclosures on strategy, progress, commercialization and completion of innovations.

H2: There is a positive association between company size and strategy and R&D disclosure index.

Larger companies are better organized that than smaller ones, operate on advanced information systems and have higher financial resources. These advantages allow to generate a much broader amount of information at relatively lower cost [Inchausti 1997; Jones, Higgins 2006]. On the other hand, larger companies are more exposed to media attacks and political risk [García-Meca et al. 2005]. They are under pressure to legitimize their activities by being socially responsible and transparent organizations. Consequently, these attitudes entail a higher level of voluntary disclosure. Positive association between the company size and voluntary disclosure level was remarked in numerous studies [Lang, Lundholm 1993; Raffournier 1995; Depoers 2000; Bozzolan et al. 2003]. Interestingly, the company size was measured diversely by various researchers. In most studies, total assets or natural logarithm of total assets were applied (see for example: Inchausti 1997; Entwistle 1999; Cerbioni, Parbonetti 2007; Nekhilli et al. 2016] whereas in other sales revenues, natural logarithm of sales revenues [Meek et al. 1995; Inchausti 1997], natural logarithm of market value [Gu, Li 2003; Jones 2007; White et al. 2007] or number of employees [Bukh et al. 2005].

H3: There is a positive association between ownership dispersion and strategy and R&D disclosure index.

Accordingly with the agency theory low concentration of ownership may cause the potential conflict between principal and agents due to opportunistic attitudes of the managers and the superior information that they possess in comparison to investors. Therefore, in order to mitigate that problem and reduce information asymmetry the companies are required to provide a higher level of voluntary disclosure. Cormier et al. [2005] claim that companies which have dispersed ownership also have more incentives to disclose voluntary information in order to respond to the needs of various stakeholders' groups which is consistent with stakeholder theory. In this vein Kang and Gray [2011] developed a hypothesis suggesting that there is a negative association between ownership concentration and a level of voluntary disclosure on intellectual capital, however, the empirical results did not bring any evidence on the existence of that relation.

H4: There is a positive association between board size and strategy and R&D disclosure index.

Board size is a governance-related variable which was applied in many studies on determinants of voluntary disclosure [Arcay, Vazquez 2005; Cerbioni, Parbonetti 2007; Abeysekera 2010; Prado-Lorenzo, Garcia-Sanchez 2010; Hussainey, Al-Najjar 2011; Allegrini, Greco 2013; Samaha et al. 2015; Nekhili et al. 2016]. Though, in general, the effect of corporate governance mechanism in combination with voluntary disclosure is expected to contribute to the reduction of agency conflicts, the other related communication and coordination problems are addressed in the literature. A large size of the board may influence poorly decision-making process and effectiveness of discussions on managerial performance in terms of timing and costs. These disadvantages outweigh the benefits deriving from wider monitoring capacities of large board-size [Lipton, Lorsh 1992].

However, Singh et al. [2004] provided the opposite evidence suggesting that experienced large boards seem to be more effective in making consistent corporate disclosure decisions than small boards. This evidence is congruent with other research results of Abeysekera [2010], Hussainey and Al-Najjar [2011], Allegrini and Greco [2013] and Samaha et al. [2015] who found a positive association between board size and voluntary disclosure. Other empirical works did not prove any significant link between the both variables [Arcay, Vazquez 2005; Prado-Lorenzo, Garcia-Sanchez 2010; Nekhilli at al. 2016] whereas Cerbioni and Parbonetti [2007] found out even a negative association between board size and quantity and quality of intellectual capital voluntary disclosure.

H5: There is a negative association between financial performance and strategy and R&D disclosure index.

Some researchers claim that companies with good financial performance should be interested in sharing positive information with investors particularly when they plan to gain new capital [Meek et al. 1995; Raffournier 1995; Patton and Zelenka 1997]. Accordingly, Ahmed and Courtis [1999] evidenced statistically relevant and positive association between corporate profitability measured as return on assets (ROA) and a level of voluntary disclosure. Nevertheless, the other researchers argue that managers may take an opportunistic attitude which is based on a conviction that own benefit justifies decision on a disclosure framework. For instance, voluntary disclosure may be used as a mean which distracts investors' attention from poor financial performance [Lansford 2006]. Merkley [2014] carried out a content analysis of annual reports and searched for relations between corporate performance and R&D disclosure level. His results was quite opposite to these of Ahmed and Courtis [1999] since it was evidenced that companies disclosed more when they achieved lower adjusted ROA (operating financial result before R&D and marketing costs scaled by total assets).

H6: There is a positive association between leverage and R&D & strategy disclosure index.

There is no consensus regarding the character of an association between voluntary disclosure level and corporate leverage in the empirical research studies. In order to explain positive relation between these two categories agency theory is applied. Jensen and Meckling [1976] remarked that highly leveraged companies incur high monitoring costs. These are expenses paid by principal to measure, observe and control agents' behaviors. To reduce monitoring costs managers are prone to provide more disclosures in their annual reports so as to close an information gap and respond adequately to investors' and creditors' needs [Ahmed, Courtis 1999; García-Meca et al. 2005; Napoli 2013]. Positive association between voluntary disclosure level and corporate leverage was evidenced by Ahmed and Courtis [1999], White et al. [2007] and Merkley [2014]. In turn, Abdelbadie and Elshandidy [2013] indicated a negative relation between voluntary R&D disclosures and corporate leverage on a sample of R&D intensive companies from UK. There are, however, some research studies which did not confirm any statistically relevant association between these two categories [Meek et al. 1995; Raffournier 1995; Depoers 2000; Cerbioni, Parbonetti 2007; Napoli 2013; Nekhilli et al. 2016].

H7: There is a positive association between growth prospects and strategy and R&D disclosure index.

MV/BV ratio which measures a level of intellectual capital in a company and reflects growth prospects was applied in many empirical research studies as a test variable which potentially may explain the extent of voluntary disclosure [Gu, Li 2003; Napoli 2013; La Rosa, Liberatore 2014]. Gu and Li [2003] evidenced statistically relevant and positive relation between MV/BV ratio and a disclosure level on innovation progress. They did not find, however, any relationships between MV/BV ratio and a disclosure level concerning innovation strategy and commercialization of innovation. In turn, Napoli [2013] proved statistically relevant and positive association between MV/BV ratio and both strategy and R&D disclosure indices, whereas La Rosa and Liberatore [2014] found statistically relevant but negative relation between logarithm of MV/BV ratio and R&D disclosure level.

The next section discusses a research design, i.e. introduces the research sample, describes dependent and independent variables.

4. Research design

In order to examine how do annual reports communicate strategy and R&D issues an insight into reporting practices of Polish IT companies was made (See table 1). IT sector is one of the most dynamically developing market in Poland [Kapsch BusinessCom 2014]. As a result of rapid technological changes IT sector is forced to be forward-looking so as to respond adequately to customer needs. Therefore,

a reasonable strategy and R&D actions are pivotal points to be disclosed in annual reports [Dyczkowska 2015].

Table 1 demonstrates descriptive statistics of the research sample. I analyzed 69 IT companies listed on the Warsaw Stock Exchange. It is worth remarking that the group of the examined objects included 30 stock issuers from the primary market (86% of the population) and 39 stock issuers from the alternative market (91% of the population).

Table 1. The examined objects – descriptive statistics

Primary market (*n* = 30): Asseco Business Solutions, Asseco Poland, Arcus, Asseco South Eastern Europe, Atende, ATM, Betacom, CI Games, Comp, Comarch, Cube ITG, Elzab, Indata, Infovide-Matrix, LSI Software, Livechat Software, Macrologic, Medicalgorithmics, NTT System, Opteam, Pc Guard, Procad, Power Media, Qumak, Quantum Software, Sygnity, Simple, Talex, Unima 2000, Wasco.				
Descriptive statistics	Min	Mean	Max	Std. dev.
Length of stock exchange listing*	9	112	234	57
Total assets	6.88	374.23	5520.90	999.96
Free float (%)	17	39	68	15
Board size	1	4	11	2
ROA (%)	–21.76	5.92	75.21	15.56
Debt ratio	0.01	0.28	0.64	0.17
Market value**	4.66	322.85	4233.02	780.28
MV/BV ratio	0.15	4.02	78.79	14.20
Tobin's *Q*	–0.09	3.00	64.83	11.75
Alternative market – NewConnect (*n* = 39): EO Networks, KBJ, Sevenet, Wind Mobile, Surfland, Intelwise, Mineral Midrange, Infosystems, XPlus, M4B, Site, IAI, Bloober Team, Forever Entertainment, Stanusch Technologies, Europejski Fundusz Energii, Makolab, M10, PGS Software, Acrebit, Vivid Games, Domenomania.pl, Suntech, The Farm 51 Group, Edison, Cloud Technologies, Pilab, Planet Soft, Examobile, Madkom, Vakomtek, Perma-fix Medical, Mega Sonic, Netwise, Grupa Exorigo-Upos, Neptis, Logintrade, 2Intellect.com, 11Bit Studios				
Descriptive statistics	Min	Mean	Max	Std. dev.
Length of stock exchange listing*	6	41	86	21
Total assets	0.31	13.49	83.57	18.34
Free float (%)	4	24	65	14
Board size	1	2	5	1
ROA (%)	–132.21	1.07	57.08	32.67
Debt ratio	0.00	0.33	1.83	0.32
Market value**	0.24	27.49	154.10	41.59
MV/BV ratio	–0.40	6.46	83.50	13.85
Tobin's *Q*	–0.20	2.98	18.95	4.16

*In months as of 31 December 2014; ** in mln PLN.

Source: own presentation.

The analyzed objects were strongly diverse in terms of a size (measured as total assets) market growth (measured as market value) and moderately differentiated in terms of a length of listing period and free float. Although, the stock issuers from the NewConnect had the mean market value of capital considerably lower than the stock issuers from the primary market their mean MV/BV ratio was higher whereas Tobin's *Q* ratio was at the similar level.

The resources for establishing the strategy and R&D disclosure index were drawn from annual reports and corporate websites (see Table 2). I attributed 1 (YES) for each reference to an item, and 0 (NO) where there was no reference. Each item was counted only once, regardless of the number of times that it was revealed by the same company.

Table 2. Components of the strategy and R&D disclosure index

No.	Questions	Data source	Binary assessment
1	Does a company elaborate on R&D activities in the letter to shareholders?	Annual report / Chairman's letter to shareholders	1 (YES) / 0 (NO)
2	Does a company discuss R&D activity or describe progress of R&D projects?	Annual report / Management commentary	1 (YES) / 0 (NO)
3	Does a company provide substantial information on R&D performance at the corporate website?	Corporate website / Separate R&D sections	1 (YES) / 0 (NO)
4	Does a company disclose its strategy ?	Annual report / Management commentary	1 (YES) / 0 (NO)
5	Strategy and R&D disclosure index ($DI_{S\&R\&D}$)	d_i = (1 or 0) N = number of analyzed questions	$\sum_{i=1}^{n} \frac{d_i}{N}$

Source: own presentation.

Based on prior research studies I selected the following independent variables to examine their influence on the dependent variable:

1) company age (period length since the company has been listed for the first time on the stock exchange measured as a natural logarithm of total number of months);
2) company size (measured as natural logarithm of total assets);
3) ownership dispersion (measured as a share of individual investors in the shareholders' structure);
4) board size (measured as a number of management board members);
5) financial performance (measured as a return on assets ratio);
6) leverage (measured as a debt to assets ratio);
7) growth prospects (measures as MV/BV ratio).

I also included three other test variables in a model, including: natural logarithm of market value at the end of the reporting year, Tobin's *Q* ratio[2] and market affiliation. The last variable is a binary one, which means that it has only two values: one, to represent the presence on the primary stock market and zero, when the company is listed on alternative market.

5. Research results

I developed the following multiple linear regression model, which explained impacts of particular explanatory variables on the dependent variable.

$$DI_{S\&R\&D} = \alpha_0 + \alpha_1 \text{AGE} + \alpha_2 \text{CSIZE} + \alpha_3 \text{ODISP} + \alpha_4 \text{BSIZE} + \alpha_5 \text{PROF} + \alpha_6 \text{LEV} + \alpha_7 \text{GPROS} + \alpha_8 MV + \alpha_9 TQ + \alpha_{10} MA + \varepsilon$$

I checked the underlying assumptions for multiple linear regression model. First of all, I examined whether residuals of the model were normally distributed. For that reason Jarque-Bera test was chosen – the most prominent goodness-of-fit measure – checking the departure from normality. The Jarque-Bera test is based on the sample kurtosis and skewness. In the estimated model test statistic equaled 1.325 with *p*-value 0.515,which means that there was no reason to reject the null hypothesis that errors were normally distributed.

Secondly, I examined whether the residuals of the model had equal variances. Therefore, I formulated the following null hypothesis: heteroscedasticity is not present. I applied Breusch-Pagan test to check whether the estimated variances of the residuals from a regression were all equal versus the alternative that the error variances were a multiplicative function of one or more variables. In the latter case, heteroscedasticity problem might arise. This problem, however, did not exist in the estimated model since test statistic LM equaled 6.690 with *p*-value = (*P*(Chi--square(10) > 6.689) = 0.754 which means that there was no reason to reject the null hypothesis suggesting the presence of homoscedasticity.

Thirdly, I tested for independence of residuals. It is assumed lack of autocorrelation in the data used in the linear regression analysis. Durbin-Watson's *d* statistic tests the null hypothesis that the residuals were not linearly auto-correlated. This statistic may take values between 0 and 4. In my data set Durbin-Watson's *d* statistic equaled 1.970, whereas 5% critical values equaled 1.297 (*dL*) and 1.951 (*dU*) for $n = 69$ and $k = 10$. Therefore, there was no reason to reject the null hypothesis since Durbin--Watson's *d* statistic is higher than upper critical value ($d > dU$).

Finally, I checked whether there existed a multicollinearity problem which might have caused the variances to be high. The inflated variances are quite adverse in regression since some variables add very little or even no new and independent

[2] Tobin's *Q* ratio was calculated as follows: (market value of the company + current liabilities + inventories – current assets) / total assets

information into the model [Belsley et al. 1980]. A good approach to detect a multicollinearity problem is the calculation of Variance Inflation Factors (VIF) for each independent variable. The results were presented with the OLS regression model. I evidenced that the problem of multicollinearity did not exist since VIFs were much more below the critical value which equaled 10.

Model OLS regression (n = 69)
Dependent variable: **Strategy and R&D disclosure index**

	Short-cut	Expected sign	Coefficient	Std. Error	t-ratio	p-value	VIF
Intercept			0.507	0.281	1.803	0.077*	
Company age	**AGE**	(–)	−0.138	0.066	−2.079	**0.042****	1.112
Company size	**CSIZE**	(+)	−0.085	0.043	−1.962	**0.054***	6.844
Ownership dispersion	ODISP	(+)	−0.122	0.246	−0.496	0.621	1.491
Board size	BSIZE	(+)	0.023	0.029	0.786	0.435	2.289
Financial performance	PROF	(–)	0.042	0.162	0.261	0.795	1.780
Leverage	LEV	(+)	0.076	0.150	0.500	0.619	1.476
Growth prospects	GPROS	(+)	0.003	0.004	0.776	0.441	3.464
Market value	**MV**	(+)	0.090	0.037	2.425	**0.018****	5.095
Tobin's Q	TQ	(+)	−0.009	0.007	−1.288	0.203	3.588
Market affiliation	**MA**	(+)	0.187	0.104	1.797	**0.078***	2.584

Mean of dependent variable	0.533		Standard deviation of dependent variable	0.281
Sum squared residuals	4.108		Standard error of regression	0.266
R-squared	0.234		Adjusted R-squared	0.102
$F(10, 58)$	1.774		P-value(F)	0.086
Log-likelihood	−0.573		Akaike criterion	23.147
Schwarz criterion	47.722		Hannan-Quinn	32.897

Analyzing the results of OLS regression it should be noted that the developed model proved to be statistically valid, with moderately low R^2 level of 23,4%. The OLS regression model indicated that there was statistically significant and negative association ($p < 0.05$) between company age and the disclosure index, which proved the first hypothesis. The second hypothesis was not confirmed by the empirical results (a sign of the relation was different as it was expected) although it was evidenced statistically relevant association between company size and the dependent variable. Following the results of Kang and Gray [2011] I found no statistically significant relationships between ownership dispersion and the disclosure index which suggests the rejection of the third hypothesis. The independent variables, including board size, financial performance, leverage and growth prospects occurred to be unrelated with the disclosure index which did not allow to validate hypotheses 4–7. Some of these results, however, are consistent with those revealed in the other

empirical research. Arcay and Vazquez [2005], Prado-Lorenzo and Garcia-Sanchez [2010], Nekhilli at al. [2016], for example, did not prove any significant link between board size and the disclosure level, whereas Meek et al. [1995], Raffournier [1995], Depoers [2000], Cerbioni and Parbonetti [2007], Napoli [2013], Nekhilli et al. [2016] did not confirm any statistically relevant association between leverage and the disclosure level.

It is worth noticing that I evidenced statistically significant relationships between two variables: market value as well as market affiliation and the disclosure index. Both variables were positively related with the dependent variable. These two associations were remarked and proved in my previous research study [Dyczkowska 2016] where I corroborated that both market value of a firm and the place of listing may be perceived separately as factors which induce managers to disclose more strategic issues in corporate annual reports.

6. Conclusions

This paper contributes to the literature on voluntary disclosure and documents the research results in reference to strategy and R&D disclosure in the high-tech sector of IT companies listed on the Warsaw Stock Exchange. The problem of the extent of strategy and R&D disclosures was previously examined by Napoli [2003], who found statistically significant relations between R&D disclosure and R&D intensity, as well as between strategy disclosure, R&D intensity and company age.

The empirical evidence provided by this research study suggests that the level of strategy and R&D disclosure was dependent on company age, which to some extent supports findings of Napoli [2013]. Younger IT companies were prone to provide a more strategic and R&D information, which may be explained variously. Firstly, younger entities experience uncertainty about future earnings and extra narrative disclosures may contribute to more accurate estimation of their market value. Secondly, younger entities are not so frequently followed by financial analysts as compared to large companies which causes information asymmetry problems. In order to mitigate these problems managers decide to disclose more. Thirdly, there exists empirical evidence that younger companies disclose more about their innovation activities particularly when current earnings are less informative or future earning are more uncertain [Gu, Li 2003].

The research results show that company size and a place of listing mattered while considering the extent of disclosure. The larger companies and these listed on the primary market revealed more information on strategy and R&D issues. It was also evidenced that if market capitalization of the company is higher as compared to peer entities managers will provide more narratives about the strategy and R&D activities.

This study has some limitations since it did not considered the impact of barriers to entry in the IT sectors as well as the influence of patent protection. Depoers [2000]

argued that the companies which are protected in their sector by heavy barriers to entry are much more likely to disclose more information as compared to organizations that are lacking the protection. The problem arises, however, how to measure a level of barriers to entry – a notion which is complex and may refer to regulations, differentiation of product strategies and conditions for organizing production, supply and sales processes [Morvan 1991].[3]

Another point is that patent protection is seen as a significant barrier to entry into markets since it gives a patent holder the exclusive right to make, use or sell the claimed invention whereas the costs of licensing or fighting legal disputes for entrants may be a huge burden [Cockburn, Macgarvie 2011]. In that context Guo et al. [2004] assumed that availability of patent protection (measured a number of granted patents and patent applications) for the products under the development phase enhances disclosures related with these products. They evidenced that although there was no significant disclosure difference between products with granted patents or patent application, the disclosure level for products without a patent or patent application was significantly lower than the average disclosure for products protected by patents.

Concluding, the research area concerning drivers of strategy and R&D disclosures is topical and not sufficiently explored in Polish conditions due to its voluntary and non-financial character. However, some Polish companies have begun to understand the role of transparent communication with the stakeholders which has become visible primarily in a way how they designed structure and content of corporate websites. Nevertheless, still much has to be done with enhancing a scope of information transferred using annual reports since most of Polish companies tend to observe mandatory requirements basically ignoring the importance of non-financial narratives.

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[3] In a specific IT sector, a considerable barrier-to-entry may be a lack of high-skilled human resources as well.

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