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Intellectual Capital Disclosure and Its Determinants: Empirical Evidence from Listed Pharmaceutical and Chemical Industry of Bangladesh

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Abstract

Purpose - The purpose of this study is to find out the intellectual capital disclosure (ICD) and its determinants in the pharmaceutical and chemical industry of Bangladesh.

Research design, data, and methodology - This research study is conducted on the listed firms of pharmaceutical and chemical industry in Bangladesh during the period of 2016 to 2017. This study develops a self-structured intellectual capital disclosure index; and the proxies of determinants of ICD are used as board characteristics (board size, independent directors and female directors), ownership structures (institutional ownership and director ownership), and firm characteristics (firm size, leverage and performance). The study uses a content analysis to analyze the extent of ICD and a pooled cross-sectional method to find the determinants of ICD.

Research Findings - This study finds that intellectual capital disclosure is positively associated with firm size, leverage, and firm performance and negatively associated with director ownership and institutional ownership. This study also finds that there is no significant association of ICD with independent director or female director.

Conclusions - The study recommends that the regulatory authority should develop mandatory guidelines on ICD for ensuring proper and consistent disclosure about the intellectual capitals. Besides, the companies should include a separate section in the annual reports to disclose the measurement and management of intellectual capital.

Keywords: Intellectual Capital, Internal Capital, External Capital, Human Capital.

JEL Classification: M14, M48.

1. Introduction

In today's knowledge based economy, intellectual capital plays a crucial part in the value creation process of organizations and thus, intellectual capital disclosure (ICD) is an emerging issue in both the corporate world and the academic research. Accounting practices have a great extent neglected to keep pace with the dynamic environment (Cañibano, Garcia-Ayuso, & Rueda, 2000). This deficiency in traditional accounting methods has led many researchers to investigate the impact of intellectual capital and find ways of how to incorporate them in financial statements. Rahman and Hasan (2019) study states that a better information and disclosure system should be developed to ensure high quality disclosure and to make investment and financing decision. ICD has been recognized as one probable answer for extending transparency by diminishing asymmetries of data between the providers of corporate data and the users of such data (Eccles & Mavrinac, 1995; Bukh & Johanson, 2003). The success of many 21st century companies hinges upon their ability to unleash and exploit their intellectual capital to gain maximum organizational advantage (Keenan & Aggestam, 2001; Nahapiet & Ghoshal, 1998). Consequently, firms are affixing rising amount of importance in recognition, measurement and disclosure of IC information in their annual reports.

IC plays an important role in value creation but Campbell and Rahman (2010) indicates that the extent of the IC disclosure practice in annual reports is less explored. They add that longitudinal studies for the analysis of the IC disclosure will be lucrative for further research. Furthermore,

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after the global financial meltdown, stakeholders' escalated awareness of the need to handle intangibles suggests that further research into the extent of IC disclosure in annual reports is necessary (Dumay, 2009; O'Donnell, Henriksen, & Voelpel, 2006).

The primary question of this research is to find out the intellectual capital disclosure and its determinants in the listed pharmaceuticals and chemicals sector in Bangladesh. Corporate governance plays influential role to control and monitor management activity. In addition, effective corporate governance reduces the various corporate scandals all over the world and ensures better performance through reducing agency conflict (Rahman & Hasan, 2019). Thus, this study investigates corporate governance's effectiveness through board characteristics and ownership structure in disclosing IC. Finally, this study also examines the relationship between ICD and firm characteristics, which is denoted by firm size, leverage, and firm performance in this study.

In Bangladesh, only a few studies have examined the disclosure of IC, but the scope of those researches was restricted to some specific aspects of the wider concept of intellectual capital. Studies conducted by Abhayawansa and Azim (2014), Rashid (2013), Khan and Ali (2010), and Khan and Khan (2010) focused only on the extent of ICD in Bangladesh. To the best knowledge of the authors, there seems to have been no prior research conducted to date in this regard. In such a context, the present study intends to carry out an in-depth analysis to explore the intellectual capital disclosure (ICD) and its determinants in the listed pharmaceutical and chemical companies of Bangladesh.

The study will contribute to the literature in many ways. First, this study will contribute to the field of ICD by finding out the disclosure patterns of IC in annual reports and the factors that determine the disclosure of ICD in the annual reports of pharmaceuticals and chemicals industry. Second, the study will present the disclosure pattern of IC in the mentioned sector based on a unique index. Third, the findings of this study will provide information regarding how effective corporate governance and good firm performance can improve the disclosure of ICD in the annual reports, which is still voluntary in Bangladesh. Finally, the study will contribute to the literatures on IC by filling up the gaps in the existing research.

The rest of the study is organized as follows: Section 2 includes the theoretical framework, section 3 presents the literature review and hypothesis development, Section 4 explains the research design which includes samples, data, and research model. Section 5 describes the analysis of the result, which includes descriptive statistics analysis, bivariate analysis and multivariate analysis. Finally, section 6 draws the conclusion of the study, specifies some of the limitations and provides some useful recommendations.

2. Theoretical Framework

Agency theory suggests that the potential for agency costs appears because of conflicts of interests between two contracting parties (Jensen & Meckling, 1976). To decrease the likelihood of shareholders-corporate management clash, agency theorists push the significance of mechanisms intended to screen the conduct of corporate management (Frankforter, Berman, & Jones, 2000). Transparency – of which voluntary disclosure is a key segment – is seen as one noteworthy type of monitoring (Ho & Wong, 2001). Agency theorists suggest that the extent of data voluntarily disclosed is a component of the relationship between the investors of a firm and corporate management. That is, voluntary disclosure is a monitoring instrument principals use to cost-efficiently examine the activities of agents to guarantee that their residual claims are not weakened (Jensen & Meckling, 1976).

Legitimacy theory is firmly connected to the stakeholder theory. Legitimacy theory guesses that companies will guarantee that they work within the points of confinement and norms of the social orders they are in (Guthrie, Petty, Yongvanich, & Ricceri, 2004). Legitimacy theory provides a theoretical foundation to understand how firms employ voluntary disclosure to gain or maintain legitimacy between them and their societal expectations. The relevant stakeholders assess an organization based on their perceptions relating congruence between their values and the organizational value (Mobus, 2005). Based on this rationale, organizations have explicit or implicit social contract (Campbell, 2000) with the societies in which they operate. Subsequently, this hypothesis energizes the companies to voluntarily reveal intellectual capital data for the advantages of society.

3. Literature Review and Hypotheses Development

Many authors have defined ICD from different perspectives. According to Caroll and Tensey (2000), "IC is best conceived as the knowledge and creativity available to a firm to implement a business strategy that maximizes stakeholders view." On the other hand, Collier (2001) defines it as "Intangible knowledge and competence base that provides the capacity for organizational purpose." In the context of Bangladesh, Khan and Khan (2010), Nurunnabi, Hossain, and Hossain (2011), and Abhayawansa and Azim (2014), among others, have examined the extent of ICD; whereas Muttakin, Khan, and Belal (2015) studied the impact of corporate governance on ICD in different sectors. Although there are a few studies on the extent of ICD in different industries of Bangladesh, there is a lack of research on examining the determinants of such disclosure.

3.1. Board Characteristics

3.1.1. Board size

Board of directors (BOD) is the highest body in the firm and BODs formulate the strategy and ensure the transparency through effective monitoring and controlling (Rahman, 2017). Thus, board size is an important variable for the effective functioning of the board. Rahman (2017) study also states that board of directors reduce the information asymmetry between BODs and shareholders. Larger board has greater diverseness of perspectives and skills, which make the board more effective and efficient in decision makings (Pfeffer, 1972). As per resource dependency theory, bigger boards will probably incorporate expanded pool of mastery who will improve board's data handling capacities. Moreover, large boards will probably expand firms' capacity to get and secure intangible resources from their environment, for example, IC assets (Abeysekera, 2010). Birnbaum (1984) recommends that vulnerability and the absence of data might be limited by a bigger board. White, Lee, and Tower (2007), Hidalgo, Garcia-Meca, and Martinez (2011) and Tejedo-Romero, Araujo, and Emmendoerfer (2017) found that the firms with the larger board size are more likely to disclose the intellectual capital information. In Bangladesh, board size should be five to twenty according to revised corporate governance guideline 2012 (Rahman & Khatun, 2017). Based on the resource dependency theory and the above arguments, the following hypothesis has been developed:

Hypothesis 1: Ceteris paribus, there is a positive relationship between board size and ICD.

3.1.2. Board independence

Board structure determines the quality of the effective functioning of the board. Fama and Jensen (1983) argue that the capability of the board to decrease agency costs is enhanced by the appointment of the independent outside directors. In line with Fama and Jensen (1983), Haniffa and Cooke (2005) stated that more non-executive directors provide wider expertise and prestige which in turn positively contribute to the quality of the functioning of the board. Past researches support the view that the balance of independent directors is positively associated to the board's overall ability to impact corporate disclosure decisions (Beasley, 1996; Chen & Jaggi, 2000; Arcay & Vazquez, 2005). As far as it is related to ICD studies, Li, Pike, and Haniffa (2008) observe that ICD is significantly associated with independent directors. Based on the above papers, the following hypothesis has been developed:

Hypothesis 2: Ceteris paribus, there is a positive relationship between board independence and ICD.

3.1.3. Female directors

As a result of increasing equality between male and females, gender composition of the board is one of the academic issues in finance and accounting literature nowadays. Many researches provide theoretical argument that the appointment of women on the board boosts the board performance in several ways (Cox & Blake, 1991; Robinson & Dechant, 1997). Consistently, Adams and Ferreira (2009) provide empirical evidence that the inclusion of women on board enhances supervisory function of the board. The study shows that female directors are likely to attend board meetings more than male directors. As for the relationship between gender diversity and the quality of disclosure information, Gul, Srinidhi, and Ng (2011) state that board's gender diversity improves the ability of the board to render better corporate disclosure. Following both theoretical arguments and empirical evidence from past research, it leads us to the following hypothesis:

Hypothesis 3: Ceteris paribus, there is a positive relationship between proportion of female directors in the board and ICD.

3.2. Ownership Structure

3.2.1. Institutional ownership

Empirically, a mixed relationship can be found between ICD and institutional ownership. A few examinations have decided a noteworthy positive relationship between institutional investors and voluntary disclosure (Mangena & Pike, 2005; Bushee & Noe, 2000). Ho and Tower (2011), and Harry and Istianingsih, (2018) have found that firms with the institutional ownership have a significantly positive association with the voluntary disclosure of the intellectual capital structure. However, Hossain, Tan, and Adams (1994) found a negative relationship between institutional ownership and voluntary disclosure. Institutional shareholders generally possess a large amount of shares and, as a result, can use the internal sources of the company to collect information, which reduces the company's willingness to disclose voluntary matters. Following these theoretical arguments, it leads us to the following hypotheses:

Hypothesis 4a: Ceteris paribus, there is a positive relationship between institutional ownership and ICD.

Hypothesis 4b: Ceteris paribus, there is a negative relationship between institutional ownership and ICD.

3.2.2. Director Ownership

According to Jensen and Meckling (1976), increased directorial shareholding will result in concentrated ownership which will reduce the agency cost. Ruland, Tung, and George (1990) found a negative relationship between voluntary disclosures and director ownership. This empirical study also showed that the director's shareholding has a negative relationship with this ICD. However, Firer and Williams (2005) found that the level of voluntary IC

disclosure is higher for publicly listed Singapore firms with a high percentage of inside director share ownership than these firms with a low percentage of inside director share ownership. Based on the previous studies, the following hypothesis is developed:

Hypothesis 5: Ceteris paribus, there is a negative relationship between director ownership and ICD.

3.3. Firm Characteristics

3.3.1. Firm Size

Firm size has a positive impact towards the ICD. Bozzolan, Favotto, and Ricceri (2003) demonstrates that company size has noteworthy beneficial outcomes on the ICD. Similarly, Bukh and Johanson (2003) found that planned and recorded nonfinancial exposures in the yearly reports were influenced by size and global activities. Moreover, the examination directed by White et al. (2007) found that firm size had a positive association with the extent of voluntary ICD among biotechnology organizations in Australia. Gilani and Geraily (2017) found a significant relationship between firm size and ICD. A study conducted by Taliyang and Jusop (2011) found that firms with high growth opportunities are more likely to provide more intellectual capital information. Based on the above arguments, we test the following hypothesis in the study:

Hypothesis 6: Ceteris paribus, there is a positive relationship between firm size and ICD.

3.3.2. Leverage

A positive connection between firm leverage and intentional section divulgences was found by Bradbury (1992). In addition, highly leveraged firms tend to have critical commitments of ICD. In addition, the investigation directed by White et al. (2007) found that level of leverage had a positive association with the level of voluntary ICD among biotechnology organizations in Australia. Besides, firms with higher leverage would like to disclose the IC related information because it ensures their creditors that they have a good condition in the market. The study mainly concluded that the level of leverage had a positive relationship with voluntary ICD. Based on the above papers, we test the following hypothesis in the study:

Hypothesis 7: Ceteris paribus, there is a positive relationship between firm leverage and ICD.

3.3.3. Firm Performance

In this study, ROA has been taken as an indicator of firm performance. Firms with higher profitability and growth potential tend to disclose more information regarding ICD (Ousama, Fatima, & Hafiz, 2011). The studies of Gilani and Geraily (2017), Muttakin et al. (2015) and Clarke et al. (2011) found a positive and significant relationship between the ROA and ICD. But Taliyang, Latif, and Mustafa (2012) did not find any significant relationship between firm performance and ICD. As most of the studies indicate the positive relationship between ICD and profitability, we test the following hypothesis:

Hypothesis 8: Ceteris paribus, there is a positive relationship between ROA and ICD.

4. Research Design

4.1. Sample and Data

For the purpose of the research, samples were taken from the listed pharmaceuticals and chemicals companies in Dhaka Stock Exchange (DSE) of Bangladesh for the years 2016 and 2017. Out of 31 companies, 3 companies were listed in 2018, leaving 28 companies. However, from the rest of the 28 listed companies, 21 companies had a similar fiscal year from July to June. As a result, the sample size ended in 21 companies for 2 years, a total of 42 firm years. All the data were collected from secondary sources. Relevant data were taken from the annual reports published by the sample companies. The pharmaceuticals and chemicals sector was selected due to its growing contribution and importance in the economy of Bangladesh. The list of sample companies are given below:

Table 1: List of sample companies

Name of the Company	Name of the Company	Name of the Company
1. ACI Limited.	8. Beximco Synthetics Ltd.	15. Marico Bangladesh Limited.
2. ACI Formulations Limited.	9. Central Pharmaceuticals Limited.	16. Orion Infusion Ltd.
3. The ACME Laboratories Ltd.	10. Far Chemical Industries Limited.	17. Orion Pharma Ltd.
4. Active Fine Chemicals Ltd.	11. Global Heavy Chemicals Ltd.	18. Pharma Aids
5. AFC Agro Biotech Ltd.	12. The IBN SINA Pharmaceutical Industry Ltd.	19. Renata Ltd.
6. Beacon Pharmaceuticals Ltd.	13. Keya Cosmetics Ltd.	20. Salvo Chemical Industry Ltd.
7. Beximco Pharmaceuticals Ltd.	14. Kohinoor Chemicals Company (Bangladesh) Ltd.	21. Square Pharmaceuticals Ltd.

4.2. Research Model

For testing the hypothesis, a pooled cross-sectional analysis was performed. For determining the dependent variable ICD, a checklist consisting of a total of 24 items was developed to match the number of disclosures regarding intellectual capital in the annual reports. The items in the checklist were sub-divided into three categories. These are: Internal Capital Disclosure, External Capital Disclosure and Human Capital Disclosure. Each category in the checklist includes 8 items. The checklist was developed by keeping consistency with checklists used by Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan, Saleh, Abessi, and Huang (2013) and Schneider and Samkin (2007).

After developing the checklist, a content analysis was performed based on the unweighted method. If the content in an annual report matched any of the items in the checklist, it was scored as 1, and if the content did not match, then it was scored as 0. Then an index was developed based on the content analysis. The calculation of the index was consistent with the models used by Muttakin et al. (2015), where the ratio between total scores achieved by a company and maximum achievable scores were used. The following formula was used to determine the ICD Index ICDIN:

$$ICDIN_j = \frac{\sum_{t=1}^{n} X_{ij}}{n_j}$$

Where n_j = number of items for j^{th} firm, X_{ij} = 1 if i^{th} item disclosed, 0 if i^{th} item not disclosed, so that 0 ≤ $ICDIN_j$ ≤ 1.

To examine the determinants of ICD, a multivariate regression analysis was conducted. On the basis of different studies, including Muttakin et al. (2015), Tejedo-Romero et al. (2017) and Oba and Fodio (2013), the following regression equation has been developed:

$$ICDIN_{it} = \alpha + ß_1\text{Board Characteristics} + ß_2\text{Ownership Structure} + ß_3\text{Firm Characteristics} + \varepsilon.$$

Where ICDIN is the intellectual capital disclosure index. Board characteristics consist of board size, proportion of independent directors and proportion of female directors in the board. Ownership structure includes institutional ownership and directors' ownership. Firm characteristics includes firm size, leverage and ROA. The extended equation is given below:

$$ICDIN_{it} = \alpha + ß_1LNBDS + ß_2IND + ß_3FD + ß_4INSOW + ß_5DIROW + ß_6LNFSZ + ß_7LEV + ß_8ROA + \varepsilon.$$

The definition and types of independent and control variables that will be used in the research are given in Table-2 below:

5. Analysis of the Result

5.1. Descriptive Statistics

5.1.1. Descriptive Statistics of Intellectual Capital Disclosure Index

Table 3 highlights the overall descriptive statistics for the intellectual disclosure indices we have calculated. It is observed from table 3 that the ICD Index is found to be 49.80% on average for the years 2017 and 2016 combined. We see that the minimum score obtained in this category is 13%, which implies that there are some companies that are not complying at almost 87% of the best practices in this category.

Table 2: Definition of Variables

Variable Name	Symbol	Explanation	Expected Relation
Intellectual Capital Disclosure (Dependent Variable)			
Intellectual Capital Disclosure Index	ICDIN	Index value of intellectual capital disclosure	
Board Characteristics			
Board Size	LNBDS	Natural Logarithm of Board Size	+
Independent Directors	IND	% of Independent Directors in a Board	+
Female Directors	FD	% of Female Directors in a Board	+
Ownership Structure			
Institutional Ownership	INSOW	% of Institutional Ownership	+/-
Directors' Ownership	DIROW	% of Directors' Ownership	-
Firm characteristics			
Firm Size	LNFSZ	Natural Logarithm of Book Value of Total Assets	+
Leverage	LEV	Ratio of Book value of Total Debt to Total Assets	+
Return on Asset	ROA	Ratio of Net Profit Before Tax to Average Total Assets	+

Table 3: Descriptive Statistics of Intellectual Capital Disclosure Index (2017 and 2016)

Variable Name	Symbol	N	Mean	SD	Min	Max	Med	Mean	
								2016	2017
Internal Capital Disclosure Index	intcin	42	0.595	0.187	0.250	1	0.5	0.591	0.598
External Capital Disclosure Index	excin	42	0.487	0.255	0	0.800	0.5	0.491	0.483
Human Capital Disclosure Index	hcin	42	0.467	0.225	0.130	0.880	0.5	0.455	0.479
Intellectual Capital Disclosure Index	icdin	42	0.498	0.202	0.130	0.830	0.5	0.494	0.502

Table 4: Overall Descriptive Statistics of the Determinants of ICD (2017 and 2016)

Variable Name	Symbol	N	Mean	SD	Min	Max	Med
Board Size	bds	42	7.167	1.766	5	11	7
Independent Directors (%)	ind	42	27.36	10.49	11.11	60	25
Female Directors (%)	fd	42	22.57	16.11	0	42.86	28.5714
Institutional Ownership (%)	insow	42	18.05	9.987	0	40.95	16.6
Director's Ownership (%)	dirow	42	40.73	18.71	11.94	90	36.005
Firm Size	fsz	42	11,351	13,180	207.7	45,763	4427.31
Leverage	lev	42	36.87	18.75	1.930	75.56	36.8027
Return on Asset	roa	42	12.83	12.34	-6.840	56.09	8.36669

This is very poor in terms of disclosure quality regarding the intellectual capital. Internal Capital, External Capital and Human Capital Disclosure Indices have a mean value of 59.50%, 48.70% and 46.70% respectively. The worst subcategory in terms of the lowest value achieved is the Human Capital Disclosure Index both in year 2016 and 2017 with a mean value of 45.50% and 47.90% respectively. The highest disclosure score is obtained by the Internal Capital Disclosure index both in year 2016 and 2017 with a mean of 59.10% and 59.80% respectively. Then in the External Capital Disclosure index, the mean disclosure level for the year 2016 and 2017 is 49.10% and 48.30% respectively. This is the only sub-category we have found, where some companies didn't disclose any information. Then, Human capital disclosure index for the year 2016 and 2017 has achieved a mean of 45.50% and 47.90% respectively. Finally, the main index, ICD has been on average 49.40% and 50.20% for the year 2016 and 2017 respectively.

From this, we can conclude that in the Pharmaceuticals sector of Bangladesh, the level of ICD is nearly 50% on average, and the rate of non-compliance is almost 50%. But compared to other sectors, pharmaceuticals sector has performed much better. For example, in the context of Bangladesh, Muttakin et al. (2015) has found the compliance of ICD to be just 15.50% on average in the selected non-financial companies, while Nurunnabi et al. (2011) study showed on average 20.72% compliance to the ICD. As expected, our study shows an increasing pattern towards the ICD with the passage of time. The level of compliance of pharmaceuticals firms is 49.40%. This shows that the compliance level of pharmaceuticals industry in term of ICD is much higher than other industries of Bangladesh.

5.1.2. Descriptive Statistics of Determinants of Intellectual Capital Disclosure Index

Table 4 shows the descriptive statistics relating to the variables collected for the regression analysis in the study. Total observation is shown to be 42. The average board size is around 7 with a maximum of 11 and a minimum of 5. The average board independence is found to be 27.36%, while the average female directors is 22.57%. Institutional ownership on average is 18.05%, and director ownership is found to be on average 40.73%. This indicates that ownership of the pharmaceuticals is highly concentrated to the owners.

Firm size is 11,351 on average. The average leverage is 36.87%, which is a safe position in terms of capital structure of the pharmaceuticals industries. The average return on asset is 12.83% with a maximum of 56.09% and a minimum of -6.84% indicating a company having negative return.

5.2. Bivariate Analysis

Table 5 represents the correlation matrix of both dependent and independent variables. From the correlation matrix, it can be seen that out of eight independent variables, two variables, namely firm size (0.400) and ROA (0.346), are significantly and positively correlated with the dependent variable ICDIN. This implies that both larger firms and high performing firms tend to disclose more information regarding intellectual capital. Besides, board size (0.283), female directors (0.167), directors' ownership (0.169) and leverage (0.124) are positively correlated to ICDIN, but the relationship is not significant. However, the ICDIN is negatively but insignificantly correlated with independent directors (-0.091) and institutional ownership (-0.093).

It is also observed that the highest correlation value is 0.400, which is between ICDIN and board size. Correlation between variables is not considered harmful if the value is under 0.8 for the multivariate analysis (Gujarati, 2003).

Table 5: Correlation Matrix

	ICDIN	Board Size (Ln)	Independent Directors (%)	Female Directors (%)	Institutional Ownership (%)	Directors' Ownership (%)	Firm Size (Ln)	Leverage	ROA
ICDIN	1								
Board Size (Ln)	0.283	1							
Independent Directors (%)	-0.091	-0.319*	1						
Female Directors (%)	0.167	-0.174	-0.095	1					
Institutional Ownership (%)	-0.093	0.256	-0.073	-0.107	1				
Directors' Ownership (%)	0.169	0.225	-0.095	0.328*	-0.389*	1			
Firm Size (Ln)	0.400**	0.393*	-0.107	0.113	0.189	0.068	1		
Leverage	0.124	-0.195	-0.097	0.282	0.010	0.372*	-0.072	1	
ROA	0.346*	0.217	0.213	-0.125	-0.138	0.375*	-0.058	-0.077	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6 represents the coefficients for Variance Inflation Factors (VIF) of the independent variables. This test was performed to check whether there is any multicollinearity problem among the variables. According to Neter (1989), the mean coefficient of VIF should not be more than 10; otherwise, this will indicate the presence of multicollinearity problem. On the other hand, if the mean VIF is less than 1, it indicates biasness in the regression analysis (Bowerman & O'Connell, 1990). From the table, it can be seen that the mean VIF is 1.650. As the mean VIF is within the limits mentioned in previous studies, it can be assumed that there is no major multicollinearity problem in this study.

Table 6: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
Board Size (Ln)	2.110	0.474
Independent Directors (%)	1.290	0.772
Female Directors (%)	1.380	0.726
Institutional Ownership (%)	1.600	0.624
Directors' Ownership (%)	2.520	0.396
Firm Size (Ln)	1.280	0.779
Leverage	1.550	0.646
ROA	1.470	0.680
Mean VIF	1.650	

5.3. Multivariate Analysis

Table 7 reports the results of our regression analysis based on Ordinary Least Square (OLS) and Robust OLS with adjustment for heteroscedasticity problem under model 1 and 2, respectively. In the first model, we see that except for the board size, independent directors, and female directors, all other variables are statistically significant. Board size has a positive but insignificant impact on ICD. This finding is the opposite of Rahman (2016) study, where he found that board size has a negative impact on the voluntary disclosures of firms. But Rahman and Saima (2018) found a very similar result in the context of Bangladesh regarding the board composition and firm performance.

Institutional ownership is found negative but significant. One explanation of this result is that higher presence of institutional owners in the board will deter CEOs to disclose more voluntary information in the reports. Director ownership is also found to be negative but statistically significant as the higher ownership concentration hampers voluntary disclosures in the annual reports. Firm size has a positive and significant impact on ICD as, according to the legitimacy theory, big firms will always try to disclose more voluntary information to legitimize their stance in the society as a good company. This finding is also supported by the previous studies (Cerbioni & Parbonetti, 2007; Muttakin et al., 2015). Leverage has positive and statistically significant impact on the ICD as, according to the agency theory, debtholders will force the management of the company to disclose more voluntary information. Finally, the Return on Asset has both positive and significant impact on ICD as profitable firms historically have been good at disclosing more voluntary information. The second model is adjusted for heteroscedasticity problem, which may give misleading conclusion in the earlier model. Here, all the results were same as the first model except the board size is now significant at 10% level positively affecting the ICD. According to agency theory, higher board size helps to bring diverse knowledge in the board, and this leads to more voluntary disclosure of ICD. In the European context, Cerbioni and Parbonetti (2007) found that board structure was negatively affecting ICD of the biotechnology firms. But our study shows a better result as expected according to the theoretical support.

Table 7: Regression Output with OLS and Rubost OLS Model

Variable Name	Symbol	Expectation	Model 1 OLS		Model 2 OLS with rubost	
			Coefficient	p-Value	Coefficient	p-Value
Board Size	lnbds	+	0.234	0.123	0.234	0.095
Independent Directors	ind	+	-0.143	0.614	-0.143	0.595
Female Directors	fd	+	0.310	0.109	0.310	0.143
Institutional Ownership	insow	+	-0.680	0.046	-0.680	0.031
Director's Ownership	dirow	-	-0.500	0.029	-0.500	0.006
Firm Size	lnfsz	+	0.055	0.010	0.055	0.003
Leverage	lev	+	0.374	0.036	0.374	0.001
Return on Asset	roa	+	0.828	0.003	0.828	0.000
	Constant		-1.147	0.015	-1.147	0.028
Observations			42.000		42.000	
R-squared			0.461		0.461	

Table 8: Regression Output of Lag and Robust Lag Model

Variable Name	Symbol	Expectation	Model 1 Lag		Model 2 Lag with robust	
			Coefficient	p-Value	Coefficient	p-Value
Board Size	lnbds	+	0.112	0.299	0.112	0.278
Independent Directors	ind	+	-0.399	0.218	-0.399	0.274
Female Directors	fd	+	0.246	0.164	0.246	0.132
Institutional Ownership	insow	+	-0.703	0.068	-0.703	0.137
Director's Ownership	dirow	-	-0.365	0.072	-0.365	0.015
Firm Size	lnfsz	+	0.078	0.001	0.078	0.000
Leverage	lev	+	0.291	0.048	0.291	0.006
Return on Asset	roa	+	0.868	0.002	0.868	0.000
	Constant		-1.343	0.004	-1.343	0.008
Observations			42.000		42.000	
R-squared			0.493		0.493	

5.4. Additional Analysis

To address the problem of endogeneity, we have used the lagged model both in model three and four. Table 8 addresses the endogeneity problem. In the third and fourth model, the results are similar as in the first model. For example, the firm size is showing a positive and significant impact in the ICD. In this respect, Rahman and Khatun (2016) studied the paper of Nurunnabi et al. (2011) and found that firm size has a significant impact on the amount and extent of ICD, which is in line with our findings in the lag model. In all four models, the R-squared is around 49.30%, which means our independent variables have captured almost 49.30% of the variations of the dependent variable ICD. This validates and strengthens our regression outcome. All the models are identical in their coefficients and significance, and thus, policy makers can use these findings without any confusion for their decision-making purposes.

6. Conclusion and Recommendations

This study examined the determining factors that affect the ICD of listed companies of pharmaceutical and chemical sectors in Bangladesh. ICD is a type of voluntary disclosure in Bangladesh. There is no particular guideline-like corporate governance guidelines for ICD. As a result, the extent of disclosure is very few. The average disclosure is 49.4%, which is less than 50%. This implies the level of indifference shown by listed pharmaceutical companies in disclosing information about intellectual capital.

This study has found a positive and significant relationship between ICD and firm size. This implies that larger firms tend to disclose more information regarding IC, as they need to maintain their goodwill in the market place. The study also found a positive relationship between ICD and leverage. This indicates that the creditors play an effective role in forcing the firms to disclose more about IC. This is probably done by stipulating the disclosure of IC as one of the debt covenants. Finally, the study found a positive relationship between ICD and ROA. This implies that more profitable firms tend to disclose more about IC to obtain a competitive advantage; whereas, poor performing firms disclose less in order to hide their poor performance (Inchausti, 1997).

However, this study has found a negative relationship between ICD and institutional ownership. This may be due to the fact that institutional owners, possessing a large number of shares, have a strong influence in the business

and can obtain necessary information from the insiders. There also exists a negative relationship between ID and directors' shareholding. This implies that large amount of directors' shareholding concentrates the ownership pattern that reduces the agency cost. As a result, it acts as an alternative to disclosure (Samaha et al., 2012). The relationship between ICD and the board size is significant in only one of the four models, which is not satisfactory enough to claim a significant relationship between these two.

This study will open up new gaps for further research. There are only a handful of research in this area in Bangladesh. This study can be extended to broader area covering different industries for a greater period. Besides, new determining variables like foreign ownership, and firm age, among others, can be added to examine their relationship with ICD. Another extension can be done by including other countries to compare the results. This will provide a more comparative analysis of the situation and determinants of ICD.

However, there are some limitations of this study. First, the sample size of this study is 42 firm years only, which is quite small. Second, the unweighted method was used for content analysis. As a result, the study did not consider the extent or importance of disclosed items in the annual reports of the company. Finally, the study extracted data from only annual reports of companies. Data published in company website and other reports were not considered in the study.

Based on the empirical results of this study, some recommendations that can be helpful in improving the current situation of ICD can be provided. First, the extent of disclosures regarding IC is less than 50% due its voluntary nature. The respective authority should understand the importance of ICD and establish a set of mandatory guidelines for ICD like corporate governance guidelines in Bangladesh. Second, the independent directors play an insignificant role in disclosing information about IC in annual reports. Considering the importance of ICD, the independent directors should come out of their shell and play an effective role in this situation. Third, the companies should put more importance on the human capital in particular, as the disclosure percentage in this category is the lowest (45.5%), because human capital is one of the most important elements behind success in any industry. Finally, it is suggested that companies should include a separate section in the annual reports disclosing the measurement and management of IC. This will help the users to have a comprehensive view on the situation of IC in the companies.

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Appendix:

Intellectual Capital Disclosure Checklist

S/L No.	Items	Description	Reference
1. Internal Capital Category			
a.	Management philosophy	Refers to the vision and mission statement.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
b.	Intellectual properties	It is a term that encompasses patents, copyrights, trademarks, trade secrets, licenses, commercial rights and other related fields.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Schneider and Samkin (2007)
c.	Corporate culture	Refers to disclosure of the attitudes, experience, beliefs and values of the firm.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
d.	Information systems	Covers systems designed to manage the major functions of the firms such as database, IT system, computer network, hardware, software, etc. that are designed to manage different functions.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
e.	Financial relations	Relationship between the management and its fund providers like investors, banks etc.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
f.	Networking systems	Information technologies consisting of communication media and devices which network with others, gaining access to customers, suppliers, databases.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
g.	Quality/recognition/ achievements	Disclosure of prizes or awards achieved by the firm for its high quality products or services.	Abhayawansa and Azim (2014), Gan et al. (2013)
h.	Management processes	Includes company policies, procedures, reengineering and other process.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
2. External Capital Category			
a.	Brand	Description of brands owned or bought by the companies.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
b.	Customer satisfaction and loyalty	Refer to customers' evaluation of firm's product or service which is reflected in customer loyalty.	Muttakin et al. (2015), Abhayawansa and Azim (2014)
c.	Favorable contract	Signing of favorable contracts.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013)
d.	Distribution channels	Disclosure of supply chain management and distribution. Information on the infrastructure of how the company provides its products or services to its customers.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
e.	Market share	Disclosure of market share or competitive position.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013)
f.	Quality standards	Includes ISO accreditations which refers to quality initiatives.	Muttakin et al. (2015), Schneider and Samkin (2007)
g.	Licensing agreements	Disclosure of any partnership or collaborative agreements with other firms.	Muttakin et al. (2015), Gan et al. (2013), Schneider and Samkin (2007)
h.	Franchising agreements	Disclosure of any franchise agreements signed.	Muttakin et al. (2015), Gan et al. (2013)
3. Human Capital Category			
a.	Number of employees	Detailed disclosure of total number of employees.	Muttakin et al. (2015)
b.	Training programs	Disclosure of training programs incurred.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
c.	Know-how	Disclosure of knowledge, expertise or skills of directors and other employees.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Gan et al. (2013), Schneider and Samkin (2007)
d.	Union activity	Trade union relations	Muttakin et al. (2015), Gan et al. (2013), Schneider and Samkin (2007)
e.	Employee involvement in the community	Disclosure ofEmployees' involvement in the community work, e.g. charity, fund-raising activity.	Muttakin et al. (2015), Gan et al. (2013)
f.	Employee share and option scheme	Existence of any employee share option or ownership plan.	Muttakin et al. (2015), Abhayawansa and Azim (2014), Schneider and Samkin (2007)
g.	Employee safety and health	Disclosure of preventive measures taken by company for securing employees' health and ensuring safety.	Abhayawansa and Azim (2014), Gan et al. (2013)
h.	Employee thanked	Any mention of expressing gratitude to employees as a token of appreciation on job well done.	Muttakin et al. (2015), Gan et al. (2013)