

Readability of Annual Reports: Evidence from Foreign Firms in the United States Stock Exchange

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ABSTRACT

This study measures the readability of annual reports issued by foreign firms in the United States stock exchange, using the two most popular measurements: Fog Index and length of reports. This study proves there is no significant diverse in readability of annual reports under different accounting standards systems. All IFRS, US-GAAP or national accounting standards systems lead to difficult-to-read reports. English is considered as the key role in determining the readability of annual reports. Additionally, this study shows that longer reports are the easier-to-read ones. This research along with related prior research provides a fully complete picture of current readability of annual financial statements.

Key Words: 20-F; Readability; Fog Index; Length of Documents

1. Introduction

Financial statements are the official and primary communication tools of firms to investors, regulators, and other users. At first, investors did not take enough consideration to understand those reports (You and Zhang 2009). When the business environment changes and becomes more complicated, the high demand for information leads investors to raise more awareness of annual reports. Moreover, regulators request firms to disclose more valuable information to the public. Therefore, the usefulness of annual reports has increased significantly in some recent years.

The fact that financial statements have become more complex over time, as the result of complicated business environments along with more strict regulations, raises a question relating to the effectiveness of annual reports in communicating users. Consequently, we witness a rapid increase in the research on readability of annual reports. Numerous research has shown that the readability of annual reports has enormous impacts on investors' perception, analysts as well as stock market (Li

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2008; Miller 2010; Lehavy et al 2011; Wayne et al 2016). Additionally, the new measurements for readability of annual reports have been continuously introduced such as LMPE of Loughran and McDonald (2014^b) or Bog Index of Samuel et al (2017). The research has improved the awareness of scholars and practitioners on the crucial role of readability of annual reports. Therefore, U.S. Securities and Exchange Commission (SEC) has promulgated regulations and guidelines for firms to improve the readability of their annual reports. The readability of filings has, however, not been improved significantly yet.

Noticeably, the prior research referring to the readability of annual reports mostly concentrates on the United States firms. There is only the fewer number of research on this topic for other samples including Lundholm et al (2014) or Lang et al (2015). In this research, we hope to draw a complete picture about the readability of all annual reports by extending our investigation to foreign firms listed on the US stock exchange. Our considered firms operate in different business and legal environments and follow different accounting standards systems. Additionally, we expect to provide the primary data for upcoming research on readability of annual reports provided by foreign firms.

Our research uses two most popular measurements of readability: Fog Index and length of reports. We find that foreign firms fill annual reports more complex than the fillings of the US firms. Annual reports of foreign firms are longer and have higher Fog Index than those of the US firms. Regardless of following different accounting standards systems, the readability of annual reports filed by foreign firms is not significantly different. However, firms in English speaking countries offer shorter but more difficult-to-read annual reports than the reports of other foreign firms due to linguistic advantage. Our research also displayed that longer reports are easier-to-understand for readers.

The remainder of this paper proceeds as follows. Section 2 summarizes the literature reviews relating to the readability of annual reports. Section 3 presents the theoretical framework about the measurements of readability. Section 4 presents the sample selection. Section 5 displays findings and discussion. Finally, Section 6 shows concluding remarks.

2. Literature Review

Accounting information plays a vital role in making decisions as well as the efficiency of the stock market, however, not at all users can perfectly understand all information of annual reports since they have different competencies in processing information. Therefore, SEC along with researchers pays more attention to the readability of annual reports. In recent years, we witness a dramatic increase in the number of research relating to the readability of financial statements. The pioneering research in this aspect was implemented in the 1970s by Smith and Smith (1971), focusing on the readability of footnotes in financial statements. Curtis (1986) reported the relationship between the readability and risk, and Subramanian et al (1993) presented the association between readability and firms' performance. The earlier conducted research, however, only used the small sample sets. The large sample set in this aspect was firstly collected by Li (2008) with more than 50,000 observations. Since 2008, there has been a blooming in the number of research on readability of annual reports.

As the first research using a large sample set, Li (2008) has substantial contributions to the academic accounting research. He successfully introduced Perl language in measuring the readability of annual reports. More importantly, Li confirmed that the readability of 10-K is strongly related to the performance of firms. Firms with bad performances tend to provide longer annual reports with fewer self-referential, more causation words, more future tense verbs to hide the adverse information in comparison with reports of firms performing well. As concluded, managers use readability of annual reports as a useful tool for hiding unfavorable information of firms to users.

In fact, the readability of annual reports also affects the efficiency of stock market throughout the information that they provide. You and Zhang (2009) recognize that if firms provide longer annual reports, the investor underreaction is statistically significant. This relationship is not statistically significant in the group of firms providing shorter annual statements. However, You and Zhang just focus on the length of reports and the tendency of stock prices in the 12-month period after filing. To improve You and Zhang research, Yen-Jung (2012) adds one more new measurement of readability and tests the speed of price adjustment for a 3-day filing window. In detail, he studies the relationship between the complexity of annual reports and underreaction by using the mandatory quarterly reports (10-Q) of the US firms in the period from 2001 to 2007 and focuses on the speed of price adjustment for a 3-day filing window. Yen-Jung uses the length of reports and Fog Index for measuring the complexity of 10-Q. Finally, Yen-Jung reports that the more complex quarterly reports are, the fewer market responses during the 3-day filling window. He also realizes that the negative impact of the complexity of annual reports on market reaction can be reduced if firms have more analysts and institutional ownership who are competent in understanding the complex reports. Miller (2010) and Lawrence (2013) also record that small investors prefer trading stocks of firms which provide more readable reports.

On the other hand, there is some research building the relationships between the readability of annual reports and behaviors of analysts such as Leavy et al (2011), or Hsieh et al (2016). They report that there is an inverse relationship between readability of 10-K and analyst reports. Leavy et al (2011) find that less readable annual reports are associated with greater dispersion, lower accuracy and greater overall uncertainty in analyst earnings forecasts. They also recognize that investors require more analyst services when firms issue difficult-to-read reports. Hsieh et al (2016) record the negative relationship between the volatility of stock prices and analyst readability. Like Leavy et al (2011), De Franco et al (2015) conclude that analysts, even experienced analysts, spend more time to issue analyst reports for complicated annual reports and the readability of analyst reports also affects the trading volume of stocks. However, the more experienced analysts are, the less complicated analyst reports will be. Not only affecting behaviors of analysts, Rennekamp (2011) realizes the significant indirect effect of readability of disclosure on credibility perception of management.

Regardless of the negative effects on both users and the stock market, almost all research presents the dramatic increase in complexity of annual reports or the significant decrease in readability. Interestingly, to reduce the adverse impacts of the complexity of annual reports on users, firms increase

the number of voluntary disclosure. Wayne et al (2016) present that firms issue more voluntary disclosures when they increase the financial statement complexity and have more outside monitors. Users increase searching when the complexity of annual reports increases. Joshua et al (2017) record the increase in internet searching during the filing date for less readable 10-K reports. SEC provides guidelines for firms to disclose the information such as suggesting using plain English or writing styles. According to Cheung et al (2016), Australia chooses to adopt IFRS with the hope of increasing the readability of annual report. Consequently, IFRS declines the Fog Index of annual reports from 17.87 before IFRS adoption to 17.47 after such adoption. However, annual reports are still assessed as difficult-to read.

Most of the above research just focuses on the US firms or 10-K or 10-Q reports. The number of research using broad empirical evidence outside of the US firms is limited. To our knowledge, Lundholm et al (2014) are the pioneers in studying the readability of annual reports of foreign firms in the US stock exchange. They concentrate on the readability of MD&A in 20-F and make the comparison with the readability of this part in 10-K. They report that foreign firms provide more numbers and more readable text in the MD&A part than US firms do. In 2015, Lang et al collect more annual reports in English from 42 countries around the world. They conclude that the complexity, as well as the comparability of annual reports, increases over time especially in countries adopting IFRS or US-GAAP. As opposed to Lundholm (2014), our research studies the complexity of the whole annual reports issued by foreign firms in 45 countries listed on the US stock exchange. We also focus on reports called 20-F which must follow the standardized presentation rather than annual reports based on different formats like Lang et al (2015) with the hope of providing a complete view on the readability of annual reports over time and cross-sections.

3. Theoretical Framework

3.1. Definition of Readability

Readability is a concept used in various sectors such as linguistic, healthcare and law; however, there is no sole and precise definition of readability. Some authors use the style of writing, coherence, and organization of reports to identify the readability (Klare (1963) in Loughran and McDonald (2014^a)). Some authors mention the target readers of reports to decide the writing style and vocabulary. Others suppose that readability requires a mixture of different elements from writing styles to vocabulary and authors (Dubay, 2007 mentioned in Loughran and McDonald (2014^a)). We highly appreciate the definition of Loughran and McDonald (2014^a) since it focuses on the business context which has the identified users with acceptable knowledge about business. They define “readability as the ability of individual investors and analysts to assimilate valuation-relevant information from a financial disclosure”. SEC also addresses the vital role of readability to users and the stock market. Since 1998, SEC required issuers to adhere to plain English in the communication with users as shown in Rule 421 in SEC’s Plain English with the hope of improving the readability of reports. SEC continued to expand the Rules about plain English in 2006 and then widened the scope of application to mutual funds and

analysts in 2009 and 2010. In 2013, AICPA (American Institute of Certified Public Accountants) established the Center for Plain English Accounting for aiming the auditors and practitioners to fluently use plain English in communication.

3.2. Measurement of Readability

There are several ways to measure the readability of annual reports; however, no measurement has been assessed as the perfect way. In the following, we present two most common measurements of readability used in prior research.

3.2.1 Length of Reports

The length of reports is identified by the number of words in the reports. It supposes that the longer reports are, the lower readability is due to containing more information and more detailed, so investors take more time and costs for processing. This measurement is one of the easiest to identify since there are several ways to get the results. The simplest way is using Microsoft Office software, the alternative is using a text manipulation programming language like Perl. One of the previous research uses the package *Lingua::EN::Fathom* of Perl to identify how many words are in the reports because it focuses only on the text of reports, excluding tables, figures which the Microsoft Office counts. Additionally, the Perl package can easily be applied to large sample sets as opposed to Microsoft Office. Despite its simplicity, this measurement is strongly criticized that it excessively concentrates into the constructs rather than readability. Currently, regulations and business environments become so complicated that it is difficult to present in the short reports. Otherwise, short reports could lead to misleading information or lack of transparency which users are not willing to accept. According to Cheung et al (2016), IFRS makes annual reports of Australian firms to be longer but easier-to-read. It is obvious that the length of the document does not entirely mean readability.

3.2.2 Fog Index

Fog Index, firstly introduced by Robert Gunning in 1952, has been used more popular in different research relating to readability. Likewise, previous research shows that Fog Index is the most in-used measurement. To our knowledge, most of the previous research shows that Fog Index is considered as the main proxy for measuring readability or comparing if using different readability measurements. The index is based on the numbers of education years that readers need to understand the texts. It contains two components: the number of words per sentence and the percentage of complex words in a document, as follows:

$$\text{Fog Index} = 0.4 * (\text{words_per_sentence} + \text{percentage_complex_words}).$$

From the formula, complex words mean multi-syllable words or pronunciation with two more syllables. Fog Index is classified into 5 levels: Fog Index is more than 18 classified as unreadability, in between 14 to 18 meant difficult-to-read, from 12 to 14 sorted as ideal for reading, from 10 to 12 considered as acceptable readability, and 8 to 10 arranged as childish.

So far, Fog Index is assessed as the best way to identify the readability of reports since it starts focusing on the writing styles of reports rather than simply the length of reports. Moreover, with the support of packages of Perl, it is easy to calculate Fog Index for large samples in an automatic manner. Most importantly, Fog Index is considered as the objective measurement since it does not suffer the subjective opinions from readers. Additionally, Fog Index is widely used in research relating to readability, therefore its accuracy and validity were tested and accepted by a wide range of users.

However, Fog Index also receives a lot of criticism from researchers. Loughran and McDonald (2014^a) criticize that Fog Index is not precise in the business context since the second component of Fog Index performs poorly. For Fog Index, each word pronouncing with two more syllables is considered as the complex word. In the business context, the usage of multi-syllable words which leads to high Fog Index is very popular, and those multi-syllable words are normally easy to understand to investors. Therefore, they complain that high Fog Index sometimes does not mean difficult-to-read in the business context. In addition, some empirical research shows that Fog Index is not the good variable in explaining the relationships. For example, Lehavy et al (2011) build the relationship between readability and analyst dispersion or Loughran and McDonald (2014^a) find that Fog Index does not have predictive power in explaining the unexpected earnings and analyst dispersion.

3.2.3 Other Measurements of Readability

File size. Loughran and McDonald (2014^a) supposed to use *File size* rather than the length of the document. They argue that *File size* is easier to identify and strongly correlated with other measurements of readability and offers fewer measurement errors. However, in our opinion, file size does not mean readability and is similar to the length of the document since the longer document means larger file size. Moreover, the development of technology such as images or HTML or PDF format leads to the dramatic increases in file size, which does not mean the decreases in the level of readability.

Flesh-Kincaid and Flesh Reading Ease. Flesh-Kincaid and Flesh Reading Ease are based on two similar components of Fog Index: word per sentences and syllable per word, however, they use different formulas to calculate:

$$\text{Flesh-Kincaid} = (11.8 \times \text{syllables per word}) + (0.39 \times \text{words per sentence}) - 15.59$$

$$\text{Flesh Reading Ease} = 206.8 - (1.015 \times \text{words per sentences}) - (84.6 \times \text{syllables per word})$$

Those measurements are used in research of Franco et al (2015) and Wayne et al (2016); however, they modified the formulas in different ways by connecting with Fog Index.

Plain English and Bog Index. Since Fog Index receives criticism and SEC also highly recommends using plain English in communication with users. Some researchers suggest using plain English to measure the readability of annual reports rather than Fog Index. The pioneer of this suggestion is Miller in 2010. He used StyleWriter-Plain English Editor software which is based on plain English to measure the readability of annual reports. Loughran and McDonald in 2014^b introduced

another measurement relying on plain English called LM PE index. LM PE index is measured by sentence length, word length, passive voice, legalese, subtract personal pronouns and other items. Equally, this measurement is personally assessed as the better method than Fog Index since it is based on business regulations. The drawback of LM PE Index is time-consuming. More currently, Samuel et al (2017) introduced Bog Index which also relies on plain English but is more easily and quickly identified, as follows.

$$\text{Bog Index} = \text{Sentence Bog} + \text{Word Bog} - \text{Pep}$$

In the definition of Bog Index: Sentence Bog means sentence length; Word Bog is calculated by (plain English + word difficulty) x 250 / the numbers of words; Pep means writing attributes. Fortunately, Bog Index is easily acquired by using the StyleWriter Professional software. Due to time constraint, this research will not mention the results of Bog Index. However, we highly appreciate this new measurement for readability of annual reports since Bog Index provides a complete view about the readability of reports, and it combines different components into one measurement from word usage to writing styles especially emphasizing the plain English, as highly recommended by SEC.

In this research, we focus on the widest measurements in research relating to the readability of annual reports, which are *Fog Index* and *Length of Reports*.

4. Sample Selection

This research focuses on foreign firms listed on the US stock exchange, normally called as “foreign private issuers” having less than 50% on the shares traded on the US stock exchange. As the requirement of SEC, those firms must annually fill the 20-F form which provides standardized financial and non-financial information to users for evaluating and making decisions. We use Python to download all 20-F filings of foreign firms in 10 years from 2004 to 2013 from the website of SEC, called EDGAR, and get 7,588 filings of 1,475 firms in 10 years. Since those are foreign firms, they have different fiscal years, therefore we choose only firms as well as their annual filings with fiscal year on December 31st. We also remove all firms in Finance and Insurance from our sample. Finally, we collect the sample with 5,014 observations shown in Table 1. The number of observations over 10 years from 2004 to 2013 is reported in Appendix 1. Overall, the number of observations fluctuates from 446 in 2013 to 616 in 2004 for a period of 10 years. Each year, the number of observations occupies around 10% of total observations in the sample.

SEC sorts listed foreign firms into 9 industrial sectors based on their business operating activities: (1) agriculture, forestry, fishing; (2) Mining; (3) Construction; (4) Manufacturing; (5) Transportation, communication, electric, gas and sanitary services; (6) Wholesale Trade; (7) Retail Trade; (8) Finance and Insurance; and (9) Services. As mentioned above, we remove all firms in Finance and Insurance from our sample. We use SEC’s classification to sort our filings into 8 industrial sectors. The distribution of filings in 8 industrial sectors is mentioned in Table 1. Approximately 63% of filings (3144 observations over 5014) operate in Manufacturing, and group of Transportation, communication,

TABLE 1. SAMPLE SELECTION

Total of observations collected from EDGAR	7,588
Number of firms	1,475
Number of firms have fiscal year on December 31 st	966
Number of observations selected	5,014
<i>In which:</i>	
Agriculture, Forestry, Fishing	17
Mining	850
Construction	29
Manufacturing	1,828
Transportation, communication, electric, Gas and Sanitary Services	1,316
Wholesale Trade	100
Retail Trade	74
Services	800

electric, gas and sanitary services. The number of observations in mining and services occupies 33%. The number of filings in other industrial sectors is at 4%.

To identify the readability of 20-F, we use the two most popular measurements which are Fog Index and length of reports. It is necessary to clean the raw text files downloaded from EDGAR before measuring the readability of annual reports. To do so, we use packages of Perl and follow the guidelines of Li (2008), Loughran and McDonald (2014^a; 2014^b) and Bonsall et al (2017) to acquiring the cleaning text of 20-F. Details of cleaning the 20-F are presented in Appendix 2. To acquire the Fog Index and the number of words of each 20-F, we use package `Lingua::EN::Fathom` of Perl and other packages such as `File::Slurp`; `Excel::Writer::XLSX`; `File::Basename` for calculation.

Li (2008) proved the validity of the program in measuring the readability of annual reports. The package `Lingua::EN::Fathom` allows for calculating the number of words, the number of characters, the percentage of complex words, number of sentences, number of text lines, number of paragraphs, syllables per words, words per sentence, Fog Index, Flesh Index and Flesh Kincaid Index. This research, however, focuses on Fog Index and the number of words only. Other Perl packages provide the Excel file for statistical analysis.

5. Findings and Discussion

5.1. Descriptive Analysis

Table 2 shows the mean of Fog Index over 10 years from 2004 to 2013 at 19.77. It means that readers need more than 19 years of education for understanding annual reports issued by foreign firms in the US stock exchange. 20-F filings are concluded as the so difficult-to-read for users. This result is

the coincidence with the results mentioned by Lang et al (2015). They show the average Fog Index of annual reports in English in 42 countries over the world at 19.52 during 14 years from 1998 to 2011. Lundholm et al (2014) record the average Fog index of MD&A part in 20-F is 17.54 in the period 2000-2012. However, Li (2008) shows that the readability of MD&A part is extremely easier to read than the whole of filings. In comparison with the readability of 10-K, Fog Index of 20-F is not significantly different. Li (2008) reports the Fog Index of 10-K in the period from 1993 to 2003 at 19.4, or Leavy et al (2011) record the average Fog Index of 10-K in 10 years from 1995 to 2006 at 19.52, or Bonsall et al (2017) showed that the Fog Index of 10-K in the period between 1994 to 2011 is 19.60. More interestingly, the average number of words of 20-F is 66,063 which is double the 10-K as mentioned around 37,000 words in previous research, however, Fog Index is not so substantially different between 10-K and 20-F.

TABLE 2. OVERALL THE READABILITY OF 20-F OVER 10 YEARS FROM 2004 TO 2013

	N	Mean	Std.Dev	Q1	Median	Q3
Number of words	5,014	66,063	31,201	45,596	62,539	81,737
Words per sentence	5,014	24.08	5.19	20.70	23.06	26.37
Percentage of complex words	5,014	25.34	1.24	24.62	25.36	26.12
Fog Index	5,014	19.77	2.11	18.39	19.42	20.69

As shown in Panel A of Table 3, there is a dramatic increase in Fog Index over time due to the increase in the complexity of regulations and the business environment. Fog index is recorded at 18.9 in 2004, significantly increasing in the next 5 years to the peak at 20.45 in 2009 where remains in one year later. However, Fog Index slightly decreases in the last 3 years from 2011 to 2013, the approval of IASB for Conceptual Framework for Financial Reporting in 2010 could be the reason for this decrease. The last 3 years witness the approximate stability in Fog Index at around 19.8. Despite the decline in Fog Index, 20-F is still concluded as the difficult-to-understand.

Conversely, the number of words in 20-F increases substantially during the 10-year period from 2004 to 2013, especially after 2010, which is displayed in Panel B of Table 3. The number of words rises from 57,127 in 2004 to 69,518 in 2010 and reaches to 77,881 in 2013. Obviously, the last three years from 2010 to 2013 witnessed the decrease in Fog Index but the increase in the number of words. Foreign firms perhaps write longer reports but shorter sentences since the average words per sentences reduce from 25.74 in 2010 to 24.23 in 2013 (referred to Appendix 3). The drop in the number of words per sentence causes the decline in Fog Index or improving the readability of 20-F. Most noticeably, the percentage of complex words remains stable over 10 years at 25%, since they are standardized financial reports which use similar professional words in accounting.

TABLE 3. READABILITY OF 20-F BY FISCAL YEARS

PANEL A: NUMBER OF WORDS OVER 10 YEARS

Year	N	Mean	Std Dev	Q1	Median	Q3
2004	616	57,127	30,830	38,128	50,677	69,293
2005	574	58,661	29,029	40,585	54,147	70,914
2006	543	60,482	29,005	41,921	55,914	74,950
2007	503	62,744	28,619	43,972	58,841	77,940
2008	478	66,701	29,104	48,825	63,416	79,976
2009	462	67,058	30,104	48,639	64,618	82,025
2010	476	69,518	30,391	50,900	66,590	83,765
2011	464	72,553	31,404	53,230	71,455	86,942
2012	452	74,338	33,241	53,874	71,881	89,764
2013	446	77,881	33,775	56,247	75,609	94,175

PANEL B: FOG INDEX OVER 10 YEARS

Year	N	Mean	Std Dev	Q1	Median	Q3
2004	616	18.90	1.86	17.69	18.56	19.75
2005	574	19.19	1.96	17.94	18.86	19.98
2006	543	19.42	1.92	18.17	19.11	20.08
2007	503	19.97	2.40	18.53	19.49	20.71
2008	478	20.01	2.05	18.63	19.57	21.06
2009	462	20.45	2.23	18.96	20.16	21.64
2010	476	20.45	2.17	18.99	20.10	21.6
2011	464	20.05	2.23	18.67	19.62	20.94
2012	452	19.87	1.86	18.63	19.61	20.65
2013	446	19.83	1.76	18.66	19.60	20.74

FIGURE 1. PEARSON CORRELATION

	Number of words	Fog Index
Number of words	1	
Fog Index	-0.1077***	1

Note: *** denote 1% significance level.

Based on the classification of SEC, we sort observations in our sample into 8 industrial sectors as mentioned above. The readability of 8 industrial sectors is presented in Table 4. As seen from statistical results, Mining, Wholesales and Services provide the most difficult-to-read annual reports at around 20 for Fog Index, however, the length of 20-F of those industrial sectors are the shortest at around 57,000 words in comparison with others. Lehavy et al (2011) and Joshua et al (2017) also report mining and trading sector issuing the most complicated reports. On the contrary, Construction, and the group of Transportation, communication, electric, gas and sanitary services annually issue the least complicated but the longest reports with more than 78,000 words.

From the descriptive analysis, the increase in Fog Index is accompanied by the decrease in the number of words. Figure 1 shows that the Pearson correlation between Fog Index and a number of words is significantly negative at the 0.01 levels. Cheung and Lau (2016) also record a similar result with us relating to the negative correlation between Fog Index and a number of words. They conclude that IFRS makes Australian annual reports become longer but have lower Fog Index. Lundholm et al (2014) compared foreign firms and US firms in readability of MD&A. They also present that MD&A of foreign firms are significantly longer, but have lower Fog Index as compared to US firms. This result could be explained by changes in writing styles. Those reports with lower Fog Index but the higher number of words are possible to use single sentences rather than complex sentences, and as a result, the number of sentences increases but the average word per sentences decreases. This writing style leads to easily understanding reports for readers, displayed by the lower Fog Index. Such writing style also complies with Rule 421(d) on plain English promulgated by SEC.

TABLE 4. READABILITY BY INDUSTRIAL SECTORS

PANEL A: LENGTH OF 20-F OVER INDUSTRIAL SECTORS

	N	Mean	Std Dev	Q1	Median	Q3
<i>Agriculture, Forestry, Fishing</i>	17	63,667	37,534	32,153	52,727	90,042
<i>Mining</i>	850	55,016	34,895	30,439	44,656	70,615
<i>Construction</i>	29	87,450	24,525	71,320	81,245	106,233
<i>Manufacturing</i>	1,828	65,874	27,292	49,731	62,918	77,133
<i>Transportation, communication, electric, Gas and Sanitary Services</i>	1,316	78,115	33,670	57,293	73,376	99,848
<i>Wholesale Trade</i>	100	57,394	24,189	41,018	57,523	73,642
<i>Retail Trade</i>	74	77,086	26,817	64,801	71,658	88,204
<i>Services</i>	800	57,758	24,135	41,716	54,980	75,005

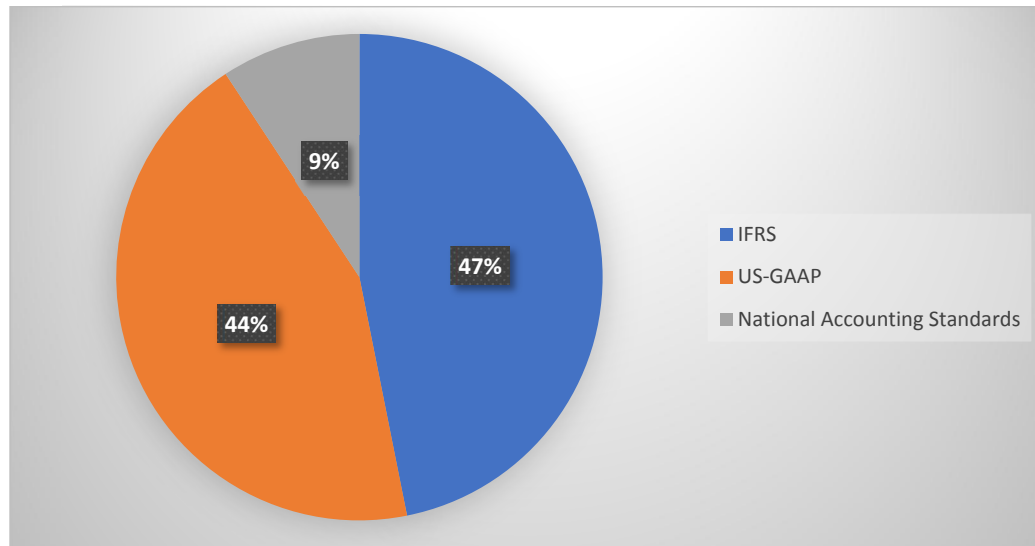
PANEL B: FOG INDEX OF 20-F OVER INDUSTRIAL SECTORS

	N	Mean	Std Dev	Q1	Median	Q3
<i>Agriculture, Forestry, Fishing</i>	17	19.57	3.04	17.46	18.54	20.12
<i>Mining</i>	850	20.07	2.19	18.52	19.66	21.22
<i>Construction</i>	29	19.24	1.63	17.99	18.65	21.22
<i>Manufacturing</i>	1,828	19.67	2.11	18.32	19.28	20.62
<i>Transportation, communication, electric, Gas and Sanitary Services</i>	1,316	19.54	1.97	18.23	19.36	20.4
<i>Wholesale Trade</i>	100	20.27	2.60	18.48	19.92	21.44
<i>Retail Trade</i>	74	19.52	2.03	18.33	19.26	20.22
<i>Services</i>	800	20.04	2.08	18.67	19.58	20.89

5.2. Readability of Accounting Standards Systems

As the requirement of SEC, foreign firms listed in the US stock market can choose to adopt International Financial Reporting Standards (IFRS), or United State General Accounting Accepted Principle (US-GAAP) or national financial accounting standards, provided that the firms must declare which accounting standards systems are adopted for preparing 20-F. As firms' declaration, we sort them into 3 groups: IFRS, US-GAAP or national accounting standards. The number of observations sorted into 3 different accounting standards systems is mentioned in Figure 2.

FIGURE 2: FILINGS FOLLOWING DIFFERENT ACCOUNTING STANDARDS SYSTEMS



More than 90% observations adopt IFRS or US-GAAP for filings, the number of filings following IFRS is slightly larger than that of filings using US-GAAP, 2349 versus 2201. Such adoption is expected to improve the comparability in reporting between foreign firms and the US firms. The readability of annual reports following different accounting standards systems is mentioned in Table 5.

As shown in Table 5, firms following US-GAAP provide the most complicated reports at 19.84 of Fog Index as compared to 19.71 of Fog Index of 20-F issued by firms adopted IFRS. However, 20-F reports prepared under IFRS are longer but have lower Fog Index than reports followed US-GAAP. Readability of annual reports adhered to national accounting standards has Fog Index in the middle of US-GAAP and IFRS. Most importantly, Tukey test and ANOVA test in Panel A of Figure 2 show that the differences in Fog Index among 3 groups are not significantly statistical even at 10% level except the difference between group IFRS and US-GAAP which is significant at 10%. The convergence of IFRS, US-GAAP and national accounting standards is supposed to explain this result. However, the difference in the length of 20-F among IFRS, US-GAAP, and national accounting standards systems is significant at 0.01 level. Overall, foreign firms using the same format of annual reports identified 20-F issue reports with significantly different length but insignificantly diverse of Fog Index or level of readability.

TABLE 5. READABILITY OF 20-F UNDER IFRS, US-GAAP AND NATIONAL ACCOUNTING STANDARDS

	IFRS	US-GAAP	National Accounting standards
<i>Number of words</i>	75,984	58,634	51,074
<i>Fog Index</i>	19.71	19.84	19.76

TABLE 6. TUKEY TEST AND ANOVA TEST AMONG IFRS, US-GAAP, NATIONAL ACCOUNTING STANDARDS

PANEL A: TUKEY TEST AND ANOVA FOR FOG INDEX AMONG 3 ACCOUNTING STANDARDS SYSTEMS

	Difference	Lower	Upper	p-value
<i>US-GAAP vs IFRS</i>	0.134	-0.012	0.28	0.08*
<i>National Accounting systems vs IFRS</i>	0.054	-0.197	0.31	0.86
<i>National Accounting systems vs US-GAAP</i>	-0.079	-0.332	0.17	0.74
<i>P-value for differences among 3 groups</i>	0.101			

PANEL B: TUKEY TEST AND ANOVA FOR NUMBER OF WORDS AMONG 3 ACCOUNTING STANDARDS SYSTEMS

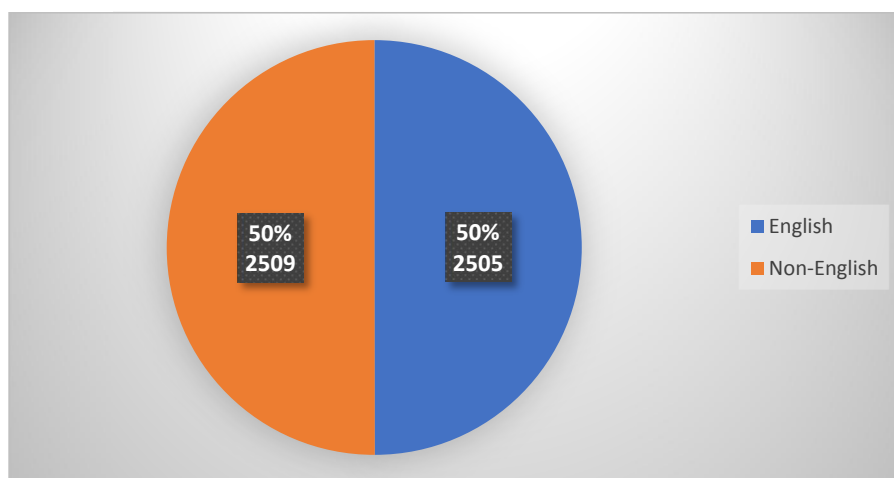
	Difference	Lower	Upper	p-value
<i>US-GAAP vs IFRS</i>	-17,345	-19,416	-15,283	0.0e+00***
<i>National Accounting systems vs IFRS</i>	-24,910	-28,449	-21,371	0.0e+00***
<i>National Accounting systems vs US-GAAP</i>	-7,561	-11,119	-4,003	1.9e-06***
<i>P-value for different among 3 groups</i>	<2e-16 ***			

Note: ***, **, and * denote 1%, 5% and 10% significance levels, respectively.

5.3. An Important Role of Native Language in Providing the Annual Reports.

According to Lundholm et al (2014), the important role of English in deciding the readability of annual reports is not evident since they found that annual reports of foreign firms in English speaking countries provide shorter MD&A section at higher Fog Index than firms in non-English speaking countries, but foreign firms in English speaking countries provides easier-to-read MD&A than US firms. Based on the declaration of firms in 20-F, we identify the executive locations of foreign firms. According to Lundholm et al (2014), we divide the observations into two groups: filings of firms located in countries whose native language is English and filings of firms located in countries not speaking English. Figure 3 shows that the number of filings issued by firms located in English speaking countries is approximately equal with its filings submitted by firms cited in non-speaking English countries.

FIGURE 3: 20-F FILINGS ISSUED BY FIRMS LOCATED IN ENGLISH SPEAKING COUNTRIES AND NON-SPEAKING ENGLISH COUNTRIES



As shown in Table 7, firms located in countries speaking English provide shorter but higher Fog Index (i.e., more difficult-to-read) reports than those of firms in non-English speaking countries, i.e., 53,477 versus 78,629 and 20.25 versus 19.29. Unlikely with differences among 3 accounting standards systems, the differences in a number of words and in Fog Index between those 2 groups are statistically significant at 1% level as shown in the t-test and Wilcoxon test in Table 7. This result is similar to findings of Lundholm et al (2014) who show that MD&A of foreign firms in non-speaking English countries has significantly lower Fog Index than its foreign firms located in English speaking countries. As concluded, firms in countries speaking English, thanks to native language advantage, are able to shorten annual reports by increasing the length of sentences (22.89 words per sentence of non-English group versus 25.28 words per sentence of English group), however, such shorter reports lead to the increase in Fog Index or readability of annual reports. In other words, language plays a key role in deciding the length of reports and the readability of annual reports.

TABLE 7. READABILITY OF ANNUAL REPORTS ISSUED BY FIRMS IN ENGLISH SPEAKING COUNTRIES AND NON-SPEAKING ENGLISH COUNTRIES

PANEL A: WILCOXON AND T-TEST FOR FOG INDEX OF ANNUAL REPORTS IN ENGLISH SPEAKING COUNTRIES AND NON-ENGLISH SPEAKING COUNTRIES

	<i>English</i>	<i>Non-English</i>
<i>Fog Index</i>	20.25	19.29
<i>Difference</i>	-0.29	
<i>p-value of Wilcoxon</i>	<2.2e-16***	
<i>t-value</i>	-16.55	
<i>p-value of t-value</i>	<2.2e-16***	

PANEL B: WILCOXON AND T-TEST FOR NUMBER OF WORDS BETWEEN ENGLISH AND NON-ENGLISH GROUPS

	<i>English</i>	<i>Non-English</i>
<i>Number of words</i>	53,477	78,629
<i>Difference</i>	25,152	
<i>p-value of Wilcoxon</i>	<2.2e-16***	
<i>t-value</i>	31.19	
<i>p-value of t-value</i>	<2.2e-16***	

Note: ***, **, and * denote 1%, 5% and 10% significance levels, respectively

6. Conclusion

Undeniably, the crucial role of accounting information in making decisions of investors and the efficiency of the stock market leads to the increase in concerns about the readability of annual reports in some recent years. Noticeably, most of the research concentrates on the US firms. Our research along with other related research provide complete views about the readability of all annual reports, not just of 10-K or 10-Q. In response, we find that 10-K and 20-F are still difficult-to-read for users. It requires users to have good background and experience when reading firms' annual reports. Even SEC and IASB have requirements to improve the readability of annual reports, however, those reports are still so complicated with high Fog Index and numerous words to understand due to the complex business environment and requirements for preventing information asymmetry. Foreign firms located in other countries rather than the US with the different legal environment and different accounting systems mitigate the negative impacts of annual reports on the US investor by issuing extremely longer reports as compared to those of US firms. This perhaps helps to improve the readability of annual reports; therefore, the Fog Index of 20-F is just slightly higher than 10-K. Interestingly, regardless of dramatic differences in the length of reports issued by firms following different accounting standards systems: IFRS, US-GAAP or national accounting standards, the differences in readability of annual reports are insignificant. Meanwhile, native language is an important determinant of readability. Firms in English speaking countries with linguistic advantage issue shorter but higher Fog Index reports in comparison with reports of firms in other countries. Most importantly, firms try to reduce the Fog Index of annual reports by writing longer reports but using shorter sentences. However, the annual reports of foreign firms are still considered as complicated for understanding.

Despite identifying the readability of annual reports issued by foreign firms, our research has some limitations and need further in-depth studies in the future. In terms of measurement, this research uses two most popular measurements: Fog Index and the length of documents, however, using plain English such as Bog Index or LM PE index should be added since this is the new tendency and receives the higher appreciation of SEC. Secondly, this research uses the indirect comparison with 10-K via prior research. It will be more valuable if using the direct comparison with annual reports of US firms. Finally, it is necessary to do further research about the relationship between the readability of 20-F and other variables such as stock reactions or analysts' perceptions or management's behaviors.

APPENDIX 1: THE NUMBER OF OBSERVATIONS OVER 10 YEARS FROM 2004 TO 2013

<i>Year</i>	<i>Number of observations</i>	<i>Percentage</i>
2004	616	0.123
2005	574	0.114
2006	543	0.108
2007	503	0.100
2008	478	0.095
2009	462	0.092
2010	476	0.095
2011	464	0.093
2012	452	0.090
2013	446	0.089

APPENDIX 2: CLEANING THE RAW TEXT FILES OF 20-F

To clean the raw text files downloaded from EDGAR, we follow the instructions mentioned by Li (2008), Loughran and McDonald (2014^a; 2014^b) and Bonsall et al (2017). We use packages `File::Slurp`; `HTML::format text`; `HTML::TreeBuilder`; `HTML::Entities`; `Text::Unidecode` to clean the raw 20-F files:

1. Removing format design in the raw files.
2. Removing all content between `<XBRL>` and `</XBRL>` tags.
3. Removing all tables with more than 15% numeric characters.
4. Removing all markup tags
5. Removing other textual expressions such as newline characters, the token or underscore characters...

APPENDIX 3: AVERAGE WORDS PER SENTENCE AND PERCENTAGE OF COMPLEX WORDS BY FISCAL YEAR

<i>Year</i>	<i>Average words per sentence</i>	<i>Percentage of complex words</i>
2004	22.04	25.21
2005	22.72	25.25
2006	23.25	25.29
2007	24.63	25.28
2008	24.55	25.46
2009	25.69	25.44
2010	25.74	25.39
2011	24.72	25.41
2012	24.29	25.38
2013	24.23	25.36

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