



Understanding the Turbulence of Business Environment in Telecom Industry: Empirical Evidence from Indonesia

Memahami Turbulensi Lingkungan Bisnis pada Industri Telekomunikasi: Bukti Empirik dari Indonesia

Muhammad Imam Nashiruddin¹

¹Postgraduate Program in Management, University of Prof. Dr. Moestopo (Beragama)

¹Jalan Hang Lekir I/8 Jakarta, Indonesia

¹Email : imam.nashiruddin@dsn.moestopo.ac.id

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ABSTRAK

Tujuan dari penelitian ini adalah untuk mendapatkan gambaran bagaimana turbulensi lingkungan bisnis yang terjadi pada industri telekomunikasi. Penelitian melibatkan pimpinan unit bisnis penyelenggara telekomunikasi di Indonesia sebagai responden penelitian. Metode penelitian yang digunakan adalah metode descriptive survey dan explanatory survey menggunakan pemodelan struktural berbasis komponen yaitu Partial Least Square-Path Modelling (PLS-PM). Hasil penelitian menunjukkan bahwa industri penyelenggaraan telekomunikasi di Indonesia mengalami gejala turbulensi lingkungan bisnis yang tinggi, disebabkan terutama oleh turbulensi lingkungan kompetisi. Meskipun demikian, ditemukan bahwa sesungguhnya turbulensi lingkungan teknologi dan turbulensi lingkungan pasar yang berkontribusi paling dominan terhadap terjadinya turbulensi lingkungan bisnis pada industri telekomunikasi. Dalam penelitian ini juga dibahas pemecahan masalah turbulensi lingkungan bisnis tersebut dan rekomendasinya bagi keberlangsungan industri telekomunikasi di Indonesia.

ABSTRACT

The purpose of this study is to understand how the turbulence of business environment occurs in the telecommunications industry. The study involved leaders of business units of telecommunications operators in Indonesia as research respondents. The research methods used are descriptive survey and explanatory survey using component-based structural modeling, Partial Least Square-Path Modeling (PLS-PM). The results of the study showed that the telecommunications industry in Indonesia has experienced high turbulence of business environment, caused mainly by competitive turbulence. However, it was found that the technological turbulence and the market turbulence have contributed the most dominant to the occurrence of turbulence business environment in telecommunication industry. This study also discussed the problem solving of the business environment turbulence and recommendations for the sustainability of the telecommunications industry in Indonesia.

1. Introduction

Current business environment is marked with increased competition intensity and rapid changes to market and customers' expectations (Altschuller, Gelb, & Henry, 2010), even faster than previous times (Hosseini & Sheikhi, 2012). Rapid technology development, changing preference of customers, emergence of new products with short product cycle and the hypercompetition have increased speed in changes and uncertainties as well as more difficult and unpredictable future which cause turbulence of the business environment. Such environmental situation can damage the value of existing competencies and competitiveness (D'Aveni, Dagnino, & Smith, 2010).

One of industries which is widely known experiencing environmental turbulence is telecommunication industry, marked with rapid and intermittent changes in the areas of (i) technology, (ii) demand/market, (iii) competition, and (iv) regulation, therefore, it is commonly called high velocity industry (Eisenhardt, 1989). The characteristics of the high velocity are not only seen in developed countries producing high technology, but also globally, including Indonesia (Kartajaya, Yuswohadi, & Madyani, 2004), as shown in Figure 1 below.

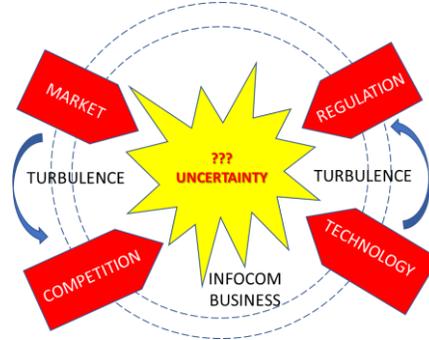


Figure 1. Turbulence of Business Environment in Indonesia Telecommunication Industry (Kartajaya et al., 2004)

Technology turbulence in the telecommunications business in Indonesia occurs because it is triggered by an increase in the trend of digital convergence which is characterized by the unification of data processing technology (computing), content technology and digital multimedia and telecommunications technology (Kartajaya et al., 2004). At present, technological turbulence is increasing sharply with increasingly rapid technological changes, especially internet technology combined with wireless technology (Latzer, 2009), which has led to the emergence of various disruptive technologies that disrupt, bypass or even replace old telecommunications technology and incumbent companies such as Email, Wifi, Voice over IP, Mobile over IP, Skype, messaging (like GTalk, WhatsApp, BBM, Line), social media (such as Facebook, Twitter), over the top (like Android Market, iTunes) and so on.

The high dependency of the telecommunications industry on technology causes the phenomenon of turbulence when rapid technological changes occur and the changes are more difficult to predict. Figure 2 shows that there are still many more possibilities for technological changes in communication and information technology globally in the future (Panetta, 2018). It also potentially lead to the phenomenon of new technological turbulence in the telecommunications industry in Indonesia.

Whereas market turbulence in the telecommunications industry in Indonesia was triggered by the increase in the customer's bargaining position, due to the eviction of monopolies and the opening of markets (Kartajaya et al., 2004). At present, market turbulence is increasing with the development of technology that accelerates changes in customer preferences and needs (for example, from a fixed line mobile phone, from voice centric or SMS to data centric, the rise of smartphones compared to phone features, Tablet usage beats PC usage, shifting usage mobile broadband from fixed broadband) and a faster product cycle. The presence of disruptive innovation can also lead to market turbulence in the form of a change in the service model business.

Regulatory turbulence in the telecommunications industry in Indonesia occurs because it is triggered by the privatization of the telecommunications sector as a consequence of the ratification of the WTO which requires the opening of markets and changing the management paradigm of telecommunication authority from a monopolistic approach to a market-based approach (State Law No. 36/1999), and the establishment of an independent regulatory body to guarantee fair and healthy competition, namely the BRTI (Kartajaya et al., 2004). In fact, turbulence regulation is believed to be one of the dominant causes of turbulence in the telecommunications industry in Indonesia because it directly and radically impacts.

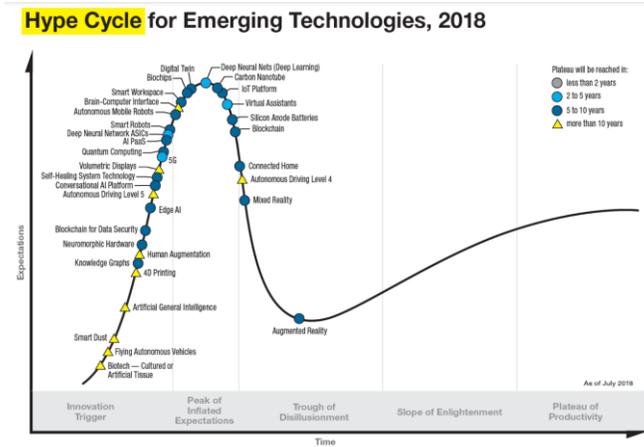


Figure 2. Hype Cycle of Emerging Technologies 2018

Turbulence Competition in the telecommunications industry in Indonesia is characterized by the phenomenon of hypercompetition as a result of the emergence of a large number of new players and sophisticated strategies, the emergence of latent competitors that are difficult to identify by incumbent operators and fearsome threats due to killer apps that have disruptive effects on this industry as a whole (Kartajaya et al., 2004). Today, the turbulence of competition is increasing sharply as more players in the industry. As an illustration, the implementation of cellular mobile networks in Indonesia which is a major contributor to the telecommunications industry in Indonesia has experienced very rapid growth and has made Indonesia the country with the largest number of cellular mobile network operators in the world.

Telecommunication industry receives significant attention from many researchers because the reality shows that information and communication technology have brought important changes in civilization development, mainly in the global economy. The research conducted in 120 countries between 1980-2006 revealed positive influence between improvement in penetration of various telecommunication services with economic growth of a country (Qiang & Rossotto, 2009).

However, environmental turbulence is an interesting topic and many researchers explore more of its strategic management, there are still many different concepts about environmental turbulence and how to measure it. This paper aims to understand how the turbulence business environment occurs in the telecommunications industry in Indonesia. The contributions of our work is results can be developed into strategic perspective for operator and government/regulator on how to deal with turbulence environment for telecom industry.

This paper is structured by 5 sections. The first Section is Introduction, the second is literature review, the third is method, Results and Discussion is presented in section 4, finally the conclusion will presented in Section 5.

2. Literature review

Environmental turbulence is generally defined by many researchers as situation of external environment that shows chaos (Emery & Trist, 1965), uncertainty (Auster & Choo, 1993) and irregularity (Calantone, Garcia, & Dröoge, 2003) which require monitoring to avoid it become threats to achieve organizational performance.

Increase of turbulence in business environment are due to the following things:

- a. Technology convergence which caused easy entrance of industry related with communication and information (Chakravarthy, 1997).

- b. Improvement of access to information and requirements for more effective information management (D’Aveni, 1996).
- c. Improvement of global competitors’ profile (D’Aveni, 1996).

Higher turbulence in the current business environment creates challenges to leaders to ensure their business units and its competitiveness generate revenue. It has never been happened in history, the rapid changes in business environment like what is happening today (Pun, 1990).

To describe environmental business turbulence, (Nuñez & Lynn, 2012) introduces a matrix developed from (Jaworsky & Kohli, 1993). This matrix classifies environmental business turbulence by dividing it into 4 quadrants, each quadrant identifies level of turbulence, as shown in Figure 3 below.

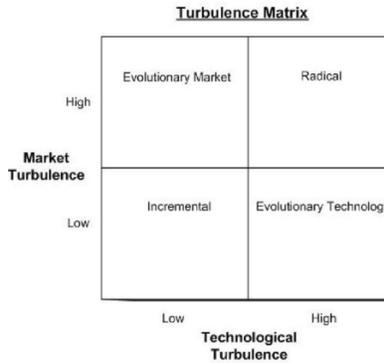


Figure 3. The Classification of Turbulence Business Environment (Nuñez & Lynn, 2012)

According to (Nuñez & Lynn, 2012), slow movement in changes of technology and market is categorized as Incremental Quadrant, output of this quadrant tends to stable like customers’ preference that rarely changed. Rapid market change but slow technological change is represented as Evolutionary Market Quadrant which means simple technological change but customers’ preference change quickly. Slow changes in market followed with rapid technological changes is categorized as Evolutionary Technology Quadrant. Rapid change in technology and market is categorized as Radical Quadrant which represents unpredictable environment.

Turbulence is also generally defined as high levels of changes periodically in key environmental variables (Glazer & Weiss, 1993). Turbulence is different with rapid change. Rapid change is predictable while turbulence is identical with uncertainty. Turbulence environment also defined as a dynamic, unpredictable, growing and fluctuative environment (Khandwalla & Mehta, 2004). While (Emery & Trist, 1965) describe environmental turbulence as an environment where someone cannot predict results of other people’s action.

(Mendelson & Pillai, 1998) define turbulence business environment as general condition of uncertainty and unpredictability and often result in high level of changes in customer’s preferences, technology development and market condition. Meanwhile, according to (Glazer & Weiss, 1993), the environmental turbulence is signed with (a) increased number of events dramatically, (b) change in basic knowledge, (c) high level of changes (both size or direction), (d) sudden cut-off in needs and growth level, and (e) increase in uncertainties and unpredictabilities about future.

Another researcher added similar opinion that change is no longer incremental, because changes happen nowadays are more radical, non-linear and often occur in big, fast and intermittent organizations (Cameron, Kim, & Whetten, 1987) referred to number of instabilities, uncertainties, and lack of controls of company in the market. The Indonesian Dictionary (Sugono et al., 2008) defines “turbulence” as “disturbed conditions due to changes that cannot be predicted and controlled “ or “irregular turbulent motion which is a characteristic of flowing substances”.

According to explanations above, there are special characters of turbulence identified namely: change, uncertainty, radical, and unpredictability. An environment that experience turbulence will be difficult to assess something before it occurs and this requires flexible organization to response to the turbulence immediately and appropriately to keep organizational competitiveness.

Considering various opinion shared on the above section and adjusting with current Indonesia telecommunication situation, then construct of environmental business turbulence of the study is defined as “dynamic of uncertainty of business environment, signed by high levels of changes, difficulty to predict and have huge impact”.

Therefore, based on the phenomenon and previous studies, hypothesis of this study are as follow:

$H_0 : \mu_0 \geq 3.41$ Turbulence business environment in Indonesia tecomunication industry is in high category

$H_1 : \mu_1 \leq 3.41$ environmental business turbulence in Indonesia telecommunication industry in not in high category

3. Method

3.1. Methodology

This study used management science approach, concentrating in strategic management which focusing on environmental business turbulence. It is a descriptive study which aim to obtain description of environmental business turbulence in Indonesia telecommunication industry.

Methodology used in the study were descriptive survey to obtain systematic and accurate description of facts and characteristics of specific subject, and explanatory survey to examine hypothesis to answer problems and study objectives.

3.2. Population and Sample

In this study, population were all business units which have license to operate as Indonesia telecommunication providers, there were 455 business units. Population and samples were drawn using the Slovin’s formula as follow:

$$n = \frac{N}{1+Ne^2} \dots\dots\dots (1)$$

where n is samples, N is population, e = critical value (percentage of tolerance due to sampling error)

Therefore, with population (N) =455 and critical value (e) = 5 percents, the required samples (n) were $455/(1+455x(0.05)) = 213$.

3.3. Measuring the Turbulence of Business Environment

In general, there are 2 common approaches frequently used by researcher to measure turbulence. First approach to measure environmental turbulence is from its characteristic, based on ideas (Emery & Trist, 1965) and developed further by (Dess & Beard, 1984) namely (1) dynamism (speed of change, uncertainty, unpredictability) (2) complexity, and (3) munificiency. Meanwhile, (Ansoff & McDonnel, 1990) added the novelty of change. Similar approach is shared by (Glazer & Weiss, 1993) namely (1) increased number of events dramatically, (2) change in basic knowledge, (3) high level of changes, (4) sudden cut-off in needs and growth level, (5) increase in uncertainties and unpredictabilities about future.

The second approach to measure environmental turbulence is from its type of turbulence, such as market turbulence and technological turbulence (Calantone et al., 2003; Jaworsky & Kohli, 1993; Liao, Welsch, & Stoica, 2008; Mysen, Svensson, & Payan, 2011; Pavlou & Sawy, 2011), competitive turbulence (Jaworsky & Kohli, 1993; Liao et al., 2008), and regulatory turbulence and supplier turbulence (Liao et al., 2008).

Considering characteristics of the industry selected for study focus – telecommunication industry – which have high level of turbulence (Eisenhardt, 1989) and marked with rapid changes in market, technology, regulatory, and high competitiveness level (Kartajaya et al., 2004), therefore, the chosen dimensions to measure turbulence business environment variable in this study are (1) market turbulence refers to (Anderson, 1985; Jaworsky & Kohli, 1993; Mysen et al., 2011; Nuñez & Lynn, 2012; Skarmeas, Katsikeas, Spyropoulou, & Salehi-Sangari, 2008), (2) technological turbulence refers to (Chen & Siau, 2012; Jaworsky & Kohli, 1993; Nuñez & Lynn, 2012), (3) regulatory turbulence refers to (Liao et al., 2008; Volberda & van Bruggen, 1997; Wijen & van Tulder, 2011) and (4) competitive turbulence refers to (Jaworsky & Kohli, 1993; Mysen et al., 2011) with indicators as shown in Table 1 below.

Table 1. Measuring the Turbulence of Business Environment

Dimensions	Indicators	References
Market Turbulence	The speed of change for customers' preferences over the time	(Anderson, 1985; Jaworsky & Kohli, 1993; Mysen et al., 2011; Nuñez & Lynn, 2012; Skarmeas et al., 2008)
	Frequency of customers to search for new products/services over the time	
	Frequency of customers to search for existing products/services over the time	
	The difference between existing and new customer's products/services requirement	
	The speed of change for marketing practice over the time	
Technological Turbulence	The speed of change for technology over the time	(Chen & Siau, 2012; Jaworsky & Kohli, 1993; Nuñez & Lynn, 2012)
	The difficulty to predict the technology change over the time	
	The opportunity of new products/services has been made possible through technological breakthroughs in our industry	
	Intensity of new product/services launch as result of technological breakthroughs	
Regulatory Turbulence	Difficulty to predict regulatory changes over the time	(Liao et al., 2008; Volberda & van Bruggen, 1997; Wijen & van Tulder, 2011)
	The intensity of regulatory changes over the time	
	Uncertainty of the law & regulations implementation	
Competitive Turbulence	The intensity of competition between operators	(Jaworsky & Kohli, 1993; Mysen et al., 2011)
	The intensity of price wars	
	Easiness of competitors to compete with the products offer	
	The intensity of the competitor's new movement	
	The strength of competitors	
	The intensity of new products available in the market	

Source : Literature Review

3.4. Testing the Validity of the Research Instruments

Validity testing is used to know to what extent questionnaire prepared is able to measure what needs to be measured. Test validity is intended to obtain information regarding degree of precision of measurement instrument -the questionnaire- to perform its measuring function. A measurement instrument with high validity will likely to have small errors variances, therefore, the data collected will be more valid.

The study used construct validity which determines validity by correlating score of each question item with total score of all study variables. Total score is total value obtained from addition of all items' score. Correlation between item score and total score should be statistically significant. If score of all items prepared based on dimensional concept has correlation with the total score, it is concluded that the measuring instrument is valid. Validity of an instrument can be tested using product-moment formula or Pearson's product-moment correlation with formula as follow:

$$r_{xy} = \frac{n\sum X_i Y_i - (\sum X_i)(\sum Y_i)}{\sqrt{[n\sum X_i^2 - (\sum X_i)^2][n\sum Y_i^2 - (\sum Y_i)^2]}} \dots\dots\dots (2)$$

Where r_{xy} is product-moment correlation coefficient or Pearson correlation among items in the instrument with total items used, X is score of each item in an instrument to be used, Y is total score of items in the instrument for variable specified, n is number of respondents involved in instrument trial.

Test of the significance of correlation coefficient is performed using the following r-count (t_{hit}) formula:

$$t_{hit} = \frac{r_{xy} \sqrt{(n-2)}}{\sqrt{(1-r_{xy}^2)}} \dots\dots\dots (3)$$

Criteria for testing research instrument validity was conducted using significance level at $\alpha = 5\%$ and degree of freedom (N-2) as shown in formula below:

- a. Question items in instrument are valid if $r\text{-count} \geq r\text{-table}$
- b. Question items in instrument are not valid if $r\text{-count} < r\text{-table}$

Table 2 shows results of test validity of data collected from questionnaires.

Table 2. Validity Testing Result of the Research Instruments

Sub-Variable	Questionnaire	r-count (t_{hit})	r-table	Remark
Market Turbulence	Q1-1	0.632	0.138	Valid
	Q1-2	0.583	0.138	Valid
	Q1-3	0.402	0.138	Valid
	Q1-4	0.343	0.138	Valid
	Q1-5	0.586	0.138	Valid
Technological Turbulence	Q2-1	0.627	0.138	Valid
	Q2-2	0.571	0.138	Valid
	Q2-3	0.487	0.138	Valid
	Q2-4	0.591	0.138	Valid
Regulatory Turbulence	Q3-1	0.524	0.138	Valid
	Q3-2	0.411	0.138	Valid
	Q3-3	0.291	0.138	Valid
	Q3-4	0.464	0.138	Valid
Competitive Turbulence	Q4-1	0.600	0.138	Valid
	Q4-2	0.463	0.138	Valid
	Q4-3	0.500	0.138	Valid
	Q4-4	0.657	0.138	Valid
	Q4-5	0.504	0.138	Valid
	Q4-6	0.637	0.138	Valid

Based on results of test validity, it is revealed significant correlation value which shows r-table or correlation coefficient is greater than 0.138. Therefore, question items in questionnaire as instrument of this study are valid to measure each variable.

3.5. Testing the Reliability of the Research Instruments

Reliability testing is conducted to obtain information to what extent the measurement instrument shows its precision, accuracy, stability or consistency although measurement is conducted in different time. Reliability testing is performed to valid questions only to know to what extent the results of measurements consistent if it is conducted using split half technique with the following steps:

1. Split questions into 2 parts.
2. Add the score for each question on each part to develop two total scores for each respondent.
3. Correlate total score on first split with total score on second split using product-moment correlation.
4. Seek for realibility of all questions using Spearman Brown formula as follow :

$$r_{tot} = \frac{2(r_{tt})}{1 + r_{tt}} \dots\dots\dots (4)$$

Where r_{tot} is internal reliability of all items, r_{tt} is product-moment correlation between odd part and even part. Decision on test reliability depends on criteria being used, if internal coefficient of all items (r_{tot}) is greater than r -table then instrument items are reliable.

Results of tests on data from questionnaires, it was found that reliability index for environmental business variable was 0.841 so significant correlation value was obtained by reliability score that was greater than critical value of 0.7. Therefore, question items in the questionnaire as instrument in this research were able to provide reliable measurement for each measurement variable.

3.6. Descriptive Analysis Design

Descriptive analysis is used to describe each variable in the study so information regarding perception/understanding of unit business leader of telecommunication provider to the fluctuation of turbulence (high or low turbulence) in the business environment can be collected.

In order to conduct descriptive analysis of each research variable, the following steps were taken:

- 1) Each variable indicator that is assessed by a respondent, will be classified into 5 alternative answers with interval scale describing level of answer. Levels of answer of each indicator have range between 1-5 with different level of meaning as outlined in the Table 3 below.

Table 3. Measuring the Turbulence of Business Environment

Answer	Market Turbulence	Technological Turbulence	Regulatory Turbulence	Competitive Turbulence
1	Very Low	Very Low	Very Low	Very Low
2	Low	Low	Low	Low
3	Medium	Medium	Medium	Medium
4	High	High	High	High
5	Very High	Very High	Very High	Very High

- 2) Total score of each variable counted = total score of all variable indicator for all respondents.
- 3) Score of each variable counted = average of total score.
- 4) To determine intervals in 5 levels, then interval range is as follow:

$$\text{Interval Range} = \frac{\text{Max Score} - \text{Min Score}}{\text{Number of intervals}} \dots\dots\dots (5)$$
- 5) Using the interval range, then class interval is defined from the lowest up to the highest with addition of interval range on the following interval class.
- 6) Based on the above techniques, then score of all variables of research are shown as score category of turbulence of business environment as displayed on Table 4 below.

Table 4. Turbulence of Business Environment Score Category

Dimensions	Score	Predicate
Market Turbulence	1.00 – 1.80	Very Low
Technological Turbulence	1.81 – 2.60	Low
Regulatory Turbulence	2.61 – 3.40	Medium
Competitive Turbulence	3.41 – 4.20	High
	4.21 – 5.00	Very High

3.7. Verificative Analysis Design

The study applied quantitative analysis using Structural Equation Model (SEM) with variance or component based in which Partial Least Square (PLS) was used to design measurement model (outer model)

defining correlation between indicator and its latent variable. For latent variable of environmental turbulence, the indicator is reflective that means the indicator is influenced by latent construct or indicator that reflects/represents latent construct.

4. Result and Discussion

4.1. Profile of Respondents

The distribution of questionnaires to business unit leader from 455 licensed telecommunication providers was conducted and the returned valid questionnaires were 213, therefore, participation rate was 46.3% with respondents' profile as shown on following Table 5.

Table 5. Profile of Respondents

Profile of Respondents	Samples (n)	Percentage (%)
Types of Telecommunications Provider:	55	25.82 %
- Network Provider	138	74.18 %
- Service Provider		
Size of Company:		
- Big size company (Asset is above Rp10 billion)	141	66.20 %
- Medium size company (Asset is between Rp500 million – Rp10 billion)	57	23.94 %
- Small size company (Asset is less than Rp500 million)	15	7.04 %
Position:		
- Manager	92	43.19 %
- General Manager	60	28.17 %
- Director	61	28.64 %
Managerial Experience:		
- Less than 1 Year	13	6.10 %
- 1 – 3 Years	33	15.49 %
- More than 3 Years	167	78.40 %

Source: Survey Result

4.2. Descriptive Analysis of the Turbulence Business Environment

The turbulence business environment being faced by unit business of the Indonesian telecommunication providers is measured through 4 dimensions, namely market turbulence, technological turbulence, regulatory turbulence, and competitive turbulence. The result of descriptive analysis as explained in the following section.

4.2.1. Market Turbulence

Market turbulence in Indonesia telecommunication industry was the consequence of the elimination of monopoly and market opening as well as development of disruptive innovation (Kartajaya et al., 2004). Results of the calculation of respondents' scores for each indicator in Market Turbulence can be describe on Table 6.

Table 6. Descriptive Analysis of the Market Turbulence

No.	Indicators	Respondent Responses										Mean	Standard Deviation
		Very High		High		Middle		Low		Very Low			
		f	(%)	f	(%)	f	(%)	f	(%)	f	(%)		
Q1-1	The speed of change for customers' preferences over the time	4	1.9%	13	6.1%	65	30.5%	104	48.8%	27	12.7%	3,64	0,85
Q1-2	Frequency of customers to search for new products/services over the time	0	0.0%	15	7.0%	59	27.7%	106	49.8%	33	15.5%	3.74	0.80
Q1-3	Frequency of customers to search for existing products/services over the time	0	0.0%	18	8.5%	77	36.2%	108	50.7%	10	4.7%	3.52	0.72

No.	Indicators	Respondent Responses										Mean	Standard Deviation
		Very High		High		Middle		Low		Very Low			
		f	(%)	f	(%)	f	(%)	f	(%)	f	(%)		
Q1-4	The difference between existing and new customer's products/services requirement	2	0.9%	34	16.0%	96	45.1%	70	32.9%	11	5.2%	3.25	0.82
Q1-5	The speed of change for marketing practice over the time	0	0.0%	15	7.0%	71	33.3%	103	48.4%	24	11.3%	3.64	0.77
Average											3.56	0.79	

Based on Table 6 and research variables score category on Table 4, market turbulence being faced by Indonesia telecommunication industry is categorized as “high” which mainly caused by high frequency of new product searching by customers and rapid changes of customer’s preferences. This situation reflects customer’s characteristics which have already been well educated on high technology product such as telecommunication products/services and dying of various new product innovations.

There is one market turbulence indicator in “medium” category which shows intensity of difference between old and new customer’s need, it indicates the telecommunication providers think that new customer’s need still can be fulfilled with existing products/services. This gap has made the business unit in Indonesia telecommunication industry could not grab the opportunity and taken by substitute providers who can take advantage of this opportunity such as WhatsApp, LINE, Telegram, etc.

4.2.2. Technological Turbulence

Technological turbulence in Indonesia telecommunication industry was a consequence of increased trend in digital convergence which marked by unification of data processing technology (computing), content technology and digital multimedia technology as well as telecommunication technology (Kartajaya et al., 2004). The rapid changes of technology mainly the internet technology which is combined with wireless technology have stimulated various disruptive technology that disturb, bypass or replace old technology as well as the incumbent companies. Results of calculation of respondents’ scores can be seen on Table 7 as below.

Table 7. Descriptive Analysis of the Technological Turbulence

No.	Indicators	Respondent Responses										Mean	Standard Deviation
		Very High		High		Middle		Low		Very Low			
		f	(%)	f	(%)	f	(%)	f	(%)	f	(%)		
Q2-1	The speed of change for technology over the time	0	0.0%	5	2.3%	38	17.8%	101	47.4%	69	32.4%	4.10	0.77
Q2-2	The difficulty to predict the technology change over the time	0	0.0%	22	10.3%	94	44.1%	76	35.7%	21	9.9%	3.45	0.81
Q2-3	The opportunity of new products/services has been made possible through technological breakthroughs in our industry	2	0.9%	14	6.6%	64	30.0%	110	51.6%	23	10.8%	3.65	0.80
Q2-4	Intensity of new product/services launch as result of technological breakthroughs	0	0.0%	11	5.2%	64	30.0%	101	47.4%	37	17.4%	3.77	0.79
Average											3.74	0.79	

Based on Table 7 and research variables score category on Table 4, the technological turbulence being faced by Indonesia telecommunication industry is in “high” category, it is contributed mainly from rapid changes of technology itself. This situation indicates telecommunication industry is very much influenced with technological aspect and respondents found high difficulty in predicting technological changes.

This finding also shows that telecommunication providers have not been able to maximize opportunity of technological innovation and or create new innovative product. It happens due to administration of Indonesia telecommunication industry is still depend on vendor’s ability to provide technological innovation, and inadequate research and development efforts of the operators lead to limited innovation in their technology.

4.2.3. Regulatory Turbulence

Regulatory turbulence in Indonesia telecommunication industry was a consequence of privatization of telecommunication sector as a follow up of WTO ratification (State Law No. 7/1994) that require opening of market, change of paradigm on telecommunication authority management from monopolistic approach to market-based approach (Kartajaya et al., 2004).

The Results of calculation of each score under regulatory turbulence indicator can be seen on Table 8 as below.

Table 8. Descriptive Analysis of the Regulatory Turbulence

No.	Indicators	Respondent Responses										Mean	Standard Deviation
		Very High		High		Middle		Low		Very Low			
		f	(%)	f	(%)	f	(%)	f	(%)	f	(%)		
Q3-1	Difficulty to predict regulatory changes over the time	1	0.5%	26	12.2%	78	36.6%	74	34.7%	34	16.0%	3.54	0.92
Q3-2	The intensity of regulatory changes over the time	3	1.4%	37	17.4%	116	54.5%	47	22.1%	10	4.7%	3.11	0.79
Q3-3	Uncertainty of the law & regulations implementation	3	1.4%	43	20.2%	89	41.8%	62	29.1%	16	7.5%	3.21	0.90
Average											3.36	0.95	

Based on Table 8 and research variables score category on Table 4,, respondents thought that regulatory turbulence being faced by Indonesia telecommunication industry is in “medium” category. Changes in telecommunication regulations in Indonesia are probably the reason that creates this situation where many unpredictable aspects, political issues and pressure of stakeholders are involved.

High legal uncertainty in implementation of regulations is allegedly closely related to criminalization potentials in indonesia telecommunication industry. Although providers implement regulations well but this will not let them get away from legal sanctions. Legal uncertainty in implementation of telecommunication regulation has become things to worry about since the case of 3G network cooperation between PT. IM2 and PT. Indosat.

4.2.4. Competitive Turbulence

Competitive turbulence in Indonesia telecommunication industry was a consequence of the emergence of hypercompetition phenomenon as a result of the emergence of large numbers of new players with more sophisticated strategies, emergence of latent competitors that are hardly identified by incumbent operators and all of these have threatened sustainability of industry because the substitution services (killer apps) have disruptive effect to the industry as a whole.

The Results of calculation of each score under competitive turbulence indicator can be seen on Table 9. Based on Table 9 and research variables score category on Table 4, competitive turbulence being faced by Indonesia telecommunication industry is in “high” category, this is mainly contributed by high intensity of competition among operators and price war.

Table 9. Descriptive Analysis of the Competitive Turbulence

No.	Indicators	Respondent Responses										Mean	Standard Deviation
		Very High		High		Middle		Low		Very Low			
		f	(%)	f	(%)	f	(%)	f	(%)	f	(%)		
Q4-1	The intensity of competition between operators	0	0.0%	1	0.5%	5	2.3%	103	48.4%	104	48.8%	4.46	0.57
Q4-2	The intensity of price wars	0	0.0%	3	1.4%	14	6.6%	80	37.6%	116	54.5%	4.45	0.68
Q4-3	Easiness of competitors to compete with the products offer	1	0.5%	12	5.6%	49	23.0%	103	48.4%	48	22.5%	3.87	0.84
Q4-4	The intensity of the competitor’s new movement	0	0.0%	5	2.3%	42	19.7%	122	57.3%	44	20.7%	3.96	0.71

Q4-5	The strength of competitors	0	0.0%	2	0.9%	45	21.1%	112	52.6%	54	25.4%	4.02	0.71
Q4-6	The intensity of new products available in the market	0	0.0%	8	3.8%	57	26.8%	115	54.0%	33	15.5%	3.81	0.73
Average											4.10	0.71	

This condition is in accordance with current phenomenon showing hypercompetition among business units in telecommunication industry in Indonesia due to many players within the industry. As an illustration, the implementation of cellular mobile network has experienced rapid growth and has made Indonesia as one of countries with highest number of providers in the world. In addition, very competitive price war between operators has made Indonesia as one of countries with the lowest tariff for mobile phone services in Asia.

4.3. Results of Hypothesis Testing

For hypothesis testing, an average test of one sample was performed to determine whether environmental turbulence occurred in Indonesia telecommunication industry was included in low or high category.

The hypothesis proposed in average test of one sample is as follow:

$H_0: \mu_0 \geq 3.41$ *Turbulence business environment in Indonesia telecommunication industry is in high category*

$H_1: \mu_1 \leq 3.41$ *Turbulence business environment in Indonesia telecommunication industry is not in high category*

From the calculation using MS Excel program, it is known that the value of x (mean) for turbulence business environment was 3.69. With μ value of 3.41 (cut-off), Deviation Standard (σ) value of 0.42 and total samples were 213 respondents, the t-count was obtained with the following formula:

$$t = \frac{\bar{x} - \mu_0}{\sigma / \sqrt{n}} \dots\dots\dots(6)$$

Therefore: t-count = 9.727

$$t = \frac{3,69-3,41}{0,42/\sqrt{213}}$$

From t table with degree of confidence at 95% and degree of freedom (df) = 213 the value obtained from t-table was 1.625. Referring to criteria if t-count > t-table (H1 rejected) and if t-count < t-table (H1 accepted), according to calculation it is known that t-count (9.727) > t-table (1.652) therefore H1 rejected (Ho accepted), it means that environmental turbulence is significantly in high category. Thus, hypothesis that Indonesia telecommunication industry currently experiencing environmental turbulence not in high category is rejected.

Referring to the turbulence matrix developed by (Nuñez & Lynn, 2012), thus environmental turbulence in Indonesia telecommunication industry can be categorized as Radical Quadrant, where it represents unpredictable business environment. The results of this study strengthen the opinion shared by (Ansoff & McDonnel, 1990) that current business development has made its environment turbulent, and (Eisenhardt, 1989) stated that telecommunication industry is an industry which experience environmental turbulence so that it is called as high velocity industry. Specifically mentioned in (Kartajaya et al., 2004) and research of (Tarigan, 2012) have strengthened the study results that business environment of Indonesia telecommunication industry is experiencing high turbulence.

4.4. Verificative Analysis of the Turbulence Business Environment

Turbulence Business Environment were measured with 4 measurement dimensions namely Market Turbulence (PSR), Technological Turbulence (TEK), Regulatory Turbulence (REG) and Competitive

Turbulence (KOMP). The Verificative Analysis of the Turbulence Business Environment resulting Measurement Model as described on Figure 4 and Table 6 below.

Table 6. Results of Measurement Model Test

Dimension	Symbol	Standardized loadings	R ²	Variants of Error	t-count	Remark
Market Turbulence	PSR	0.784	0.614	0.386	18.336	Valid
Technological Turbulence	TEK	0.791	0.626	0.374	18.805	Valid
Regulatory Turbulence	REG	0.613	0.376	0.624	11.279	Valid
Competition Turbulence	KOMP	0.726	0.527	0.473	15.340	Valid

Composite Reliability (CR) = 0.786

Source: Data Processing Result with XLSTAT

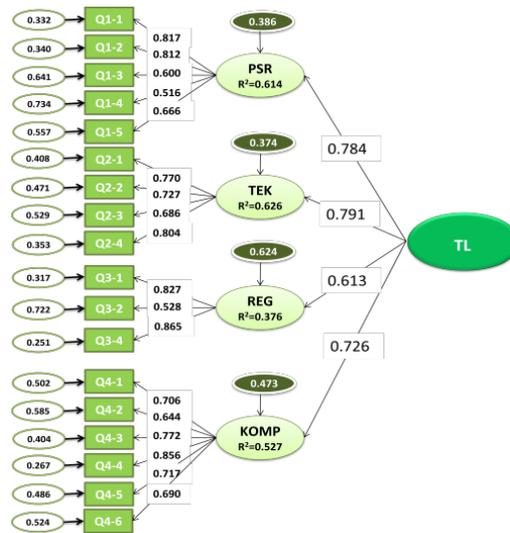


Figure 4. Measurement Model Path Diagram

Based on loading factor value in the business environmental turbulence measurement model above, it can be seen that all four dimensions and its indicators used to measure environmental turbulence were valid with loading factor value > 0.50 and reliable with composite reliability > 0.70. It is observed that the most dominant dimension reflecting business turbulence environment in indonesia telecommunication industry is technological turbulence and market turbulence, while regulatory turbulence is the least dominant.

From the measurement model path diagram on Figure 3, it is also observed that:

- The most dominant indicator reflecting technological turbulence (TEK) is the intensity of new product/services launch as result of technological breakthroughs (Q2-4 with standarized loading factor is 0,804).
- The most dominant indicator reflecting market turbulence (PSR) is the speed of change for customers' preferences over the time (Q1-1 with standarized loading factor is 0,817) and the frequency of customers to search for new products/services over the time (Q1-2 with standarized loading factor is 0,812).
- The most dominant indicator reflecting competition turbulence (KOMP) is the the intensity of the competitor's new movement (Q4-4 with standarized loading factor is 0,856).
- The most dominant indicator reflecting regulatory turbulence (REG) is the uncertainty of the law & regulations implementation (Q3-4 with standarized loading factor is 0,865) and the difficulty to predict regulatory changes over the time (Q3-1 with standarized loading factor is 0,827).

4.5. Problem Solving Analysis

Based on the study above, we can compare the result of descriptive analysis and verificative analysis to knowing the real problem of turbulence business environment in indonesia telecommunication industry. As describe on Figure 4, there is a gap between average values of turbulence business environment indicators which represent perception of business unit leaders (descriptive analysis) with the results of verificative testing of perception indicators using Partial Least Square measurement model (verificative analysis).

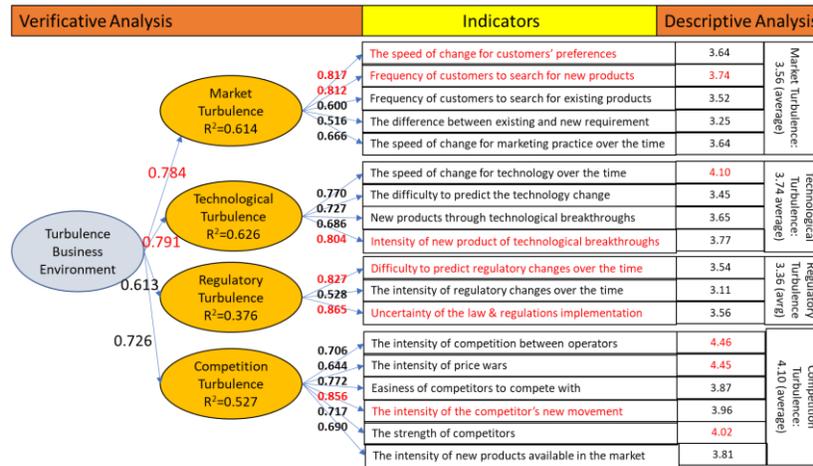


Figure 3. Solution Indicators for Problem Solving

Judging from the average values, unit business leaders have perception that competitive turbulence is a dimension that best describes competitive turbulence in Indonesia telecommunication industry, marked with high intensity of competition among operators and price setting. However, the test results actually show that technological turbulence and market turbulence have higher contribution.

Thus, to overcome turbulence business environment in Indonesia telecommunication industry, the business unit of telecommunication providers are required to improve their understanding especially on the following things (1) emergence of new product as result of technological breakthroughs, (2) changes in customer's preferences and (3) search for new product.

Based on the mapping of the indicators on solutions to handling turbulence business environment, it reveals that Indonesia telecommunication providers have not yet been used opportunity from technological innovations and relatively treat old and new customers' needs in the same way, therefore, market opportunity in terms of changes in customer's preferences to a product and search for new product were utilized by providers with technological innovations that commonly called as Over-The-Top (OTT). The OTT providers both for OTT Voice or OTT Messaging threaten the sustainability of Indonesia telecommunication industry. The latest development shows more OTT Videos, OTT Clouds and other technological innovative products which bypass revenues of telecommunication operators.

5. Conclusion

Similar with other countries in the world, telecommunication industry in Indonesia experience high turbulence business environment. Based on the survey to their business unit leader, this is mainly due to competitive turbulence. However, it was found that technological turbulence and market turbulence gave most dominant contribution to this turbulence business environment.

To deal with turbulence business environment, telecommunication provider should improve their understanding on technological turbulence, mainly to intensity of emergence of new product/service as results of technological breakthrough, and also market turbulence, mainly related with searching of new product and changes in customer's preferences.

There are some suggestions proposed to telecommunication providers to overcome high turbulence business environment, (1) establish cooperation with OTT providers or other technological breakthrough to make new collaborative product innovation; (2) improve market intelligence to explore more on market changes and customer's preferences; (3) launch of various new products/services intensively and communicate it widely through variety of media; (4) strengthening cooperation with competitors through association of operators and government/regulator.

To deal with high technological turbulence business environment, several suggestions are proposed to government/regulator, there are (1) to adjust telecom regulation approach with neutral of technology and neutral of service, to make it more relevant with business need and sustainability of the industry; (2) provide clear and strong regulations to avoid disturbance to the sustainability of telecommunication industry, including the importance of protection to operators who comply to law and legal in operations; (3) to provide regulations and licenses that make operators easy to develop its OTT services or other convergence services effectively if it is conducted through synergy with value chain operators; (4) to encourage telecommunication providers to improve cooperation among themselves and joint together to response to Global OTT for maintaining sustainability of the industry, (5) to establish regulations as legal basis for development of cooperation among telecommunication providers such as service management, network sharing, radio network sharing, virtual operator, etc.

The following suggestions also proposed to government/regulator to deal with high market and competitive turbulence in Indonesia telecommunication industry, there are (1) to encourage community to use local OTT products; (2) to strengthen synergy with telecommunication operators, MICT and the Creative Economy Authority to encourage incubation of local OTTs and provide some incentives, such as grant for start-up digital creative company; (3) to reduce intensity of competition among operators and industry efficiency by encouraging merger and acquisition of providers and to be more selective when giving new license; (4) to reduce intensity of price wars by determination of minimum tariff, like aviation industry; (5) to re-evaluate existence of too many operators and apply moratorium to provide new license until overall review of the ideal number of operators for Indonesian market has been completed, and (6) to review and encourage the possibility of mobile virtual operator (MVNO) existence which can improve efficiency in operations and avoid duplication of investment.

Construct measurement of environmental turbulence in this study was performed through intermediary in the form of assessment of perceptions of business unit leaders, therefore, measurement process used interval and has characteristic as one shoot or cross-sectional. Further study is required as comparison and use time series or longitudinal data with ratio measurement.

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