CREATING FIRM VALUE: LINKING DEMAND UNCERTAINTY, ADAPTATION VERSUS REPLACEMENT INVESTMENTS, AND RISK

Nur Khusniyah Indrawati ¹

¹ Universitas Brawijaya, Indonesia

ABSTRACT

Real assets investment can relate to real options. This study aims at analysing the effect of demand uncertainty on replacement investment and adaptation investment supported by manager's attitude towards risk and the effect of each investment type on firm values. The 352 observation data was collected from companies listed in Indonesia Stock Exchange. The data was analyzed using Path analysis. The research findings prove that demand uncertainty can increase the adaptation investment, which is in contrast to replacement investment. The manager's attitude towards risk in terms of demand uncertainty and adaptation investment is considered as risk-taker, while in replacement investment is risk aversion. The effects of the two investment types also differ on firm value. The adaptation investment cannot increase the firm value, while the replacement investment can. The manager has the policy to make or not to make profitable investments to maximize investment returns based on real option policy and to decrease the risk, as the real assets investments are not passive investments. The manager's attitude towards risk is quasi moderation, both in replacements investment and adaptation investment. It implies that manager's attitude towards risk can be a moderator and independent variable.

Keywords: demand uncertainty, adaptation investment, replacement investment, firm value, manager's attitude towards risk

MENCIPTAKAN NILAI PERUSAHAAN: MENGHUBUNGKAN KETIDAKPASTIAN PERMINTAAN, INVESTASI PENYESUAIAN VERSUS INVESTASI PENGGANTIAN, DAN RISIKO

ABSTRAK

Investasi aktiva riil dapat berhubungan dengan opsi riil. Penelitian ini bertujuan untuk menganalisis pengaruh ketidakpastian permintaan terhadap investasi jenis penggantian dan jenis penyesuaian yang diperkuat oleh sikap manajer terhadap risiko dan dampak masing-masing jenis investasi tersebut terhadap nilai perusahaan. Data diperoleh dari perusahaan manufaktur di Bursa Efek Indonesia sebanyak 352 observasi. Analisis data menggunakan Path Analysis. Hasil penelitian menunjukkan bahwa ketidakpastian permintaan mampu meningkatkan investasi jenis penyesuaian, sebaliknya untuk investasi jenis penggantian. Sikap manajer terhadap risiko dalam hubungan antara ketidakpastian permintaan dan investasi jenis penyesuaian adalah risk taker, sedangkan untuk investasi jenis penggantian adalah risk aversion. Dampak kedua investasi juga berbeda terhadap nilai perusahaan. Investasi jenis penyesuaian tidak mampu meningkatkan nilai perusahaan, sebaliknya, investasi jenis penggantian mampu meningkatkan nilai perusahaan. Manajer mempunyai kebijakan untuk melakukan atau tidak melakukan investasi yang menguntungkan dalam rangka memaksimalkan hasil investasi sesuai dengan kebijakan opsi riil dan menurunkan risiko karena investasi aktiva riil bukan merupakan investasi yang pasif. Sikap manajer terhadap risiko merupakan quasi moderasi baik untuk investasi jenis penggantian maupun penyesuaian. Ini berarti bahwa sikap manajer terhadap risiko dapat menjadi variabel moderator dan variabel independen.

Kata-kata Kunci: ketidakpastian permintaan, investasi penggantian, investasi penyesuaian, nilai perusahaan, sikap manajer terhadap risiko

Korespondensi: Dr. Dra. Nur Khusniyah Indrawati, M.Si, CSRS, CFP*. Jurusan Manajemen Fakultas Ekonomi dan Bisnis Universitas Brawijaya. Jln. MT. Haryono 165, Malang 65145. E-mail: nur_khusniyah@ub.ac.id

Submitted: March 2020, **Accepted:** March 2020 **Published:** March 2020

ISSN: 1412 - 3681 (printed), ISSN: 2442 - 4617 (online), Website: <http://journal.feb.unpad.ac.id/index.php/jbm>

INTRODUCTION

Each investment conducted by the company is the realm of capital budgeting. A manager who concerns about achieving the company's main goal, which is to maximize the firm value, tries to invest in projects with positive Net Present Value (NPV) despite the fact that there is no guarantee that the management will implement projects with positive NPV, in case there is high environmental uncertainty.

The environment plays an essential role in company growth and is considered as a critical factor for company development (Indrawati, *et al.*, 2015). Environmental uncertainty is one of the company risks, such as demand uncertainty that influences the operational uncertainty. It hence provokes cash flow stability in terms of cash flow or distribution index of the company's cash flow (Dechow and Dichev, 2002). Additionally, environmental instability occurs in the external environment. The rising of external environmental uncertainty is characteristic of the company which reduces the effectivity of traditional capital budgeting procedures due to its inability to adequately anticipate and face any changes (Dixit and Pindyck, 1994). Therefore, cash flow projection related to the investment will be far different from the realized cash flows Lee, *et al.* (2008). In such condition, the real option appears as a strategic decision solution. For example, one Peruvian company in Peru has used the concept of real options to assess the investment of one mining project in its business group. The silver

company gives the biggest contribution of 80% of all company's potential products. This investment is done while in exploration and sells the mining at stable prices. Through the Discounted Cash Flow (DCF) and Net Present Value (NPV) methods without options, the results showed that the project was not feasible to be implemented because it produced a negative NPV value. However, calculation of real option with a modified trinomial model for a standard deviation scenario showed that the project was feasible because it has a positive NPV (Sumarti, *et al.*, 2018)

Real options arise due to opportunities for the managers to change time, scale and other aspects in responding to market changes (Brigham and Dave, 2016). These activities depend on the management attitude in taking risks. Risk aversion managers respond to demand uncertainty by cutting investment, while risk-taking managers respond positively to demand uncertainty (Bo and Sterken, 2006). Despite the assumption of the previous studies that manager's attitude towards risk is risk-neutral, Bo and Sterken (2006) assume that risk aversion will strengthen the effect of demand uncertainty on fixed-asset investment. In addition, some studies argue that manager's attitude towards risk is risk aversion (Sandmo, 1971; Leland, 1972; Hartman, 1976; Nickell, 1978; Zeira, 1990; Nakamura, 1999). Nonetheless, Indrawati (2017) finds that manager's attitude towards risk is potential moderation variables (homologizer moderation) that insignificantly

strengthens the relationship between demand and investment uncertainty. It is in line with the previous studies stating that manager's attitude towards risk is risk-neutral. With such different findings, it is possible to perform another study in order to strengthen the assumptions of manager's attitude towards risk that Bo and Sterken (2006) believe as risk aversion.

Managers act as coordinators within the market level and company. The modern manager of a company is a risk bearer (Pragg, 1999) who is responsible for the company management in maximizing the firm value (Brigham and Daves, 2014) in an attempt to maximize the welfare of the shareholders. Several studies have shown that capital expenditures affect the firm values, such as Chan *et al.*, 1995, Chung, *et al.* 1998; Nwaeze, 2004; Deshmukh and Voght, 2005, Indrawati, 2017). Capital budgeting expenditures level is relevant to personal information owned by each person in regards to investment availability for the company (Trueman, 1986; Ambaris *et at.*, 1987; John and Mishra, 1990; Nwaeze, 2004). However, only a few studies that have divided investment into replacement investment and adaptation investment as performed by Nwaeze (2004) in examining their relationship with company performance.

This study develops previous research conducted by Nwaeze (2004) and Indrawati (2017) to examine the effect of demand uncertainty for replacement investment and adaptation investment, and to examine the effect

of each influence on firm value. This study implements utility theory, risk and uncertainty, capital budgeting, and firm value. The next section of this paper is divided into (1) literature review and hypotheses, (2) research methods, (3) research findings, (4) research findings and discussions, and (5) scope of the research and suggestions for further researches.

LITERATURE REVIEW

Theory of Demand Uncertainty and Fixed Investment Decision

The company's ability to remain competitive and survive depends on the constant cash flow as a result of creating new products, improving existing products, and efficient operations. Therefore, it is essential for companies to evaluate the proposed projects accurately in which requires the ability, effort, and time from the manager. These projects encompass (1) asset replacement investments intended to maintain current profits or to reduce costs by replacing expired assets, and (2) adaptation investment projects intended to finance new projects, such as creating new products or entering a new market as a strategic decision for the company (Brigham and Daves, 2014).

Decisions on asset replacement and adaptation projects require growth projection in demand. Demand uncertainty will affect the uncertainty of cash flows. Thus, a manager may postpone the implementation of projects with a positive NPV, decided in traditional capital

budgeting theory using real options, such as conducting investment decision analysis by considering the ability to revise operating decisions in the future in order to increase current cash (Brigham and Daves, 2014). It is possible as the management has the opportunity to change the time, scale, or other aspects of investment in response to market changes.

The result of Leahy and Whited's research (1996) shows that demand uncertainty has a negative impact on fixed investment. Indrawati (2017) proves that demand uncertainty weakens management's response to fixed-asset investment. Nwaeze (2004) classifies fixed assets into two, investment adaptation and replacement. The results show that investment in replacement assets shows a negative effect and increases earnings performance. In contrast, the fixed assets in the adaptation type have a positive effect on equity value and reduce earnings performance.

Based on the description above, research hypotheses are developed as follows:

- H1a: Demand uncertainty has a significant effect on adaptation investment
- H1b: Demand uncertainty has a significant effect on replacement investment

The Effects of Moderation in Manager's Attitude towards Risks In Terms of Demand Uncertainty and Investment Decision

Different opinions on risk and uncertainty provoke the importance of manager's attitude towards risk, both in financial asset investments and real assets,

despite the assumption of the previous studies that manager's attitude towards risk is risk-neutral. However, several studies claim the manager's attitude in making investment decisions in uncertainty as risk aversion (Sandmo, 1971; Leland, 1972; Hartman, 1976; Nickell, 1978; Zeira, 1990, Nakamura, 1999), although not many have predicted the right size of risk aversion (Bo and Sterken, 2006). On the other hand, Indrawati (2017) says that manager's attitude towards risk is indeed a potential moderation variable (homologizer moderation) that insignificantly affects the relationship power between demand uncertainty and investment. This strengthens the findings of the previous studies where manager's attitude towards risk is risk-neutral.

Based on the description above, research hypotheses are developed as follows:

- H2a: Manager's attitude towards risk predicted as risk aversion strengthens the relationship between demand uncertainty and adaptation investment policies.
- H2b: Manager's attitude towards risk predicted as risk aversion strengthens the relationship between demand uncertainty and replacement investment policies.

Theory of Firm values

The main objective of the company is to maximize the welfare of shareholders (Brigham and Houston, 2007) by escalating market prices. Several studies have examined the effects of capital expenditures on firm value, including Chan

et al. (1995), implying that the stock market price will react positively to businesses that relocate decisions, motivated by business expansion or savings costs. Besides, it negatively reacts when companies reduce their business capacity. Whereas, Nwaeze (2004) and Deshmukh and Voght (2005) clearly emphasize that companies committed to capital budgeting expenditures for investment, will increase the firm value.

Based on the description above, hypotheses are developed as follows:

H3a: Investment decision on adaptation type has a significant effect (s) on firm value.

H3b: Investment decision on replacement type has significant effect(s) on firm value.

Based on a review of the theory as previously described, the conceptual research framework is shown in Figure 1 below.

Figure 1. Research Conceptual Framework

METHODS

Research Design

This research is categorized as explanatory research. The research population is manufacturing companies listed in Indonesia Stock Exchange (IDX) during 2014-2017 research period, with the following criteria:

1. Listed companies before 2014

2. Companies that had never been delisted during the research period
3. Companies publishing financial statements during the research period
4. Companies with financial statements in the rupiah currency
5. Company with no negative profit balance

From the population criteria, 40 basic and chemical industries, 20 various industries, and 28 consumer goods industry sectors were gathered. The observation period was four years, with 352 observations. This study uses the selected companies as research samples and implements the saturated or census sample technique. The data collection was done with documentation techniques. The level of significance was 5%, and data was analyzed using path analysis model.

Definition of Variable Operations

Investment (Y1)

Investments in this study are classified into two: (1) adaptation investment (Y1) and replacement investment (Y2). Proxy of these two types of investment refers to Burgstahler and Dichev (1997) cited by Nwaeze (2004), and uses earning to book ratio with the following conditions: (1) Earning to book ratio < average = adaptation investment and (2) Earning to book ratio > average = replacement investment.

Firm value (Z)

Firm value is defined as the investor's perception on company's level of success in managing the

company's resources reflected in stock price. The firm value is generated with Tobin's Q, which is in accordance with Lindenberg and Ross (1981) opinion that Tobin's Q is the standard for firm value and performance. Tobin's Q formula is as follows:

$$\text{Tobin's Q} = \frac{(MVE+BVL)}{(BVA)}$$

Source: Deshmukh and Vogt (2005)

Description:

Tobin's Q = Firm value

MVE = Equity market value calculated by closing price x number of shares outstanding

BVL = Book value of total debt

BVA = Book value of total assets

Demand Uncertainty (X1)

Demand instability is the instability of customer demand for products produced by the company. Demand instability is measured by δ (ln of changes in sales) (Banker, *et. al.* 2010)

Manager's Attitude towards Risk (X2)

The manager's attitude towards risk in this study is assumed as risk aversion. The risk aversion measures are as follows:

$$RP_t = RC \cdot SD_t + w \cdot SKEW_t$$

Source: Bo and Sterken (2006)

Description:

RP_t = Risk Premium in year t

RC = The measure of absolute risk-averse (risk coefficient).

SD_t = Standard deviation of profit realization in year t

$SKEW_t$ = The tendency of profit realization in year t

According to utility theory, a positive risk coefficient ($RC > 0$) indicates that managers are risk aversion. The negative risk coefficient ($RC < 0$) indicates that managers are risk-takers. An insignificant risk coefficient (RC) indicates that managers are risk-neutral.

Data Source

Secondary data in this study were taken from the following sources:

1. The Annual Report of Manufacturing Companies that Go Public in Indonesia Stock Exchange website (www.idx.ac.id) from 2014 to 2017
2. The closing stock price is taken from Statistics Books Indonesia Capital Market Directory (ICMD) in 2018.

Data Analysis

Data in this study was analyzed using Path Analysis with SPSS software 24 to calculate the Path coefficient. Based on the conceptual framework of the study, the following equation model are formulated:

$$Y_1 = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \varepsilon_1$$

$$Y_2 = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \varepsilon_1$$

$$Z = \beta_0 + \beta_1 Y + \varepsilon_2$$

Description:

Y_1 = Adaptation investment

Y_2 = Replacement investment

Z = Firm value

X_1 = Demand uncertainty

X_2 = Manager's attitude towards risk

α = Constant

β = Beta Coefficient

ε = Error term

RESULTS AND DISCUSSION

Descriptive Analysis

The descriptive analysis result is shown in table 1.

Table 1. Description of Adaptation Type Investment

		Firm Value	Adaptation Investment	Demand Uncertainty	Manager's Attitude towards Risk
2014	Mean	2.254	0.091	28.709	0.013
	St Dev	2.446	0.059	1.796	0.057
2015	Mean	2.061	0.100	28.586	-0.009
	St Dev	2.342	0.067	1.681	0.078
2016	Mean	2.068	0.110	28.895	-0.016
	St Dev	2.036	0.109	1.721	0.068
2017	Mean	1.418	0.099	28.703	-0.012
	St Dev	0.907	0.058	1.093	0.053
All	Mean	2.001	0.100	28.715	-0.006
	St Dev	2.114	0.076	1.625	0.067

Based on company data description with a type of adaptation investment, the average firm value was 2,23112, and the standard deviation was 5.66948. High standard deviations indicate that the performance of the sample companies reflected through the firm value varies significantly from one another.

Table 2. Description of Replacement Type Investment

		Firm Value	Replacement Asset	Demand Uncertainty	Manager's Attitude towards Risk
2014	Mean	3.706	-0.016	27.693	0.019
	St Dev	10.491	0.145	1.538	0.383
2015	Mean	1.710	0.005	27.759	0.045
	St Dev	2.050	0.018	1.949	0.421
2016	Mean	1.777	-0.006	27.876	0.037
	St Dev	2.631	0.044	1.616	0.376
2017	Mean	1.751	-0.024	28.108	0.026
	St Dev	2.693	0.055	2.114	0.345
All	Mean	2.231	-0.012	27.878	0.031
	St Dev	5.669	0.082	1.825	0.376

A company has an opportunity to have high firm value, while others may attain the low one. The average adaptation investment was -0.01182, while the standard deviation was 0.08185. It reflects that the amount of adaptation investment by large companies varies greatly. It is potentially to get high and low. The Average Demand Uncertainty was 27.87816, while the standard deviation was 1.82467. The low standard deviation reflects that the level of demand variability is potentially low. The average manager's attitude towards risk was 0.03082 ($RC > 0$), while the standard deviation was 0.37568. It shows that descriptively, the majority of manager's attitude towards risk is risk aversion.

Based on company data description with the type of replacement investment, the average firm value was 2.00111, and the standard deviation was 2.11423. These findings indicate that the majority of companies have good performance, as reflected in firm values. The average replacement investment was 0.10023, and the standard

deviation was 0.07592. Lower standard deviation than the average indicates that the majority of the sample companies perform replacement investments. The average demand uncertainty was 28.71454, and standard deviation was 1.62531. These results illustrate the low uncertainty in the demand level of the sample companies. The average manager's attitude towards risk was -0.00594 (RC <0), and standard deviation was 0.06701. Descriptively, the average of manager's attitude towards risk represented risk takers. It means the managers realize that every decision to make an investment will certainly have a risk. However, as long as there is an opportunity to maximize its utility to increase the firm value, managers will invest even in conditions of demand uncertainty because in reality the demand uncertainty is inherent to the risk element.

Moderation Analysis

The influence of the moderating variable can be found from the effect of two-way interaction between predictor variables and the moderating variable in predicting the dependent variable. If X is predictor variable, Y is dependent variable, and M is moderating, the regression equation will be:

1. $Y_i = b_0 + b_1 X_i$ without moderating variable
2. $Y_i = b_0 + b_1 X_i + b_2 M_i$ involves moderating variable
3. $Y_i = b_0 + b_1 X_i + b_2 X_i + b_3 X_i * M$ involves moderating and interaction variable

The results of the moderating test for manager's attitude towards risk on investment decisions with adaptation and replacement types are presented in Table 3 as follows.

Table 3. The Results of Moderating Test for Manager's Attitude towards Risk on Adaptation Investment and Replacement Investment

Effect	Investment Decisions of Adaptation Type			Investment Decisions of Replacement Type		
	Coeff.	t-count	Sig	Coeff.	t-count	Sig
Demand Uncertainty → Investment Decisions	0.073	0.004	0.091	0.110	0.011	0.003
Manager's Attitude → Investment Decisions	-0.531	-0.132	0.00	0.630	0.286	0.00
Manager's Attitude (Demand uncertainty) → Investment Decisions	0.574	0.005	0.00	-0.623	-0.01	0.00
Investment Decisions → Firm values	-0.087	-5.649	0.213	0.947	31.095	0.00

Category of moderating variable:

1. Investment decision on adaptation type

$$Y = 0.073x - 0.531m + 0.574xm$$

The result of b2 was significant, b3 was significant. Hence, type of moderation in terms of demand uncertainty with investment decision on adaptation type is considered as quasi-moderation (quasi moderator), meaning that the manager's attitude towards risk in addition to being a moderating variable can also be an independent variable.

2. Investment decision on adaptation type

$$Y = 0.11x + 0.63m - 0.623xm$$

The result of b2 was significant and b3 was significant. Hence, type of moderation in terms of demand uncertainty with

investment decision on replacement type is considered as quasi-moderation (quasi moderator), and manager's attitude is not only a moderating variable but also an independent variable.

Path Analysis

Investment in this study is divided into two types, (1) adaptation investment and (2) replacement investment. 206 companies invested in adaptation types and 146 companies invested in replacement types. The results of path analysis are shown in Table 4 as follows.

Table 4. Research Hypothesis Test Results

Effect	Investment Decision of Adaptation Type			Investment Decision of Replacement Type		
	Coeff.	t-count	Sig	Coeff.	t-count	Sig
Demand Uncertainty → Investment Decision	0.073	0.004	0.091	0.110	0.011	0.003
Manager's Attitude → Investment Decision	-0.531	-0.132	0.00	0.630	0.286	0.00
Investment Decision → Firm values	-0.087	-5.649	0.213	0.947	31.095	0.00
F	9,575		0,0020	9,075		0,0022
R ²	0,069			0,057		

Source: Processed Research Data

Based on Table 4, adaptation investment reflected H2a hypothesis accepted (significant), while in replacement investment, all proposed hypotheses were accepted (significant). The RC coefficient for adaptation investment was significant but negative (RC < 0) meaning that the manager's attitude towards risk is risk taker. RC coefficient for replacement investment was significantly positive (RC > 0) meaning that the manager's attitude towards risk on replacement investment is risk aversion.

This study results indicate that managers have different attitudes towards risk depending on different types of investment. The different types of investments have different implications to firm value. The effect of different investment types on firm value depends on the relative attractiveness of the underlying asset options.

Discussion

Based on theory of preference, investment is the current expenditure of funds as an attempt to obtain greater income in the future. Theoretically, during financial forecasting in disclosing the amount of fund needed as a result of sales increases in the coming period, the Additional Fund Needed (AFN) method and Sales Percentage assume that all assets are operating maximally, and hence, to increase the sales, a manager must increase assets, including fixed assets (Brigham and Dave, 2014), and increase in sales will automatically raise the fixed assets.

The results of this study indicate that demand uncertainty proxied by sales uncertainty is not able to increase adaptation investment. Demand at any level does not affect investment in fixed assets. This means that in level of fluctuating demand, company strategic decision in making innovation, creates new products or enters new markets as reflected by the adaptation investment, and manifests as a strength. These findings are consistent with the results of research by Indrawati (2017), Guiso and Parigi (1999), and Caballero (1991). The results of this study further

support the opinion of Caballero (1991) that imperfect market and lack of diversification result in negative relationship between uncertainty and investment. However, these findings are in contrast to the theory of sales forecasting as described above and Freiling's opinion (accessed July 1, 2019) that innovation and uncertainty cannot be separated. In addition, managers have a set of investment opportunities (Investment Opportunity Set), as stated by Myers (1977), which can be the basis for investing. Thus, an increase in uncertainty in product demand will be responded by managers by investing in new projects that will increase growth.

Research findings regarding demand uncertainty towards adaptation investment indicate that manager's attitude towards risk is known as risk takers seeking to maximize their utility functions and the managers base on some rational choice axioms in utility theory when associated with demand uncertainty. The results of this study are in contrast to Hartman (1972), Abel (1983), and Indrawati (2017) whose findings imply to risk neutral. Further, these findings are not in accordance with Bo and Sterken (2006) that manager's attitude tend towards risk aversion. The results of this study do not support the research of Indrawati (2017) that demand uncertainty is not able to increase fixed asset investment,

In addition, these findings are contrary to the results of the research described above that demand uncertainty is a basis for managers in attempting investment replacement. It is because

the previous studies only examined the effect of demand uncertainty on overall asset investment decisions even though each type of asset has a different effect on firm value. The managers can make different decisions to invest in different types of assets. Therefore, this study examines the effect of demand uncertainty on investment decisions of two types asset, namely adjustment asset type and replacement asset type. It differentiates the results of this study from previous studies. Despite the findings presented by Guiso and Parigi (1999) that the effects of demand uncertainty on investment decisions are ambiguous, as they depend on assumptions on production technology, competition in product market, form of cost adaptations, and manager's attitude towards risk, this study provides empirical evidence that managers 'attitude towards risk is not merely moderating variable that reinforces the influence of demand uncertainty on investment policies, both in adaptation and replacement types, but also a quasi-moderation (quasi moderator). Thus, the manager's attitude toward risk can be moderating as well as independent variable. This is different from Indrawati (2017) that the type of moderation in the study is potential moderating (homogolized moderation). Although the managers execute investments to replace assets that have expired and are inefficient in supporting the company's operations, this replacement investment is generally performed in an attempt to maintain the existing market to remain profitable and survive.

These findings are in line with real option theory in terms of risk, where investor's attitude towards risk is risk-averse in replacement investment. In response to environmental uncertainty resulting in demand uncertainty, a manager may perform replacement investment by executing real option as they have the opportunity to delay the investment and seek to the appropriate time, scale, or other aspects in responding to market changes (Brigham and Dave, 2016). Thus, it decreases the risk. This strengthens the manager in their decision on replacement investment in case of demand uncertainty. These findings support Bo and Sterken (2006) that manager's attitude towards risk is risk aversion while being in contrast to Hartman (1972), Abel (1983), and Indrawati (2017) that imply manager's attitude towards risk as risk-neutral.

Investment may increase demand, and hence the company will improve its performance, while the individual manager will improve satisfaction for making the right decision for the company. An investment decision on adaptation type requires high funding as well as effective marketing activities, particularly in promotion, as new product innovation or entering new market enforce extra effort in terms of promoting the new products, and hence, the profitability is low. These findings are in contrary to Nwaeze (2004) that asset investment on replacement type promotes negative effect and increases earning performance. The manager's attitude towards risk is not moderating variable, and rather implied as pseudo

moderating (quasi moderator), thus, the manager's attitude towards risk may be moderating variable as well as independent variable. These findings are different from Indrawati (2007) that moderation type in the research is potential moderating (*homogolized moderation*).

In general, research findings for adaptation investment are in contrast, while replacement investment is in line with Chan *et al.* (1995) and Chung, *et al.* (1998) that expansion by the company, reflected in the expenditure of funds for investment, raises the stock market price and eventually increases firm value. Adaptation investment does not support the results of Indrawati's research (2017), while replacement investments do.

CONCLUSION

Demand uncertainties have different effects on investment types. Higher demand uncertainty will increase adjustment type investment. Adversely, higher demand uncertainty unable to increase the replacement type investment. This indicates a manager should base his fixed asset investment on demand uncertainty to develop the company and to take new projects to provide opportunities for the company to grow and develop. The expired fixed assets will not be replaced in order to maintain profits achieved.

Manager's attitudes towards risk also create different results to affect demand uncertainty for the replacement and adjustment type. Managers have a risk taker attitude to

adjustments type investment. Adversely, managers have risk aversion attitude to replacement type investment. Despite the high demand uncertainty, managers will invest in a hope to create a growth effect on the company, because in reality, the demand uncertainty is inherent with risk element. The manager realizes that decision to replace expired assets will be risky. The managers give more emphasis on adjustment investment type than replacement investment type in conditions of high demand uncertainty. The investment in real assets is not passive because managers can make policies after the investment decision to affect the outcome, based on the theory of real options.

Manager's decisions on adjustments type investment cannot increase the company value. Adversely, the replacement investment type can increase company value. The results of this study are inconsistent with options theories, especially growth and discontinuation options.

LIMITATION

This study has some limitations. First, the population of this study is the manufacturing industry, which consists of several sectors with different characteristics and patterns of demand, environment, and uncertain investment opportunities. Second, this study does not include agency cost variables which according to (Nwaeze, 2004) and Lamont (1977) affect real option decisions or fixed asset investment decisions, as they are performed in imperfectly competitive markets and under uncertainty. Third,

this study does not include leverage, liquidity, and information inequality, which by Nwaeze (2005) believed as a control variable. Lastly, this study does not incorporate financial risk. In reality, it is applied as a path that needs to be considered to investigate the investment-uncertainty relationship.

REFERENCES

- Abel, A.B. (1983). Optimal investment under uncertainty: *The American Economic Review*, 73(1), 228-233.
- Ambarish, R., John, K. & Williams, J. (1987). Efficient signaling with dividends and investment: *Journal of Finance*, 42, 321-344
- Banker, R.D., Byzalov, D. & Plehn-Dujowich, J.M. 2010. Demand uncertainty and cost behavior: *The Accounting Review*, 89(3), 839-865.
- Bo, H. & Sterken, E. (2006). Attitude towards risk, uncertainty, and fixed investment: *The North American Journal of Economics and Finance*, 18(1), 59-75.
- Brigham, E.F. & Daves, P.R. (2016). *Intermediate Financial Management*. Cengage Learning.
- Brigham, E.F. & Daves, P.R. (2014). *Intermediate Financial Management*. Thomson-South Western.
- Brigham, Eugene F. & Joel F. Houston. (2007). *Fundamentals of Financial Management*. 10th Edition. Translated. Salemba Empat. Jakarta
- Caballero, R.J. (1991). On the sign of the investment-uncertainty relationship: *The American Economic Review*, 81(1), 279-288.
- Chan, S.H., Gau, G.W. & Wang, K. (1995). Stock market reaction to capital investment decisions: evidence from business relocations.: *Journal of financial and quantitative analysis*, 30(1), 81-100.
- Chung, K.H., Wright, P. & Charoenwong, C. (1998). Investment opportunities and

- market reaction to capital expenditure decisions: *Journal of Banking & Finance*, 22(1), 41-60.
- Dechow, P. & I. Dichev. (2002). The Quality of Accruals and Earnings: The Role of Accruals Estimation Errors: *The Accounting Review*, 77 (Supplement) : 35-39.
- Deshmukh, S. & Vogt, S.C. (2005). Investment, cash flow, and corporate hedging: *Journal of Corporate Finance*, 11(4), 628-644.
- Dixit, Avinash K. & Robert S Pindyck. (1993). *Investment Under Uncertainty*. Princet on University Press. Princeton. New Jersey
- Freiling, Jörg, Undate . Uncertainty, Innovation, and Entrepreneurial Functions – Working out and Entrepreneurial Management Approach. *Paper*. Institute for Competence-based strategic Management, University of Bremen, Wilhelm-Herbst-Strasse 5, D- 28359 Bremen, Germany. www.researchgate.net. Accessed July, 1st 2019
- Guiso, L. & Parigi, G. (1999). Investment and demand uncertainty: *The Quarterly Journal of Economics*, 114(1), 185-227.
- Hartman, R. (1976). Factor demand with output price uncertainty: *The American Economic Review*, 66(4), 675-681.
- Indrawati, N.K. (2017). Moderating Effects of Manager Attitude towards Risk on Relationship between Demand Uncertainty and Fixed Investment Decision and the Effect on Firm Value: *Australian Academy of Accounting and Finance Review*, 3(2), 72-84.
- Indrawati, N.K. Ubud Salim, & Helmy Djawahir. (2014). The mediating role of entrepreneurial alertness in relationship between environmental dimensions and entrepreneurial commitment: entrepreneurial self-efficacy as moderating variables: *International Journal of Entrepreneurship and Small Business*, 26 (4), 467 -489
- John, K. & Mishra B. (1990). Information Content of Insider Trading around Corporate announcements: The Case of Capital Expenditure. *Journal of Finance*. 45, 835-855
- Lamont, O. (1977). Cash flow and investment: evidence from internal capital markets. *Journal of O'Finance*. 52, 83-109.
- Leahy, J.V. & T.M. Whited. (1996). The Effect of Uncertainty on Investments: Some Stylized Facts: *Journal of Money, Credit, and Banking*. 28, 64-83
- Leland, H.E. (1972). Theory of the firm facing uncertain demand: *The American Economic Review*, 278-291.
- Linderberg, E., & Ross, S. (1981). Tobin'Q Ratio and Industrial Organization: *Journal of Busienss*. 54, 1-32
- Myers, S.C. (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics*, 5, 147-175.
- Nakamura, T. (1999). Risk-aversion and the uncertainty–investment relationship: a note.: *Journal of Economic Behavior & Organization*, 38(3), 357-363.
- Nickel, S.J. (1978). *The Investment Decision of Firm*. Cambridge Press University. Cambridge. MA
- Nwaeze, E.T. (2004). Replacement versus adaptation investments and equity value: *Journal of Corporate Finance*, 11(3), 523-549.
- Sandmo, A. (1971). The effect of uncertainty on saving decisions: *The Review of Economic Studies*, 37(3), 353-360.
- Sumarti, N., Andrean, D., and Arifin, N.R. (2018). Implementastion of real option analysis with volatility of change in determine the value of a mining project. *Research Gate*. 88-103.
- Trueman, B. (1986). The Relationship Between The Level of Capital Expenditures and Firm Value: *Journal of Financial and Quantitative Analysis*, 21, 115-129
- Zeira, J. (1990). Cost uncertainty and the rate of investment: *Journal of Economic Dynamics and Control*, 14(1), 53-63.