Supply Chain Herding Behavior Management in Investment Decision among Investors at Indonesia Stock Exchange: Experimental Study on the Social Effect of Established Investors and the Informative Effect of Information Regarding Earning Per Share Value

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***Abstract*— This research is aimed to conduct an empirital test on supply chain herding behavior of domestic investors in capital market in Indonesia by assuming that supply chain herding behavior is affected by the social effect of established investors and the informative effect of information regarding Earning Per Share (EPS) value. Motivation behind this research is a concern that many investors often make mistakes repeatedly in their investment decision, which later it forces them to suffer a great loss. This phenomenon is explained using Behavioral Finance Theory. The theory says that while making decision to invest, investors are affected more by irrational factor than rational factor. Research method was using 2x2 factorial experiment design that involved two factors and two indicators in each factor. The effect of two factors and also two indicators in each factor, either partially or simultaneously, on supply chain herding behavior in investment decision was tested. Data were collected by giving treatment to 100 investors. The collected data were processed for testing the hypothesis. Data analysis was done by determining mean difference value across the groups and examining the effect of independent variable on dependent variable. Result of research shows that the social effect of the established investors who are skilled in investment analysis is more dominant and significant on investors' decision to invest than the informative effect of information regarding EPS value. The implication of this result is that investors need to understand their psychological condition and strengthen their investment analysis skill. It is suggested that the next research should use biased psychology as variable or other indicator of accounting information that influences investment decision.**

***Keywords*—** *Supply chain herding, Social Effect, Information Regarding Earning Per Share Value, Experimental, Supply Chain Management*

1. Introduction

Many investors in capital market often make the same mistakes repeatedly when they make investment decision. Repetitive behavior had encumbered investors with a great loss. Main reason behind this behavior is that investors are lacking of self-confidence on their own capability in investment analysis [1]. As a consequence, this behavior could create unreasonable condition in capital market. This unreasonable condition was indicated by the presence of anomaly at capital market. This anomaly refers to a situation when investors simultaneously imitate the action of other investors (mostly established investors) but without knowing the consequence of their own action [2]. This behavior is known as supply chain herding behavior, an activity that potentially can change stock return volatility [3].

Supply chain herding behavior is often found among investors in emerging market countries and dominantly shown during market stress condition. Investors suppress their conscience and choose to follow market consensus. Based on Emerging Market Index released by Morgan Stanley (MSCI), it was stated that Gross National Income (GNI) of Indonesia in 2017 was USD (United States Dollar) 3,540, and in 2018, it increased to USD 3,840, and pursuant to this result, thus, Indonesia was classified into Emerging Market category because Indonesia's GNI was at middle level. By this statement, it could be said that investor behavior in Indonesia capital market tends to follow the decision of other investors [4].

Moreover, supply chain herding behavior was dominated by investors in several sectors including agriculture, infrastructure, transportation, finance, mining and property [5]. However, different finding which showed that supply chain herding behavior symptom was hardly found in Indonesia stock market because there was no extreme movement of stock price or no prolongation of market stress condition. Furthermore, supply chain herding behavior of certain investors was affected by the type of information they receive, which can be either financial information (Earning Per Share value) or non-financial information (social effect).

Financial information is one determinant factor that affects the decision made by investors at stock market [6]. Financial information that is frequently used at stock market is information regarding Earning Per Share (EPS) value. This information has a value of relevance and is capable to increase investors' interest to invest their capital and reduce the risk level of their investment. Meanwhile, non-financial information that is often available at capital market is the social effect of other investors, and this social effect becomes a factor of irrationality of investors when they make investment decision [7].

Supply chain herding behavior of investors and the social effect of established investors on supply chain herding behavior are two phenomena usually found in the context of economic and finance. A survey had been conducted involving interdisciplinary approach that took ideas from social and behavioral sciences (economic, sociology, psychology, biology and nerve science). Result of this survey showed that supply chain herding behavior and the social effect of established investors are two factors affected by reason and emotion. Indeed, supply chain herding behavior can be triggered by the social effect of established investors because potential investors often use established investors as their reference (the trustworthy individuals) before they make investment [8]. Such potential investors are not only affected by their knowledge about investment prospect, return rate, and risk, but also by psychology. This situation is in accord with the expectation of Behavioral Finance Theory.

Behavioral Finance Theory explained that investor behavior in investment decision is affected by irrational factor (intangible/psychology) and rational factor (tangible). By taking this theory as a reference, the current research attempts to construct a comprehensive model that comprises irrational factor (the social effect) and rational factor (the informative effect). Experimental method is used to create this model. Moreover, this model is actually a development research from a previous research examined both rational and irrational strategies used by investors in their investment decision [9].

After taking into consideration of all explanations previously given and using it as background, then research problem is formulated as follows: Is there a difference in supply chain herding behavior among investors at Indonesia Stock Exchange, especially when they make investment decision after getting the social effect of established investors and obtaining information regarding Earning Per Share (EPS) value ?

2. Literature Review

Investment is a sacrifice made by investor in the present days to obtain good return in the future after taking into account the risk that they possibly confront with. Return and Risk have unidirectional relationship [10]. For example, high return is only achievable with high risk. Low return comes with low risk. In such condition, investors must choose the best investment among many options available to them, such as buying, selling or keeping stocks. Any investment can deliver the expected return, but the return in the form of capital gain or dividend yield is only achieved through stock investment [11]. Based on the opinion given, return on investment is an indicator used by investors to increase their welfare. Investors expect that they would get capital gain and dividend yield as high as possible at certain risk rate. This expectation motivates investors to take into consideration any information and also psychological factor in order to produce optimum investment decision [12].

The current research is analyzing the investments at capital market through financial and psychological sciences. Two bases of theory are used by this research, namely Behavioral Finance Theory and Heuristics Psychology Theory. Behavioral Finance Theory was developed by Daniel Kahneman and Richad H. Thaler, the winners of Nobel Prize in Economics in 2002. The illustration of Behavioral Finance Theory is given as following:

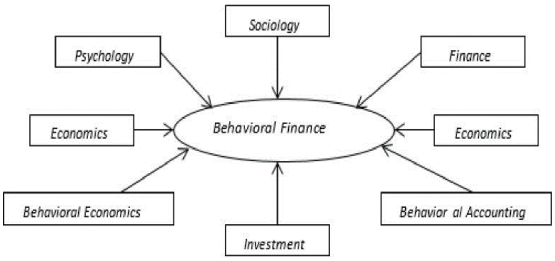

Figure 1. Behavioral Finance Concept

Figure 1 shows that behavioral finance is a discipline of science that contains the interaction of various disciplines of science (interdisciplinary), which include sociology, finance, economic, accounting, investment, and psychology. Behavioral Finance Theory declared that normal behavior of investors in their investment decision is always determined by rational factor (finance) and irrational factor (psychology).

Investors can behave rationally if they evaluate financial information as the optimum base of investment decision [13]. Information regarding earning per share (EPS) value is a financial information that shows the rate of net earnings that investors possibly get from every sheet of the stock. This information is then used by investors as the indicator to determine their investment decision [14].

Meanwhile, investors with irrational behavior often use psychological factor when they make investment decision. The condition of capital market in the last few decades had indicated that investors were not always rational, and market was not always efficient. In fact, in average, investors base their investment decision on irrational factor [15]. Investors' irrational behavior can force stock price to go unstable although there is no fundamental change in economic indicators. Psychological pressure often compels irrational investors to act uncontrollably due to fear, greedy, and panicking.

Besides Behavioral Finance Theory, Heuristics Psychology Theory is also used as theoretical base in this research. But, it must be noted that heuristics psychology theory is precisely a theoretical frame that underlines behavioral finance theory [16]. Heuristics psychology theory explains that investors often make systematic mistake in their way of thought (cognitive capacity), including too confident with their skill and capacity, too much relying on self experience, and others. Investors were too easily experiencing biased trust when they are under uncertainty and risk in the environment characterized by a great deal of activities, dynamics, and complexities like capital market. There are many kinds of biased trust experienced by investors during uncertainty condition, and one of them is biased supply chain herding [17].

Supply chain herding is a biased psychology that drives investors to imitate the decision of others rather than to follow their own belief or information. Supply chain herding is usually done by investors without thinking about fundamental guidelines of their own company, and this behavior makes the market becoming difficult to be efficient. Supply chain herding is an expression used to describe institution or individual that takes the same behavior as the other (acting like a herd) [18]. Moreover, supply chain herding is not independent behavior because investors tend to follow the decision made by the market. Supply chain herding behavior can be measured by ensuring whether an investor has made stock transaction and other investors follow this transaction. This condition may increase or decrease the same stock ownership level at certain period [19].

2.1. The Social Effect of Established Investors on Supply chain herding Behavior in Investment Decision

Human is a social creature that is hardly separated from the effect of other human, and therefore, the behavior of one human in environment is always affected by other human in surroundings [20]. Before making their own decision, some individuals tend to imitate the behavior of other individuals. Referring to, a behavior adopted by an individual is a behavior caused by the social effect. Moreover, the social effect was defined as social psychology domain that investigates how individuals are affected by the pressure of individuals or other group of individuals as their effort to change attitude, perception, or behavior of those individuals [21]. Social effect occurs when some investors interact with other investors, and this interaction creates a process of influencing one another that can change both attitude and behavior dynamically.

Social effect can be understood as the change of thought, feeling, attitude or behavior of any individual after having interaction with other individuals or group of individuals who are considered skillful in the questioned field, or with those who have social power [22]. The perspective of social power bases perceives social power as social effect. Community members who have great social power bases tend to have great opportunity to receive the social effect of others. The bases that underline social power consist of reward power, coercive power, legitimate power, referent power, and expert power [23].

The current research is focused on the social effect that is based on expert power. Expert power is underlined by a belief that certain individuals are considered as having power because they have knowledge, skill, and information needed by others to solve their shared problem [24]. The social effect that is based on expert power can influence potential investors to change their behavior in making investment decision. Indeed, potential investors do not have other choice but change their behavior because they do have imperfect information and lacking of capability in investment analysis [25]. Therefore, they take reference from other investors who are already established and have better skill and information.

Social effect is measured by differentiating positive social effect from negative social effect. Both positive and negative social effects are the indicators that measure social effect. Both positive and negative social effects were influencing supply chain herding behavior of investors in their investment decision. It can be said that supply chain herding behavior is chosen by the potential investors due to social effect, and later, this social effect produces a sentiment among them that manifests as excessive irrational behavior (psychology factor) when they make opinions and decisions regarding investment. It is consistent with heuristics psychology theory that explains that potential investors often experience biased trust (biased psychology) [26]. Such biased condition affects the way of thought of investors in initiating and making decision, especially at the condition of uncertainty including the environment that is always active, dynamic, and complex like capital market. Pursuant to the explanations above, the first hypothesis is proposed as following:

Hypothesis 1: Investors who receive positive social effect from established investors tend to choose the buy option in their investment decision than investors who receive negative social effect.

2.2. The Informative Effect of Information Regarding Earning Per Share Value on Supply chain herding Behavior in Investment Decision

Investors' decision at capital market is dominantly affected by accounting information. Two benefits are obtained from accounting information, which respectively are, that accounting information has value relevance, and that accounting information can predict equity market value. There are four approaches to the value relevance of accounting information, which respectively are: (1) fundamental analysis approach, which says that accounting information not only can change the market price of the stock but also helps the users to detect stock price deviation; (2) prediction approach, which declares that accounting information is useful to predict the future prospect of company performance; (3) embodiment approach, which emphasizes that accounting information can be used by investors to determine stock price; and (4) value relevance measurement approach, which states that value relevance is measured from the capability of the value in capturing or summarizing the information of business and other activity.

The current research uses first approach, which is, fundamental analysis approach. Investors implement fundamental analysis on accounting information that they receive, and then use this information as the base of consideration in making investment decision [27]. Earning Per Share (EPS) value is an information usually found in corporate financial statement, and this information shows the size of corporate net earnings that are ready to be distributed by company to all shareholders. Accounting information in a form of EPS value is an information with value relevance because at least it can increase investors' interest to invest their capital, although investors must still use other measurement indicator before reaping benefits from EPS value.

Earning Per Share (EPS) value is measured with two indicators, namely the increase of EPS value and the decrease of EPS value. The increase of EPS value gives indication that the company has been successful in increasing corporate wealth, and therefore, investors expect that they will get high rate of return. In the other hand, the decrease of EPS value indicates that the company is not successful in increasing corporate wealth, and as a consequence, investors find difficulty to expect high return rate. Both indicators of EPS value become consideration bases used by investors to choose supply chain herding behavior in their investment decision [28].

As previously described in behavioral finance theory, investors who experience biased supply chain herding tend to conduct fundamental analysis on accounting information. The form of this accounting information is EPS value, which can be found in financial statement that is periodically publicized. When capital market is not stressed, investors tend to buy the stock, especially after the financial statement shows the increase of EPS value. In pursuance of all explanations above, the second hypothesis is written as following:

Hypothesis 2 : Investors who receive information regarding the increase of EPS value tend to choose the buy option in their investment decision than investors who receive information regarding the decrease of EPS value.

2.3. The Social Effect of Established Investors and The Informative Effect of Information Regarding Earning Per Share Value on Supply chain herding Behavior in Investment Decision

It was already stated in previous section that human is a social creature, and it is absolutely difficult for human to be separated from the effect of other human, either in daily activity or in deciding to invest at capital market. Social effect has significant impact on financial decision making in various contexts. Social effect of established investors can influence the participation of potential investors on market share [29].

Supply chain herding behavior of investors and the social effect of established investors on this supply chain herding behavior are always found in financial and economical contexts. Supply chain herding behavior in economical context and decision making in financial context are two social learning processes, and these processes are moderated by emotional and psychological attributes of investors [30].

As already explained in previous section, a survey involving interdisciplinary approach had been conducted. This survey took ideas from social and behavioral sciences (economic, sociology, psychology, biology and nerve science). Result of this survey proved that supply chain herding behavior and the social effect of established investors are two factors affected by reason and emotion [31]. Investment decision made by investors at capital market is greatly influenced by many information, including financial information, such as EPS value, and non-financial information, such as social effect. It corresponds with behavioral finance theory that explains that investor decision is often affected by psychological and financial factors. Third hypothesis is stated as following:

Hypothesis 3a : Investors who obtain information regarding the increase of Earning Per Share (EPS) value and receive positive social effect tend to follow the buy option in their investment decision rather than investors who obtain information regarding the decrease of Earning Per Share (EPS) value and receive negative social effect.

Hypothesis 3b: Investors who obtain information regarding the decrease of Earning Per Share (EPS) value but receive positive social effect tend to follow the buy option in their investment decision rather than investors who obtain information regarding the increase of Earning Per Share (EPS) value but receive negative social effect.

This research proposes a comprehensive model by referring to behavioral finance theory. Information regarding EPS value is important information used by investors as the base of fundamental analysis. Social effect of established investors has led the investors to show irrational behavior in their investment decision. Based on theoretical elaboration above, the empirical research model is then created as following:

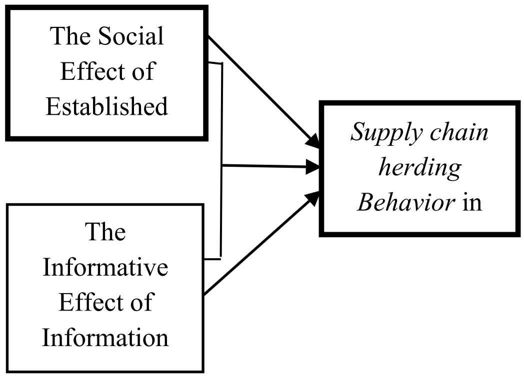

Figure 2. Empirical Research Model

3. Methodology

Research type is quantitative. The approach is pure experiment or randomized experiment. Randomized experiment usually involves arranging the participants randomly. Main goal of experimental research is to understand the causal relationship (cause and effect relationship) between variables. Within the context of the current research, the social effect of established investors and the informative effect of information regarding EPS value on supply chain herding behavior in investment decision are investigated.

Data were collected by giving treatment or manipulation to 100 investors as the participant (subject) of research. This treatment took form as a set of simulations. Participants were divided into four groups. Every group consisted of 30 participants, and the selection was done through randomization where participants were randomly selected from the existing population. The simulation was done through a workshop organized by RHB Security Company in Jakarta. Referring to the data provided by Statistic Indonesia Stock Exchange (IDX), it was indicated that the number of investors in Indonesia per August 21 of 2019 was 1.7 millions investors. Great number of investors were often found in big cities, including Jakarta, the capital of Indonesia. Therefore, research decided to use investors from Jakarta city as the participants because research expected its sample to be more representative. Data collected from experiment (treatment) activity were then analyzed.

Data analysis instrument was a statistic test called Univariate Two Ways Analysis of Variance. This instrument was used to assess significance level of the effect and the average difference across the groups [32]. There are two independent variables (factors) considered in this research, namely social effect of established investors and informative effect of information regarding Earning Per Share (EPS) value. Each variable has two indicators (levels) [33]. Social effect of established investors has two indicators (levels), which respectively are, positive and negative social effects. Informative effect of information regarding EPS value comprises two indicators (levels), namely the increase of EPS value and the decrease of EPS value. Therefore, research design is 2x2 factorial experiment, and this design is selected by intention to examine the effect of two factors, either partially or simultaneously, on supply chain herding behavior in investment decision.

4. Results/Findings

4.1. Result of Participant Profile Description

Participants in experiment are investors who are listed at Indonesia Stock Exchange (ISE) in Jakarta. There are 100 individual investors included as participants. The participants are divided into four groups, and each group comprises twenty five individuals. The following is the description of participant profile, which consists of gender, age, last education, and investment experience.

Table 1. Participant Profile Description

Group	Gender		Age		Last Education		Investment Experience	
	Male	Female	< 30 Years Old	> 30 Years Old	College	Non-College	< 1 Year	> 1 Year
1	15	10	20	5	24	1	8	17
2	12	13	18	7	20	5	2	23
3	14	11	19	6	19	6	19	6
4	17	8	21	4	22	3	15	10
Total	58	42	78	22	85	15	44	56

Based on the description in Table 1, there are 58 male participants, and this number is higher than female participants as many as 42 persons. It indicates that male has greater future orientation than female, and it is actualized by the decision to invest on stock. Most participants are in productive age, precisely below 30 years old, and they use their income not only for fulfilling livelihood necessities but also for investment. Moreover, participants hold undergraduate degree that gives them a capacity to perform investment analysis. Possibly related to this capacity, participants have experience on investment of more than a year.

4.2. Result of Univariate Two Ways Analysis of Variance (ANOVA)

Table 2. Levene's Test of Equality of Error Variances[a]

Dependent Variable: Decision Level

F	df1	df2	Sig.
1.336	3	96	.267

Result of Levene's Test of Equality of Error Variances was given in Table 2. This table also shows the result of Anova assumptions test, which requires that data must be homogenous. Result of F-test gives a value of 1.336 > 0.05, which signifies that Anova model has same variance, and therefore, Anova assumptions are fulfilled and the analysis can be continued to the next phase.

Table 3. Test of Between-Subjects Effects

Type of Effect	Change in Information regarding EPS Value	Mean	Sig
Positive Effect	Increase	84.8000	
	Decrease	71.2000	
Negative Effect	Increase	34.4000	
	Decrease	19.2000	
Social Effect			.000
Informative Effect			.000
Social Effect * Informative Effect			.740

a. R Squared = 854 (Adjusted R Squared = 850)

Table 3 provides few information that are used to verify Hypothesis 1, 2 and 3. Those information concern with the social effect of established investors and the informative effect of information regarding *Earning Per Share* (EPS) value, either partially or simultaneously, on *supply chain herding behavior* in investment decision [34].

Result of test on partial effect shows that either social effect of established investors or informative effect of information regarding EPS value has significant effect on *supply chain herding behavior* in investment decision. This significant relationship is proved by significance value of 0.000 < 0.005. Based on this result, Hypothesis 1 and 2 are accepted. In average, *supply chain herding behavior* in investment decision between from the investors who receive social effect of established investors and from those who receive informative effect of information regarding EPS value is statistically different of one to another [35]. This result supports the previous research. Furthermore, *behavioral finance theory* explains that normal behavior of investors always involves psychological attribute that makes them following the decision of other investors (*supply chain herding*) [36]. Investors can develop their *supply chain herding behavior* due to the social effect of established investors, and this effect can begin either through direct conversation or communication media [37]. Results of hypothesis test on Hypothesis 1 and 2 are statistically different, and these are presented in the following figure.

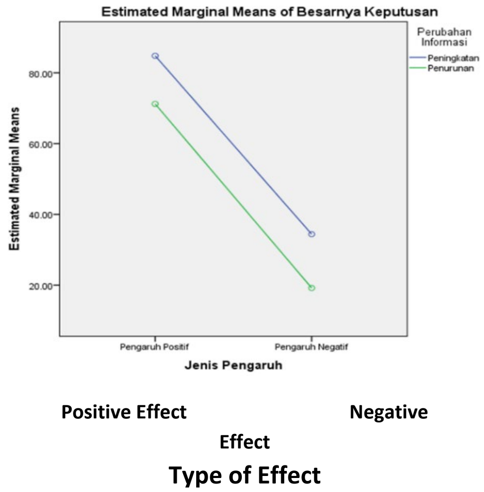

Figure 3. Estimated Marginal Mean

Based on the illustration of Figure 1 above, the mean score of supply chain herding behavior in investment decision after receiving positive social effect and after obtaining information regarding the increase of EPS value is higher than the mean score of supply chain herding behavior in investment [38] decision after receiving negative social effect and after obtaining information regarding the decrease of EPS value.

Result of test on simultaneous effect shows that the interaction between social effect and informative effect does not have significant effect on supply chain herding behavior in investment decision. This condition is proved by significance level of 0.740 > 0.05. Based on this result, Hypothesis 3 is rejected because in average, supply chain herding behavior in investment decision from the investors who receive social effect and obtain information regarding EPS value is not statistically different of one to another [39]. This result is not supporting the previous finding given by Areiqat et al. (2019) but it supports heuristics psychology theory, which explains that investors are dominantly affected by their psychological factor when they make investment decision.

5. Conclusion

This research implements investment analysis using behavioral finance theory approach. This theory says that investors' behavior in their investment decision is dominantly affected by irrational factor rather than rational factor. Irrational factor is associated with psychology, and the most frequently form of this factor is biased psychology that often precedes the supply chain herding behavior of investors in emerging market country like Indonesia. This research has proved that most Indonesia investors have a great inclination to follow the decision of other investors (showing supply chain herding behavior) in their investment decision.

Result of this research shows that Indonesia investors tend to follow other investors (supply chain herding behavior) after they receive positive social effect and obtain information regarding the increase of Earning Per Share (EPS) value. They decide to not follow other investors when they receive negative social effect and obtain information regarding the decrease of EPS value. Investors may feel that they are not capable to conduct fundamental analysis on investment and probably lacking of information about investment. This finding supports behavioral finance theory. Previous research had discovered that most Indonesia investors are driven by psychological factor (irrational factor) and they tend to follow the decision of other investors (supply chain herding behavior) in their investment decision.

This research gives two meaningful benefits. One is that the results of this research can provide information possibly needed by accounting regulators. Secondly, the results of this research may guide other accounting-related professions such as accountans, investors and others, to become more efficient in their work. It is suggested that the next research should examine a topic called behavioral accounting. This topic can be elaborated by involving psychological factors such as anchoring bias, conservatism, representativeness, availability, and overconfidence.

Acknowledgments

Researcher would like to express a great gratitude to the Education Fund Management Agency (LPDP), which is under the Finance Ministry of Indonesian Republic, for the funding given to researcher to be used for the publication of journal in Scopus Index.

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