FEASIBILITY STUDY USING SIMULATION BASED NET PRESENT VALUE ANALYSIS

(Case Study in Kopen Coffee, Yogyakarta)

Thesis

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By

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Had been defended in front of Examination Committee in Partial Fulfillment of the requirement for the bachelor degree of Industrial Engineering Department

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DEDICATION

I dedicate my final project for my beloved parents especially my mother who gave me everything that I need, everything that she has, forgiveness, and a chance in every single mistake I've made,

Sisters who gave me motivation, my friends who support me, everyone who set me down and everyone who wake me up.

MOTTO

"Tatkala umurku habis tanpa karya dan pengetahuan (ilmu), lantas apa makna umurku ini?."

(KH. Hasyim Asy'ari)

PREFACE

Assalamualaikum Wr. Wb.

Alhamdulillah and gratitude are presented to Allah, which has always grants with His grace, strength, and blessing so the author could complete this undergraduate thesis. The author would like to thank for those who always help and support the author so that, this thesis can be finish. Therefore, thanks to:

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The author realizes as a human that there are a lot of mistakes and weaknesses in what author wrote. But, the author hopes this thesis could help and bring advantages for everyone who reads this.
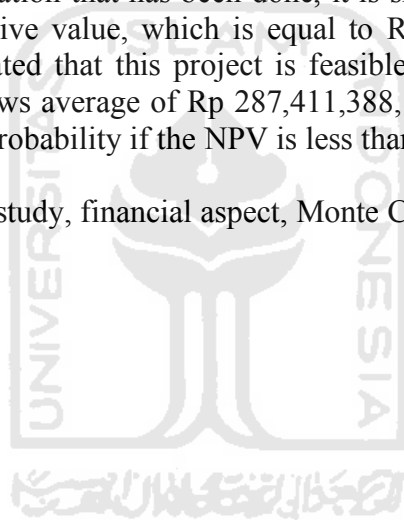
Wassalamualaikum Wr. Wb.

Khairesa Handayu

ABSTRACT

Coffee is one of the biggest commodities in Indonesia, along with rubber and textile. Nowadays, there are many coffee shops that established and this also in-line with the number of demands that increasing in Indonesia from period of 2018/2019 to 2019/2020. Luckily, Indonesia is the fourth biggest countries producing coffee beans after Brazil, Vietnam, and Colombia. Lots of people investing their money in coffee shop business. In Yogyakarta itself, coffee shop can be found in every inch of steps. One of the coffee shops in Yogyakarta that already established is Kopen Coffee. It is located in Condongcatur, where there are quite lots of undergraduate students lived and also one of densely populated area in Yogyakarta. With the competition and lots of people who invested and interested in this kind of business, this research would like to know the worth of the money invested in Kopen Coffee as well as the other similar business using Net Present Value (NPV) method that simulated using Monte Carlo. From the calculation that has been done, it is shown that the NPV of Kopen Coffee generates positive value, which is equal to Rp 336,506,243.61. From this result, it can be indicated that this project is feasible to run. After 1000 times of iteration, the NPV shows average of Rp 287,411,388, with mean standard error Rp 3,956,371. While the probability if the NPV is less than zero is 0.08%.

Keywords: Feasibility study, financial aspect, Monte Carlo, Net Present Value.

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CHAPTER I

INTRODUCTION

1.1   BACKGROUND

Indonesia has abundant natural resources from coal to spices. One of the potential commodities which needs to be developed is coffee bean. Coffee itself is a type of beverage that is important for most people all over the world. Not only because of the enjoyment of consumers of coffee drinkers but also because of the economic value for countries that produce and export coffee beans. Coffee could be one of the people's incomes, which can increase the foreign exchange of a country through raw and processed coffee beans as well. There are two varieties of coffee beans that are generally known, which are Arabica and Robusta Coffee.

Countries that dominate world's coffee production are in the regions of South America, Africa, and Southeast Asia. In 2018, Brazil is pronounced as the largest coffee producer country followed by Vietnam and Columbia. Figure 1.1 shows that Indonesia was able to produce around 10,000 thousand 60 kg bags in 2018. This makes Indonesia currently ranked fourth as the largest coffee producer country in the world.
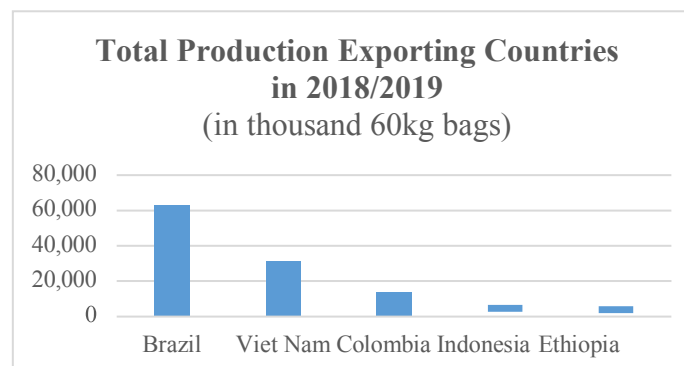
Figure 1.1 The World's Biggest Coffee's Producer in 2018/2019

Indonesia's achievement as the fourth-largest coffee producer in the world is in line with the high coffee consumption in Indonesia. Indonesia's Coffee Consumption Annual Data 2019 released by the Global Agricultural Information Network shows projections of domestic consumption in 2019/2020 reaching 294,000 tons or around 13,9 per cent compared to consumption in 2018/2019, which reached 258,000 tons (Widiati, 2020). That statement also emphasized by coffee entrepreneurs who estimate that domestic coffee consumption is now showing significant growth along with the development of café which has modified how coffee is being served. The owners try to make interesting concepts to make consumers come to their place of business in an effort to meet the desires and needs of consumers, as well as to generate profit for the business. The growth of coffee shops business contributes a big role in increasing the consumption of coffee faster. This phenomenon is expected to be able to boost the increase in the level of coffee consumption per capita. Hence, there is an increasing in the number of new coffee shops in Yogyakarta as cited from Harian Jogja which shown in Table 1.1.

Table 1.1 Number of coffee shop in Yogyakarta

Years	Coffee Shop Amount	Increasing Percentage
2008	156	0%
2009	186	19.23%
2010	191	2.68%
2011	196	2.61%
2012	235	19.89%

In accordance with the growth of the coffee shops, Indonesian economy is currently experiencing rapid development. This was proven by data from the Central Bureau of Statistics/Badan Pusat Statistik (BPS) which released the results of the first quarter of 2018 economic growth of 5.06 percent. This figure grew higher than the year-on-year economic growth of 5.01 percent. Economic progress in Indonesia is marked by the number of new businesses that have established, ranging from small-scale businesses to large-scale businesses. The business that is in great demand by the public is a business engaged in the service sector. Every company has its goals, in carrying out business activities, both short and long-term goals. The short-term goal to be achieved by the company is the achievement of profits so that the availability of continuous funds to be able to operate everyday business could be maintained. While the long-term goal to be achieved is to guarantee the survival of the business as well as developments in the future. This requires each business leader or owner to act professionally in achieving the goals set by the business. The success of a business to achieve its goals is determined by the business's ability to manage various supported resources and investments, in terms of establishing a business.

Investment in this business can help people's lives become more practical and efficient. Many benefits can be obtained from investment activities, saving foreign exchange, and adding foreign exchange. Basically, an increase in investment activities can escalate the economic activity in a country. Of course, investment activities here is defined as the investment activities that are economically profitable, not investment activities that lead to future losses to the parties involved. In order to be able to carry out its function as a service provider to the community, supporting facilities are needed so that it can run properly.

Nowadays, almost everyone especially students have lot of activities outside, in terms of accomplishing the tasks, meetings, or just hang out with friends. These activities certainly require supporting facilities in the form of a comfortable place that suitable for socializing. One of the favorite places that often used by student is the co-working space in coffee shop. Coffee shop, aside of considered as a comfortable place, coffee shop usually can accommodate them with basic necessities while performing activities. Capturing these opportunities, researcher tries to make a feasibility study for coffee shop business, named Kopen Coffee.

Kopen Coffee is one of coffee shops in Yogyakarta. It was established with a concept of a homey coffee place, which has a unique room design. Kopen Coffee offers several types of coffee and non-coffee beverages such as Breve and Groen, which are pronounced as the favorite menu. Students and young executives are the target market of Kopen Coffee, who like to spend time for drinking coffee, having meeting or discussion with friends, or enjoy the leisure time with their relatives. The location is strategic, unique, and comfortable. For establishing and developing business, accuracy and carefulness need to be done. Hence, by a proper feasibility study, it will be able to be analyzed whether a business can be declared feasible or not. According to Jumingan (2009) a feasibility study is a comprehensive assessment to assess the success of a project, and the feasibility study of the project has the aim of avoiding investment too large for activities that turn out to be unprofitable.

Sofyan (2004) assessed the financial aspect by conducted the feasibility study using Net Present Value (NPV) investment. It is calculating the difference between the present value of an investment and the present value of net cash receipts (operational cash flow) in the future. Implementation of the NPV method will encounter problems when faced with conditions where the output is probabilistic and random in nature, one alternative approach proposed for the decision diagram case with a probabilistic outcome is to use a Monte Carlo simulation approach. real system 1 has a relatively high uncertainty factor. With the simplicity possessed by this Monte Carlo method, the outcomes that have uncertainty factors from a decision diagram will be accommodated. This is done by determining various outcome values and their probabilities, then doing a Monte Carlo simulation based on random number outputs on outcome probabilities (Cahyo, 2008). The random number used in this Monte Carlo simulation is a representation of an uncertain situation in a real system.

Because Kopen Coffee is one of the newly established and developing coffee businesses, the Monte Carlo method is very suitable for calculating investment feasibility in this coffee shop. Estimated error of the option price generated by using the Monte Carlo method is still small enough so that it is necessary to produce values with high accuracy. Because Kopen Coffee's financial condition is quite good but there is no investor

who want to develop Kopen Coffee, therefore researchers need to conduct a feasibility analysis on Kopen Coffee, so that in the future it will attract investors to contribute in developing the business.

Based on the background mentioned above, it is necessary to have a feasibility study especially from financial aspect aimed at reducing the risk of failure of an investment raised as a basis for investment decision to expand business with the title "Feasibility Study using Simulation based Net Present Value Analysis". Simulation is applied in this research, in order to achieve reliable cash flow and NPV estimation.

1.2 PROBLEM FORMULATION

Based on this background, problem to be solved in this study is how to simulate financial condition of Kopen Coffee using Monte Carlo simulation and analyze it using NPV. Result of the analysis could be used as the basis of investment decision to expand the business.

1.3 RESEARCH OBJECTIVE

Referring to the formulation of the problem above, the purpose of this paper is focused on identifying the feasibility study of investment in Kopen Coffee, in terms of financial aspect using Monte Carlo Simulation for Net Present Value that is obtained.

1.4 PROBLEM LIMITATION

Under the large scope of the analysis of the problem system, the following constraints will be provided: This study only discusses the feasibility study of Kopen Coffee, that concerns about the financial aspect, using net present value method. The research only analyzes the company's perspective, because it is expected that the results of this study can help achieving the company's purposes.

1.5 BENEFIT OF RESEARCH

This research is expected to provide a real picture of the actual situation related to the title that previously selected by the. The expected benefits of the study are divided into theoretical uses and practical uses.

1. Theoretical Purpose

   The results of this study are theoretically expected to be useful as a contribution to the development and theory deepening in the field of industrial engineering. Especially the investment feasibility study using the Net Present Value method which later can be used as a reference or literature for other researchers who want to do further research.

2. Practical Purpose

   As one of the decision considerations for both, investor and business owner who wants to invest their money in coffee shop sector.

1.6 SYSTEMATICAL WRITING

Furthermore, this thesis writing will be continued as follows:

CHAPTER I   **INTRODUCTION**

This chapter contains problem statement, problem background, problem formulation, research objective, scope of problem, research benefit, and systematically writing.

CHAPTER II   **LITERATURE REVIEW**

This chapter will elaborate the inductive and deductive study. Inductive study is primarily important to determine the literature study of the previous research. Deductive study is needed to be elaborated to

provide basic supporting theories to develop the benchmarking assessment.

CHAPTER III **RESEARCH METHODOLOGY**

This chapter will describe the methodology which is applied in the study. It consists of several parts: the arrangement of research position, conceptual model and model development as improvement.

CHAPTER IV **DATA COLLECTING AND PROCESSING**

This chapter will present the elaboration of whole aspect assessment using the data that have been collected based on the research. Result of assessment would be developed in a model and simulated by using Technomatrix Plant Simulation.

CHAPTER V **DISCUSSION**

Chapter five is going to discuss the results of data processing and the analysis. Discussion will present the result of assessment based on the parameters. It will also discuss the simulation result that has been generated.

CHAPTER VI **CONCLUSION AND DISCUSSION**

The final section will describe the overall conclusions from the results of study and the suggestion for the future research.

REFERENCES

CHAPTER II

LITERATURE REVIEW

In this chapter, it will be explained the literature review studies which are divided into two, inductive and deductive. Inductive study is a study from reputable previous research. Besides, deductive study is study that would be explain about the basic theory that has relation with research that would be conducted from the textbooks, etc. Inductive and deductive study need to be done to find out the gap between previous study and the research that would be conducted and to avoid the plagiarism. This literature review will be divided into several sub chapters.

2.1   CURRENT STUDY

There are several studies related to this study. Researcher Shaffie (2016) conducted research about capital investment in Malaysia by using Net Present Value and add Monte Carlo approach. Capital speculation ends up critical venture choice in unsure financial condition should be made. Two noteworthy traps of old-style net present worth are vulnerability and administrative adaptabilities. These disadvantages lead to uncertain money streams estimation. This examination proposes the work of the Monte Carlo technique in the NPV model so as to accomplish solid money streams estimation. Monte Carlo gives the hazard examination which can be received by financial specialists in settling on capital planning choices. Consequence of this examination found that Monte Carlo is a fitting device to insert in NPV model.

Stretcher & Robert (2015) discussed about NPV with Monte Carlo Simulation study. This paper introduces a system for showing Monte Carlo reenactment utilizing the instance

of a capital extension choice for ArkMed Corporation, a little biomedical gadget producer situated in Houston, Texas. The organization proposes the idea of putting resources into an office that can give custom items utilizing 3d printing. The office would serve the custom orthotics and strong embed needs of the restorative network of the more noteworthy Houston metropolitan territory. A reproduction of the budgetary achievability of the new office is suitable since the assembling technique is new to the company's administration, and on the grounds that the office would serve a specially requested item that would be quickly given, inside a couple of hours to a couple of days, in contrast to the organization's present business. The case gives a chance to enlarge inclusion of capital planning situation investigation, and to give understudies an activity that requires multi-page referencing in Excel. It additionally can give yield information that can be abridged into a histogram and recurrence appropriation diagram. This procedure takes into consideration a visual of the hazard that an undertaking could restore a negative NPV result. The dispersion of NPVs along these lines gives better data on which to base a capital resource development choice than would a discrete NPV worth dependent on midpoints of offers development, cost proportions, and expense rate.

Sachin et al. (2014) used Monte Carlo Simulation approach to manage the risks in operational networks. The work introduced in this paper is an underlying exertion that broadens the perspective of overseeing dangers with regards to GSC. This work tries to boost the GSC environmental financial gains and guarantees manageability in business. The commitment of this work can be condensed in two stages: in the underlying advance, the various dangers identified with the operational system in GSC have been perceived and estimated to assess their outcomes. In the last advance, the outcomes of the dangers explicitly as far as deferral/unsettling influence have been investigated. In view of the past examinations and sources of information obtained from the specialists, an absolute five operational dangers in GSC were recognized and assessed to break down their results regarding Time, Brand picture, Economic, Health and Safety, Quality and so forth. The most extreme results were found in time-based outcomes and that was estimated as far as time delays/aggravations and interruptions. Further, the human-based appraisal incapable to give outrageous situation thus reproduction was utilized. Monte Carlo Simulation approach was utilized to break down the operational hazard factors and their outcomes on the exhibition of GSC and it additionally

catches the vulnerabilities in the data sources. An affectability investigation test was performed to catch the outcomes of dangers on the postponement/unsettling influence profile mean.

Ganame & Chaudhari (2015) assessed the development building timetable hazard investigation utilizing Monte Carlo reproduction. For the likelihood of finishing the Hostel working inside the due date, the recreation utilizing @RISK programming had demonstrated that there is zero likelihood for the task to be finished inside 282 days (in all probability length). This demonstrates the due date dependent on no doubt spans that had been utilized by the development supervisory crew was not noteworthy in a vulnerability domain; it is probably not going to be accomplished. The vulnerabilities lead the undertaking the board to dangers and issues. The development timetable ought to be overhauled normally, and the progressions of due date may happen more than once.

Hizkia (2018) evaluated investment risk in the construction of office buildings. Risk analysis becomes necessary in a feasibility study, especially during a financial feasibility study because uncertainty in income and construction costs is always present. This study aims to conduct a financial feasibility study and carry out a risk analysis using a Monte Carlo Simulation Method that is a simulation that considers the probability distribution of predetermined variables into a model, which in this study is a Discounted Cash Flow Model (Discounted Cash Flow, DCF). The results showed that the conclusion of feasibility produced by financial analysis with the Discounted Cash Flow Method has a p-value of around 67%. From the sensitivity analysis, it is known that the selling price has twice the impact on NPV and IRR compared to construction costs.

Boufateh (2019) did research use Monte Carlo simulation to examine the consequences of slipping of the identification restriction value and get the sensitivity of variables. The sensitivity of the variables used to change the identification restriction of the value. This research found that precision measurement should be considered.

Vajargah (2017) did research on evaluating random path of wave using multilevel of Monte Carlo. This research found that the evaluation of random paths can be done with Monte Carlo simulation as a simple and flexible tool to use. This research also comparing Monte Carlo with Multilevel Monte Carlo result of the valuation of European options integral discretization.

Bendob & Bentouir (2019) wrote paper that intends to testing the adequacy of the most mainstream choices valuing models, which are the Monte Carlo reproduction strategy, the Binomial model, and the benchmark model; the Black-Scholes model, when it disregard/consider the Moneyness classifications and distinctive time to developments. The outcome demonstrates that all models are overrated in all Moneyness classifications with an abnormal state of instability In-the cash classification, other finding infers that the Monte Carlo Simulation strategy is outflanking when the unpredictability is lower, while the Black-Sholes model and the Binomial model are beating in the whole example with disregarding the Moneyness.

Park & Sharp (1990) wrote a book "Advanced engineering economics" Park and Sharp-Bette in his book write some further analysis of technical economics. One of the fields shown by Park and Sharp-Bette is the manufacture of Monte Carlo simulations to accommodate risk factors in the calculation of technical economics. In this book, the steps for making the Monte Carlo simulation will be discussed in detail. However, in this book, Park and Sharp-Bette only state the distribution of the economic method parameters of technique they used, for example NPV. Park and SharpBette do not show how the subsequent analysis (risk analysis) of the results of the distribution of these parameters.

In a study conducted by Komljenovic & Robertson (2016) proposing a high-level Risk-Risk Decision framework in Asset Management that integrates the risk of extreme and rare events as part of the overall risk assessment and management activities. This research focuses on a methodology that aims to identify, assess, and manage these risks in Asset Management. Researchers believe that this approach can support organizations to become

stronger and stronger companies in changing and complex environments. The study exposes two case studies that show the application of the proposed model.

Another study did by Mujiningsih (2013) about feasibility stufy. The feasibility analysis method used is the calculation of NPV, IRR, and BCR while to create a development strategy using SWOT matrix analysis. The results showed that tempe small industries in Matesih sub-district numbered 80 business units and were able to absorb 53 workers. The feasibility analysis of NPV of small tempe industries in the sub-district of Karanganyar is feasible, the BCR value of 1.37 is feasible, the IRR value of 38.72% is feasible and the strategy used is the SO strategy that is to overcome existing weaknesses by taking advantage of opportunities emerging.

A research of Wulan et al. (2012) uses qualitative and quantitative analysis tools. Qualitative analysis used on technical aspects, market aspects and marketing, organizational aspects, juridical aspects, management aspects, economic aspects and environmental aspects. Quantitative analysis on financial aspects with Net Present Value (NPV) investment criteria, Break Event Point (BEP), Internal Rate of Return (IRR), Payback Period (PP), Net Benefit Cost Ratio (Net B / C), analysis of technical aspects, organizational aspects, and economic aspects with the results of research that guest house investment projects are feasible.

Wirastuti (2012) examined the financial analysis of the development of The Magani Hotel Kuta with research variables on financial aspects. This study uses an analysis of the calculation of investment criteria, namely Benefit Cost Ratio (BCR), Net Present Value (NPV), Internal Rate of Return (IRR) and Payback Period (PP) with the results of the development research of The Magani Hotel Kuta feasible under fixed income conditions.

Nufaili & Utomo (2014) about Investment Analysis of Pesonna Makassar Hotels with research variables on financial aspects. This study uses an analysis of calculation of Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period (PP), with the results of the study showing investment planning of Pesonna Makassar Hotel is feasible.

Manope et al. (2014) wrote financial analysis obtained from calculations Based on the results of the analysis and discussion it can be concluded that: The business of commodity seeds and mace pala is feasible to run. The six methods of analysis (Cash Flow, Payback Period, Average Rate of Return (ARR), Net Present Value (NPV), Internal Rate of Return (IRR), and Profitability Index (PI) all state that this business is feasible. the opportunity for investors and entrepreneurs is still large enough to get profits from running commodity and nutmeg seed business in Siau Island.

Cheon & Liang (2009) shows in theory that the samples generated by SAMC can be used for Monte Carlo integration via a dynamically weighted estimator by calling some results from the literature of nonhomogeneous Markov chains. Our numerical results indicate that SAMC can yield significant savings over conventional Monte Carlo algorithms, such as the Metropolis-Hastings algorithm, for the problems for which the energy landscape is rugged.

Nurkhotimah (2014) analyze Kampoeng Doeloe Semarang Joglo Franchise investment business, is a culinary product that was only established since 2010 and is risking large capital in the long run, there will be problems whether investing Franchise at Kampoeng Doeloe Joglo Restaurant is profitable or not. In analyzing the data and results of the study, researchers used NPV analysis, IRR analysis, PI analysis, MIRR analysis, COC analysis, Sensitivity analysis, and Monte Carlo simulation analysis.

Nuryanti (2015) wrote an analysis of feasibility study in PLTN SMR project in Indonesia with considering the uncertainty variable. In order to accommodate the probability which can cause uncertainty variable, this research use probabilistic analysis with Monte Carlo technique. This technique simulating the correlation between uncertainty variable with feasibility indicator of the project. The results showed that in the probabilistic approach the SMR nuclear power plant project was considered feasible in the "most probable value".

Oztaş & Okmen (2004) examine risk in a construction project. This research use Monte Carlo simulation to examine the uncertainty of a construction project. The results of

the Monte Carlo simulation are in the form of project duration distributions. After that a risk analysis is carried out. The stages of risk analysis according to Akintoye and Maclead in Oztaş & Okmen (2004) are establish an appropriate context, set goals and objectives, identify and analyze risks, influence risk decision-making, and monitor and review risk responses.

Krzysztof (2016) examine the effect of a few situations of loan cost changes in Poland on the neighborhood governments' capacity to support their ebb and flow obligation loads. Reproductions are directed with the Monte Carlo strategy. A few situations show a high powerlessness of neighborhood governments to antagonistic changes in market financing costs, however just in the event that they are joined with a decrease of division's working excess. Such a monetary arrangement may offer ascent to foundational issues for the entire open part.

Robert (2006) wrote a Monte Carlo Analysis connected investigations of business angling have generally overlooked the intertemporal parts of rehashed site decisions. For some fisheries, anglers may pick a progressively ideal voyage direction instead of nearsighted everyday techniques and a model that overlooks these contemplations will probably prompt one-sided parameter evaluations and poor strategy direction. A dynamic irregular utility model is built up that uses a similar data as static site-decision models yet is settled in the standards of dynamic advancement. Utilizing Monte Carlo investigation, they assess the exhibition of this estimator when contrasted with the static model for an assortment of reproduced fishery types.

Peleskei et all. (2015) investigate how the expense of development activities can be assessed utilizing Monte Carlo Simulation. It explores if the diverse cost components in a development venture pursue a particular likelihood circulation. The exploration inspects the impact of connection between's various venture costs on the consequence of the Monte Carlo Simulation. The paper discovers that Monte Carlo Simulation can be a useful apparatus for hazard chiefs and can be utilized for cost estimation of development ventures. The

examination has demonstrated that cost dispersions are emphatically slanted and cost components appear to have some reliant connections.

This study has similarities with the research from Mujiningsih (2013) that also uses Monte Carlo simulations and equally researches about feasibility studies. In addition, this research also examines the developing small industry. While the difference between the two is that the research conducted by Mujiningsih aims to create a development strategy using a SWOT matrix analysis while, in this study, aims to see the feasibility of an investor to invest in Kopen Coffee.

Based on the studies that have been obtained, the conclusions that can be drawn from previous research to this research is to use the Net Present Value method with Monte Carlo simulations to design strategies in helping companies make decisions for investment policies. The difference between this research and previous research is as follows:

1) This research focuses on the use of Monte Carlo simulations in analyzing coffee shop investment feasibility studies. Outlining the project scope and conducting current analysis which focuses on financial aspects.

2) This research provides suggestion regarding to the feasibility of financial aspects of coffee shop business investment which can be used as a basis for making policies regarding the sustainability and business development.

2.2   DEDUCTIVE STUDY
2.2.1   Feasibility Study

Business feasibility study is an activity that studies deeply about a business or business that will be run, in order to determine whether or not the business is feasible (Kasmir and Jakfar, 2012). Meanwhile, how successfully a project can be completed, considering the factors that influence it such as economic, technological, legal and scheduling factors.

Based on the definition above, it can be concluded that a business feasibility study is an initial consideration that must be carried out before running a business, and to control

operational activities in order to obtain maximum profit. Therefore, it is important to identify and to be familiar with business feasibility studies.

2.2.2 Feasibility Study Method

According to Kasmir and Jakfar (2008), the stages of business feasibility studies need to be carried out correctly so that the goals set can be achieved. The stages of the feasibility study are as follows:

1) Collecting Data and Information

   Collecting the data and information in qualitative and quantitative. Data collection is obtained from reliable source such the business owner, etc.

2) Data and Information Mining

   After the required data and information are collected, the next step is to process data and information. Data processing is carried out correctly and accurately with methods and sizes that are commonly used in business.

3) Data Analysis

   Data analysis to determine the feasibility basis for an aspect. Business feasibility is determined by the criteria that have met the standard according to the factors that are appropriate to use.

4) Decision Making

   After being measured by certain criteria and the measurement has met the result, then the next step is to make decisions on the results.

5) Recommendation

The last stage is to provide recommendations to certain parties on the study reports that have been prepared. In recommendations, suggestions are also given if needed.

Other opinions also expressed by Cleverism (2017). Steps to conducting a feasibility study, that are:

1) Conduct preliminary analysis

2) Outlining the project scope and conducting current analysis

3) Comparing your proposal with existing products/services

4) Examining the market conditions

5) Understanding the financial costs

6) Reviewing and analyzing data

Suliyanto (2010) said that the activity of preparing a business feasibility study is not only done when there is an idea to start a truly new business, but a business feasibility study is also needed when business people will do the following rights:

1) Starting a new business

When a businessperson will start a new business, a business feasibility study is conducted to find out whether the business that will be pioneered is feasible or not.

2) Developing an existing business

When a businessperson will develop a business, a business feasibility study is conducted to find out whether the business development idea is feasible or not.

3) Choosing the type of business or investment / project that is most profitable

Often investors and businesspeople are faced with the problem of choosing the type of business or investment / project because of limited costs for investment. In order to decide optimal investment, it is necessary to have a business feasibility study to determine the choice of various investment alternatives.

2.2.3   Purpose of Business Feasibility Study

According to Kasmir and Jakfar (2008), there are five objectives why conducting feasibility study is crucial before running a business, which are:

1) Avoid the risk of loss

The risk for future loss is full with uncertainties, in this case the function of a feasibility study is to minimize the risks that can be controlled, or which cannot be controlled.

2) Facilitate Planning

Planning includes how much funding is needed, when the business will be run, where, how it will be implemented, how much profit will be obtained and how to monitor it if there is a deviation.

3) Facilitate Implementation

With a plan that has been arranged so it is very easy to do business, business execution can be done systematically.

4) Facilitate Supervision

By implementing the project according to plan, it is easy to supervise the running of the business.

5) Facilitate Control

If it can be monitored, if a deviation occurs, it will be easily detected, making it easy to control the deviation.

2.2.4   Net Present Value (NPV)

There are several meanings in the Net Present Value Method as follows, Net present value is a model that considers the overall cash flow pattern of an investment, in relation to time, based on a certain Discount Rate (Syafaruddin, 2001). Net present value of an investment proposal is equal to the net present value of annual cash flows after taxes reduced by the initial investment expenditure (Arthur, 2001). "Present Value" shows the current value of money for a particular value in the future. The formula in the Net Present Value Method is:

$$NPV = \sum_{t=0}^{1} \frac{B_t - C_t}{(1+i)^t}$$

(2.1)

Where:

NPV = *Net Present Value* (Rp)

B_t = Benefit in t-year

C_t = Cost in t-year

i = Interest

t = t-period

If NPV > 0, then the business is profitable and provides benefits (feasible to run). Whereas if NPV < 0, then the business is not profitable (not feasible to run).

2.2.5 Monte Carlo

The word "Monte Carlo" is the name of an area in Monaco which is famous for its judicial facilities (Sediawan, 2013). The Monte Carlo method was first introduced to the world of finance by David B. Hertz in 1964, in the article "Risk Analysis in Capital Investment "in the Harvard Business Review.

2.2.6 Monte Carlo Definition

Monte Carlo is one of the most powerful computing tools to solve the high dimensions of problems in physics, chemistry, economics, and information processing. Monte Carlo method is a method used to calculate or estimate values or solutions using random numbers, probabilities, and statistics (Nadinastiti, 2011).

The Monte Carlo method is defined to represent the solution of a problem as a parameter of the hypothetical population, and use a random number sequence to construct a sample of the population, where statistical estimates of parameters can be obtained.

The Monte Carlo method is the basis for all algorithms of the simulation method which is based on the idea of solving a problem to get better results by giving as many values as possible (Generated Random Number) to get higher accuracy. This method adheres to a free programming system without too much being bound by certain rules or rules.

2.2.7 Monte Carlo Implementation

The Monte Carlo method has many applications in various fields. Nadinastiti (2011) mention about the application of the Monte Carlo method is in the field, which are:

1) Graphic, used to light tracking
2) Biology, used to studying biological networking
3) Financial, used to assess and analyze financial models
4) Physics, the sections of physics that are used that include statistical physics and particles. In particle physics, it is utilized for experiments. In nuclear science this method is also widely applied
5) Probability and statistical sciences are used to simulate and understand the effects of diversity.
6) Computer sciences are used as example of Las Vegas Algorithms and various computer games
7) Chemical science, used for simulations involving atomic clusters
8) Environmental science, this method is used to understand the behavior of contaminants

2.2.8 Monte Carlo Simulation

Construction of a Monte Carlo Simulation model is based on the probabilities obtained by historical data of an event and its frequency, which is:

$$Pi = fi/n$$

(2.2)

Where:

Pi = Probability of i occurrence

Fi = Frequency of i occurrence

n = Number of frequencies of all events

Monte Carlo simulations, derived from statistical sampling, were first delivered by Metropolis and Ulam in a journal entitled The Monte Carlo Method, Journal of the American Statistical Association (Yeh & Sun, 2013)

Monte Carlo Monte Carlo simulation is one of simple simulation methods that can be built quickly by using only spreadsheets, such as: Ms. Excell (Cahyo, 2008). Monte Carlo simulation is a method for evaluating iteratively deterministic models using random numbers as input (Yeh & Sun, 2013). Monte Carlo simulation is defined as all statistical sampling techniques used to estimate solutions to quantitative problems (Achmad, 2008). Monte Carlo simulation is sampling using random numbers with the working principle to generate random numbers or samples of a random variable that is known to be distributed, so that data can be obtained from the field, or in other words Monte Carlo simulations mimic field conditions numerically. Monte Carlo simulations can be defined as real system simulations which are units/particles, by observing the behavior of a number of units/particles that has random conditions according to population distribution, similar to real systems through random number generation (Sediawan, 2013).

2.2.9   Monte Carlo Simulation Steps

According to Sediawan (2013), there are three important steps in carrying out Monte Carlo Simulation, which are:

1) Build a population distribution that closely represents the population distribution of the real system.
2) Produce random numbers following population distribution, to represent the nature or condition of the components that make up the system.
3) Predict the nature of the macroscopic system based on mathematical expectations of the simulated system.

In the Monte Carlo method, simulations system consisted of a number of units/particles that have random conditions, and their distribution are made as closely as possible with real systems that are carried out through random number generation. The nature of the macroscopic system is then only approached with relevant mathematical expectations.

2.2.10 Monte Carlo Simulation Elements

Based on Yeh & Sun (2013), the elements of a Monte Carlo Simulation Monte Carlo simulations require the following elements, which are:

1) Probability density function (pdf).
2) Random number generator to provide random numbers.
3) Recipe sampling, samples from pdf of certain availability with a random number interval unit.
4) Calculation, in which output results need to be given as total value.
5) Incorrect calculations, where the relationship between the number of statistical errors that occur and the function of other numbers.
6) Reducing variations in techniques, to reduce the time needed to calculate Monte Carlo Simulation.
7) Horizontal and vertical integration, to apply effective Monte Carlo simulation to computational system structure.

2.2.11 Monte Carlo Simulation Advantage

The main advantage of Monte Carlo Simulation of other computational techniques is the independence of computing resources on the dimensions of the problem. There are many modifications of this method such as "classic" Monte Carlo, (samples taken from probability distributions), "Quantum" Monte Carlo, (random walks are used to calculate quantum mechanical energy and wave functions), "path-integral" quantum Monte Carlo, (Quantum statistical mechanical integrals are calculated to obtain thermodynamic properties), "simulation" Monte Carlo, (stochastic algorithms are used to produce initial conditions for quasiclassical trajectory simulations).

2.2.12 Net Present Value using Monte Carlo

Following is the step by step on how to do the simulation in budgeting analysis using Monte Carlo method, which is Net Present Value (Dhiensiri & Balsara, 2014).

1. Determining the input variables, there are some variables (unit sales) that will be random number, some others (initial investment, price per unit, variable cost per unit, depreciation, and tax percentage) are already fixed. The random number is converted to a value according to a probability distribution function that already determine.

2. Computing NPV from the key variables that already determined.

3. Then, repeating the same process up to 1,000.

4. For the NPV simulation analysis, there are several variables which can be calculated, such as the average of 1000 iterations of NPV, low end of the distribution given by the 5th percentile, the high end of the distribution given by 95th percentile standard deviation for each key input variable and NPV. A mean of each key input variable and NPV is used as an estimation of the expected value.

Monte Carlo simulation is categorized as a powerful analytical tool since it provides unbiased estimation. Hence, it makes the NPV is estimated accurately.
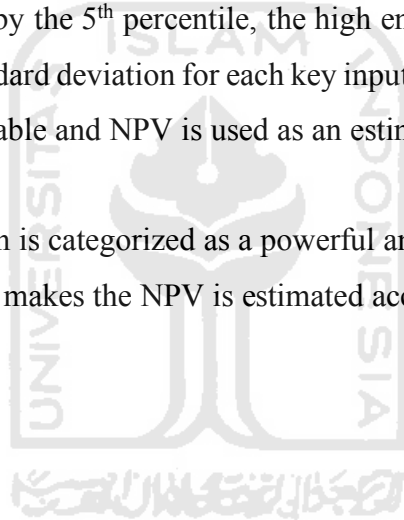
CHAPTER III

RESEARCH METHOD

3.1 PROBLEM IDENTIFICATION

This research took place at Kopen Coffee, located in Harjosudiro street, Sanggrahan, Condongcatur, Sleman, Yogyakarta. Expansion of that business requires capital investment, and an investment requires financial analysis. However, the financial analysis must be conducted for the future. Therefore, how to project financial condition in the future and analyze it before investment would be an essential problem to be solved.

3.2 PROBLEM FORMULATION

Problem to be solved in this study is how to simulate financial condition of Kopen Coffee using Monte Carlo simulation and analyze it by using NPV. Result of the analysis could be used as the basis of investment decision to expand the business.

3.3 LITERATURE REVIEW

There are two types of literature review that carried out in this study. First is literatures' survey on current studies on feasibility analysis, including risk and financial analysis. Besides, another study that has been reviewed is the use of Monte Carlo simulation to project condition in the future based on historical data. This survey aims to support this study in determining the suitable tools for analysis and to position this study to be comparable to the previous studies. Second literatures' survey is performed on basic theory that required in doing this study, which are feasibility study, NPV analysis and Monte Carlo theory.

3.4 DATA COLLECTION METHOD

Basically, in the feasibility analysis, there are two types of required data that are cash inflow and cash out flow. The cash inflow data was obtained from the sales of the Kopen Coffee shop while cash out flow was obtained from the investment value and the operational cost in running the business activities. Therefore, most of the data in this study are considered as primary data that collected directly from the Kopen Coffee shop. Table 3.1 shows the required data and the data sources.

Table 3.1 Required data and the data sources

Data	Data Sources
Coffee sales (cup)	Historical coffee sales (minimum, most likely, maximum)
Profit margin per unit product	Sales price and production cost per unit product
Initial investment: business space, equipment, tools, and licensing	Interview and discussion with the owner
Tax rate	Interview with the owner
Interest rate	Bank interest

3.1.1 Monte Carlo Simulation of Coffee Sales

Monte Carlo simulation for the coffee sales in this study was carried out based on triangular distribution of the historical data. Triangular distribution is employed in this research because of the uncertainty of demand (Salling, 2007). Random data generation based on the triangular distribution could be explained using Figure 3.1 and the following equations.
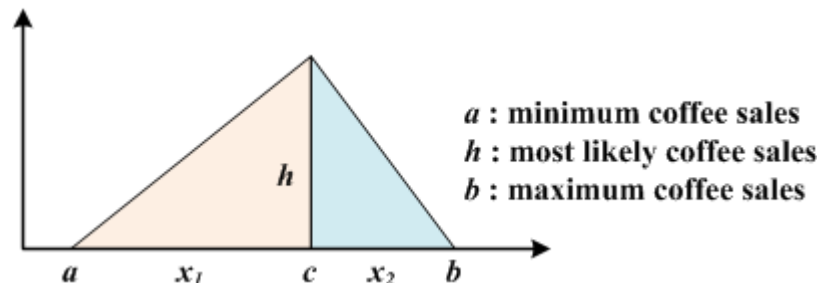
Figure 3.1 Diagram of minimum, most likely and maximum sales of coffee product

Most likely coffee sales (h) could be estimated using Equation 3.1.

$$h = \frac{2}{(b - a)} \qquad (3.1)$$

When probability of the triangle area is considered, then probability of X_1 and X_2 value appearance could be calculated using Equation 3.2 and Equation 3.3, respectively.

$$P(x_1) = \frac{2 \times (x_1 - a)}{(b - a) \times (c - a)} \qquad (3.2)$$

$$x_1 = a + \sqrt{P(x_1) \times (b - a) \times (c - a)}$$

$$P(x_2) = \frac{2 \times (b - x_2)}{(b - a) \times (b - c)} \qquad (3.3)$$

$$x_2 = b - \sqrt{(1 - P(x^2))} \times (b - a) \times (b - c)$$

When Monte Carlo concept is incorporated at those equations, then the simulated sales could be formulated as shown in Equation 3.4.

$$S = \begin{matrix} x_1, & \text{if } n \le \frac{(c - a)}{(b - a)} \\ x_2, & \text{otherwise} \end{matrix} \qquad (3.4)$$

Where:

S : simulated coffee sales value
n : random number from 0 to 1.

3.1.2 Average Profit Margin per Unit Product

Actually, there are several products that have been sold in the Kopen Coffee Shop. However, selling price and production cost of each products is not significantly different. Therefore,

profit margin that considered in this study is average profit margin per unit product. In this study, profit margin per unit product was obtained by performing interview with the Kopen Coffee shop owner regarding to estimated average production cost for a cup of coffee and the average selling price. Interview was conducted because it is almost impossible to calculate the production cost in detail since the process to produce a cup of coffee is quite complicated. Average profit margin per cup of coffee then could be calculated using Equation 3.5.

$$\bar{R} = \bar{k} - \bar{d} \tag{3.5}$$

Where:

$\bar{R}$: Average profit margin of coffee product
$\bar{k}$: Average selling price of coffee product
$\bar{d}$: Average production cost of coffee product

3.1.3 Initial Investment

In this study, initial investment data collection was collected by carrying out interview with the Kopen Coffee shop. Items in initial investment that should be considered are business space, equipment, tools, and licensing costs. Total investment is the sum of all of considered items, as formulated in Equation 3.6.

$$I = b + e + t + l \tag{3.6}$$

Where:

I : total investment cost
b : business space rental cost
e : equipment cost
t : tools cost
l : licensing cost

3.1.4 Depreciation

In this study, depreciation was implemented in order to payback the investment during investment period. Average depreciation method was applied to calculate the depreciation value, as shown in Equation 3.7.

$$\bar{D} = \frac{I}{M} \tag{3.7}$$

Where:

$\bar{D}$: average depreciation value
M : investment period

3.1.5 Before and After-Tax Profit

Before tax profit was calculated by subtracting total average profit margin with the depreciation value, as shown in Equation 3.10.

$$BP_m = \hat{R} \times S - \bar{D} \tag{3.8}$$

After tax profit was calculated by multiplying before tax profit with 1 - tax percentage, as shown in Equation 3.11.

$$AP_m = BP_m \times (1 - tx) \tag{3.9}$$

Where:

BP_m : Before tax profit at period m, during investment period
AP_m : After tax profit at period m, during investment period
tx : tax percentage
m : period index during investment period

3.1.6 Cash Flow

Cash flow was calculated by summing AP_m and $\bar{D}$, as shown in Equation 3.10.

$$CF_m = AP_m + \bar{D} \tag{3.10}$$

Where:

CF_m : cash flow in period m, during investment period.

3.1.7 NPV Simulation Analysis

NPV simulation was conducted using Microsoft Excel and has been ran for 1000 iterations. Analysis on the result of NPV simulation was carried out for average NPV (as shown in

Equation 3.11), mean standard deviation of NPV and interest value (shown in Equation 3.12 and Equation 3.15, respectively), estimation of minimum and maximum of NPV value based on 95% of confidence level (shown in Equation 3.13 and Equation 3.14, respectively) and estimation of minimum and maximum of interest rate based on 90% of confidence level (shown in Equation 3.16 and Equation 3.17, respectively). Such estimation would be used to support the decision making before capital investment.

$$\overline{NPV} = \frac{\sum_{0}^{a} NPV_r}{R} \tag{3.11}$$

$$ST_{def} = \sqrt{\frac{\sum_{0}^{a}(NPV_r - \overline{NPV})^2}{R-1}} \tag{3.12}$$

$$EMinNPV_{ij} = \overline{NPV} - Normsinv(0.975) \times ST_{def} \tag{3.13}$$

$$EMaxNPV_{ij} = \overline{NPV} + Normsinv(0.975) \times ST_{def} \tag{3.14}$$

$$ST_r = \sqrt{\frac{P(NPV < 0) \times A1 - P(NPV < 0)B}{R}} \tag{3.15}$$

$$EMinI_{i1} = P(NPV < 0) - Normsinv(0.950) \times ST_r \tag{3.16}$$

$$EMaxI_{i1} = P(NPV < 0) + Normsinv(0.950) \times ST_r \tag{3.17}$$

Where:

$\overline{NPV}$: average NPV value for R iterations
r : iteration index
R : number of iterations
ST_{def} : standard deviation of NPV value after iterated
$EMinNPV_{ij}$: expected minimum NPV value with confident level at 95%
$EMaxNPV_{ij}$: expected maximum NPV value with confident level at 95%
$EMinI_{i1}$: expected minimum interest value with confident level 90%
$EMaxI_{i1}$: expected maximum interest value with confident level 90%

3.2 DISCUSSIONS

Next step is discussing important things that have not been discussed in previous steps. The discussion would be the basis in arranging suggestions for next research.

3.3 CONCLUSION AND RECOMMENDATION

Conclusion would be arranged in order to answer problem statement. Recommendation for next research would also be arranged based on the previous discussion. Steps in this study are depicted in a flowchart, as shown in Figure 3.2.
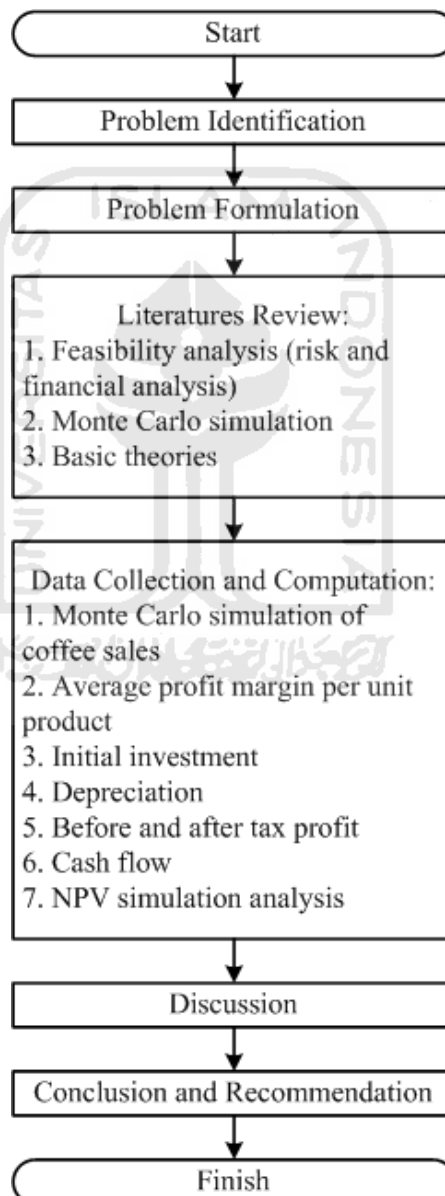
3.5 FLOWCHART

Figure 3.2 Steps in conducting this study

CHAPTER IV

DATA COLLECTION AND PROCESSING

4.1 DATA COLLECTING

The first set of data to be collected is sales of coffee products. Actually, there are several products that sold by the Kopen Coffee shop. However, in this study, only the main products, that made based on coffee, considered in the analysis. In the Kopen Coffee shop, number of secondary products is insignificant and not considered as the core business of the Kopen Coffee shop.

Sales data of the main products could be collected from the Kopen Coffee shop directly. Sales estimation for the main products in the future would be conducted based on Monte Carlo simulation and triangular random distribution. One-year sales data are available, and Table 4.1 shows most likely, minimum and maximum sales of the main products.

Table 4.1 Most likely, minimum and maximum of sales of the main products

	Min	Most Likely	Max
Sales	1,825	29,200	43,800

Second data to be collected is average profit margin per unit products. This data would be calculated from the raw data on average sales price of the main products and average production cost of the main products. Table 4.2 shows the average selling price and average production cost of the main products since there are several types of coffee in Kopen.

Table 4.2 Average selling price and production cost of the main products

	Average Selling Price	Average Production Cost
Main products	Rp 16,500	Rp 11,700

The third data to be collected is the required initial investment. The data was collected by direct observation in the Kopen Coffee shop and discussion with the owner, with the result as shown in Table 4.3.

Table 4.3 Required initial investment

Items	Amount (in IDR)
Rent a business space for 5 years	50,000,000
Equipment	10,270,000
Tools	22,960,000
Licensing	3,000,000
Total	86,230,000

The next data to be collected are tax that could be obtained by interviewing the owner and interest rate that could be obtained by asking to bank that usually used by the coffee owner to safe his money. Table 4.4 shows the data.

Table 4.4 Data about tax and bank interest

Items	Percentage (per year)
Tax	10%
Bank interest	5.4%

4.1 DATA PROCESSING

After collecting several data, the cash flow calculation has been done for five years ahead, with the initial investment that has been calculated in Table 4.3, which equal to Rp 86,230,000. This process of calculation employs Equation 3.1 to Equation 3.10 from the previous chapter, to obtain cash flow and Net Present Value (NPV) of Kopen Coffee. Then the NPV simulation will be analyzed using the formula stated in Equation 3.11 to Equation 3.17.

4.1.1 Cash Flow

Using the formula given in Equation 3.1 to Equation 3.10, Table 4.5 shows the result of Kopen Coffee's cash flow for the next five years.

Table 4.5 Recapitulation of cash flow calculation

End of year	1	2	3	4	5
Sales (cups)	28,540	26,255	24,108	22,091	20,268
Unit margin (in IDR)	4,800	4,560	4,332	4,115	3,909
Gross Profit (in IDR)	136,992,000	119,722,800	104,435,856	90,904,465	79,227,612
Depreciation (in IDR)	17,246,000	17,246,000	17,246,000	17,246,000	17,246,000
Before-tax profit (in IDR)	119,746,000	102,476,800	87,189,856	73,658,465	61,981,612
After-tax profit (in IDR)	107,771,400	92,229,120	78,470,870	66,292,619	55,783,451
Cash flow (in IDR)	125,017,400	109,475,120	95,716,870	83,538,619	73,029,451

4.1.2 NPV

The Net Present Value method is used to calculate the difference between the present value of expenditure and the present value of revenue. The NPV calculation in this study is based on the projection calculation of five years ahead. Based on the calculation using formula provided from Excel, it is generated that the Net Present Value of this business is equal to Rp 336,506,243.61. Table 4.6 shows the details cash flow.

Table 4.6 Cash Flow Details

End of year	In Cash Flow		Out Cash Flow		Cash Flow	
1	IDR	136,992,000.00	IDR	11,974,600.00	IDR	125,017,400.00
2	IDR	119,722,800.00	IDR	10,247,680.00	IDR	109,475,120.00
3	IDR	104,435,856.00	IDR	8,718,985.60	IDR	95,716,870.40
4	IDR	90,904,465.00	IDR	7,365,846.50	IDR	83,538,618.50
5	IDR	79,227,612.00	IDR	6,198,161.20	IDR	73,029,450.80

4.1.3 NPV Simulation Analysis

After that, NPV simulation was ran up to 1000 iterations using Microsoft Excel. From the result of the simulation which is shown in Table 4.7, later it can be analyzed using several categories, such as the average of the NPV result from 1000 iterations, the mean standard error, the expected minimum and maximum NPV value with confident level at 95%, as well as expected minimum and maximum interest value with confident level 90%, which can be obtained using formula that has been stated in Equation 3.11 to Equation 3.17 and presented in Table 4.8.

Table 4.7 NPV simulation result of 1000 iterations

Iteration	NPV	
1	IDR	(38,040,935)
2	IDR	(36,233,761)
3	IDR	(35,936,572)
4	IDR	(28,663,459)
5	IDR	(16,927,477)
6	IDR	(15,763,907)
7	IDR	(15,172,390)
8	IDR	(11,410)
9	IDR	861,744
10	IDR	2,389,914
…..		…..
999	IDR	554,650,914
1000	IDR	556,519,523

Table 4.8 Recapitulation of Monte Carlo simulation result

Simulation Analysis	Results
NPV Average	IDR 287,411,388
Mean Std. Error	IDR 3,956,371
Expected Min. NPV	IDR 279,657,043
Expected Max. NPV	IDR 295,165,732
Min. Interest Value	-0.07%
Max. Interest Value	0.23%
P (NPV < 0)	0.08%

4.1.4 Sensitivity Analysis

For the sensitivity analysis, it is conducted using Excel. Table 4.9 shows the data that are used for the calculation, with fixed cost is equal to Rp 86,230,000 and depreciation is equal to Rp 17,246,000, and tax rate 10%.

Table 4.9 Data for NPV Sensitivity Analysis

	Pessimistic (min)	Base (most likely)	Optimistic (max)
Unit Sales	1825	29200	43800
Price per unit		Rp 16,500.00	
Variable cost per unit		Rp 11,700.00	
Fixed cost per year		Rp 17,246,000.00	

After that, Out Cash Flow (OCF) were calculated by considering price per unit, variable cost per unit, fixed cost per year, depreciation cost, and tax for each categories, pessimistic, base, and optimistic unit sales as shown in Table 4.10.

Table 4.10 Out Cash Flow and Net Present Value of Sensitivity Analysis

		Pessimistic (min)	Base (most likely)	Optimistic (max)
OCF	Rp	(5,912,800.00)	Rp 112,347,200.00	Rp 175,419,200.00
NPV	Rp	(111,548,728.14)	Rp 394,842,962.74	Rp 664,918,531.21

To know how does the NPV reacted to the changes that happened especially in terms of sales. Then, the scatter diagram was presented in Figure 4.1.
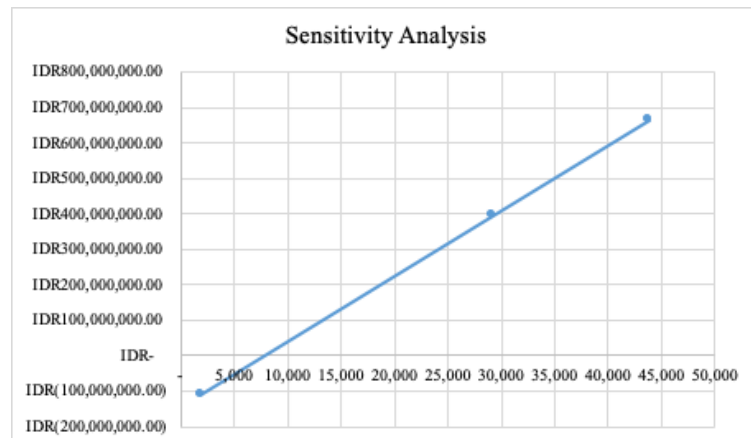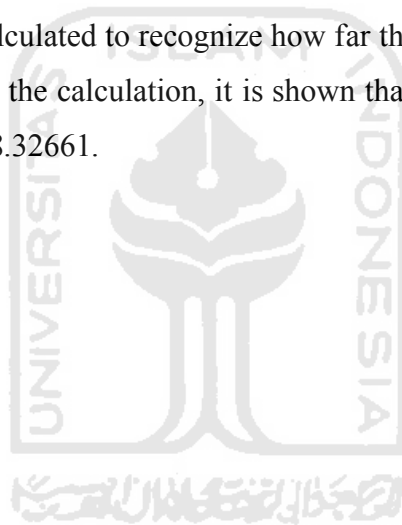
Figure 4.1 Sensitivity Analysis Scatter Diagram

Then, the slope was calculated to recognize how far the NPV will move, if there is a change in the sales unit. From the calculation, it is shown that for every unit sale, the NPV will move for about Rp 18,498.32661.

CHAPTER V

DISCUSSION

5.1 NET PRESENT VALUE

From the data processing in the previous chapter, it is generated that the NPV value for the next five years is equal to Rp 336,506,243.61. NPV comes from the cash flow of year-1 to year-5, by considering the interest rate of 5.4%. The interest rate comes from the deposit rate of bank that usually used by the owner. First, the sales unit of the coffee was simulated by using triangular random distribution method, which is divided into three categories, such as worst, most likely, and best scenario. This research employs triangular distribution since it is more reliable to predict the sales of Kopen Coffee based on the three scenarios of the demand. From the triangular distribution, the demand will be fall more in the most likely value, but also considering the worst and the best case of the value that has be determined. After that, cash flow was calculated, by adding the after-tax profit and depreciation. It is shown that the cash flow is quite good, even though the cash flow is decreasing each year due to the annual decay, but the cash flow is still positive and beneficial. Hence, from the NPV result which has been calculated, it is generally stated based on literature review, business of Kopen Coffee or similar business is feasible to run, because NPV > 0.

5.2 NPV SIMULATION ANALYSIS

After obtaining the NPV result for the next five years, Monte Carlo simulation is accomplished by running the iteration as many a 1000 times. Monte Carlo is one of reliable tool which is unbiased. Besides, NPV is one of the financial aspects that can be easily analyzed and compared for one project over others. In this project, the triangular random distribution for the sales of the coffee cups is applied as the input to calculate the cash flow, which will be more reliable because it will rely mostly on the most likely scenario, but also considering the worst and best case.

Using the help of Microsoft Excel features, the result simulation can be obtained easily, which is shown in Table 4.6.

The simulation generates an average value of NPV equal to Rp 287,411,388, with mean standard error Rp 3,956,371. It is shown that the NPV is positive and above the initial investment. With confidence level of 95%, the expected minimum NPV is Rp 279,657,043, while the maximum NPV will be Rp 295,165,732. Theoretically, investor should accept the project when the NPV is positive or NPV > 0. It is because the value of the revenues (cash inflows) is greater than the costs (cash outflows). Hence, this business is beneficial for the investor or business owner statistically with confidence level of 95%, because it is profitable for both investor and business owner.

From the result of simulation, it can be seen that there is only a few of NPV result which is less than 0 or showing the negative result. The probability of NPV < 0 is only 0.08% which categorized as a very low possibility. The mean standard error for the probability is 0.001. Hence, with 90% of confidence level, the minimum NPV will be less than 0 is only up to 0.23%, or it can be concluded that there is a little possibility for this business to result negative NPV and create the loss. From this calculation, it is shown that this research 90% confidence statistically, if at least 99.77% of this project is possible to be run and willgenerate profit.

After conducting the sensitivity analysis for the NPV, it is shown that the differences between the pessimistic and the mode is quite high, but not for the mode and the optimistic, as in Figure 4.1. While for every change in sales unit will affect the NPV for about Rp 18,498.32661.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

Problem to be solved in this study is how to simulate financial condition of Kopen Coffee using Monte Carlo simulation and analyze it by using NPV. Result of the analysis could be used as the basis of investment decision to expand the business.

6.1   CONCLUSION

The NPV shows positive result which is equal to Rp 336,506,243.61. After running 1000 iterations for NPV simulation, it is generated that the NPV will fall with average of Rp 287,411,388, with mean standard error Rp 3,956,371. From 1000 of iterations, the probability the NPV will be resulted with negative value is only 0.08%. Hence, it can be concluded that the financial condition of Kopen Coffee is great. Therefore, this business and other similar coffee shop project is feasible to run.

6.2   RECOMMENDATION

There are several suggestions that the researcher can give, which are:

1) Kopen Coffee can conduct the other aspects to identify the feasibility, such as marketing, technical, and legal aspect to consider the business as a whole.

2) For further research, feasibility studies in other fields are needed to be performed in order to know other new business fields and open an entrepreneurial spirit for the community.

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