CHAPTER 2
LITERATURE REVIEW

2.1 System information

According to Jeffrey L. Whitten on his book, titled "System Analysis and Design Methods (Whitten, 2007), system in general has a meaning as a set of procedure, methods and work process used to achieve a goal. While information is forms of data which has undergo further processing until it has function. Data is a raw information which need further processing to utilize it. How to process and what type of data that will be used, it depends by the form and need from each organization. The organization in this paper is group of users who works together to achieve a goal.

From the explanation above, Whitten concluded that information system is a set of procedure, methods, and work process from a group of users aim to process and utilized data produce information which can be used in a certain purpose.

The success of information system to achieve set of goals and aims measured by the effectively, which connect with quality and quantity factors to increase the user satisfaction and the quantity from ERP System.

2.1.1 ERP System

ERP system is software system which can assist integrate the organization's information and operation flow, through real-time data collection and data storage in a single database to support different departments and operational functions in organization (Bo Chen and Zili Zeng, 2012). According to Martin Folwer (2003), enterprise application software focused on the systematic and co-ordinate the activities, decision-makings, and knowledge among different functions, sectors, and departments, however, ERP (Enterprise Resource Planning) System is well recognized as one of the most important world-wide enterprise application

software. In 1990, Gartner Group is the first to proposed the concept of ERP, that ERP system is an integrated module, including financial, manufacturing, distribution, human resources, research & development, and others business function framework operation, such as connecting customers and suppliers, and ERP system is more functional than MRP (Manufacturing Resource Planning). MRP focused on the calculation of material requirements, while ERP emphasized the use of single information and IT infrastructure to integrate all business processes and functions (Waartsa, Everdingen & Hillergersber, 2002). Kale (2000) pointed out that the ERP system is a set of pre-planning software package that integrate production, marketing, human resources, research & development, financial, and other modules, which can fulfill the requirement of the various functions within the enterprise and it is also very flexible that it can customized and reset the module configuration according to the user's operating environment.

For a lot of organization, in terms of the implementation scale, people involvement and financial investment, ERP systems are the largest system they have worked with. In general, ERP system implementations are very time consuming, complicated and resource intensive. The reason is ERP system has big size as well as impact on the organization. ERP system will raise the complexity (Motiwalla & Thompson, 2009). Motiwalla (2009) also pointed out that ERP implementation cannot be finished within one-time; however it involved a continuous cycle of product release and support. Nonetheless, lots of ERP implementation have turn into disastrous endeavors during or after Going-Live stage, the majority success of ERP implementation therefore exist in post-implementation phase.

2.2 Process System Development

2.2.1 System Cycle

A system always encounters a condition called life cycle system which can be seen in the following picture:
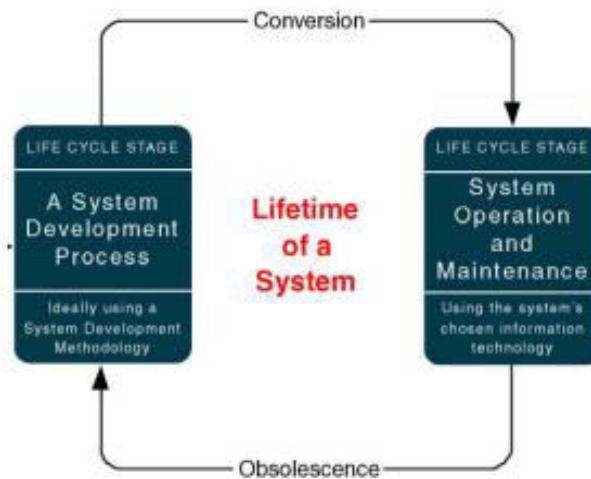

Figure 2.1System Cycle (source: Whitten, 2007)

From the picture above can be seen that the development process of a system is a part of a cycle which continues as long as the company use that system. The development of a system based on cases is need for process agility and higher data agility which has to be process and other things. Even though the cases can be dealt with develop information system, the reality is when the system implement, another case will arse which demand development process to the system.

This reason cause selection of the right technology in developing an information system will determine the reliability of the system, how long the system will survive how effective the system will excel and does the development follow the internal condition of the organization.

2.2.2 System Development Methodology

According Whitten (Whitten, 2007), system development

methodology is a group of activities, methods, guides, output and helping tool used by developer system in develop and maintain a part or whole information system and develop software, so it will always in consistency and documented well. Nowday many methodologies can be used in helping the development of information system. Those methodologies are: (Whitten, 2007)

a) Classic Problem Solving Approach

It is a set of steps done in develop an information system, those steps are:

1) Study and understand the problem and its context

2) Define the requirements of a suitable solution

3) Identify candidate solutions and select the "best" solution

4) Design and or implement the solution

5) Observe and evaluate the solution's impact and refine the solution accordingly

This classic approach is based that used in developing other methodologies.

b) Waterfall Methodology

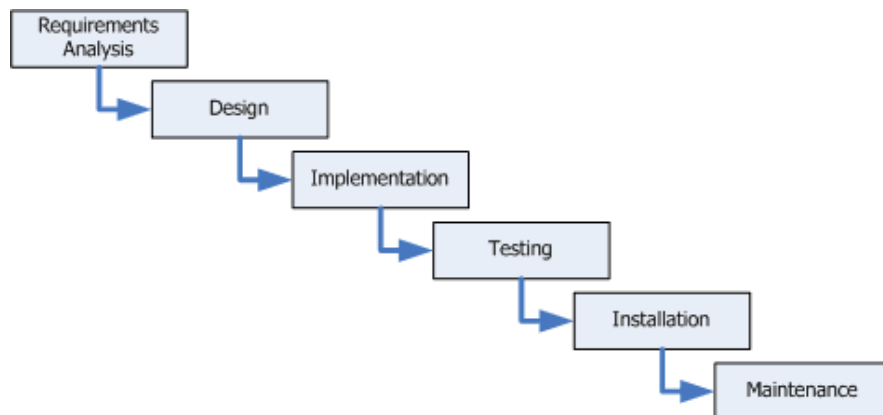Development done in this methodology based by steps done Top-Down which can be seen in the following picture:

Figure 2.2 Waterfall Methodology

When the system is being used, there is some problem such as in every steps need to be precisely, because there is no change to make mistake, no error process correction after settled requirement. Consumer has to be patience because the development of software will start when design step is done while step before design step can take a long time. Even in consumer system development does not given a chance to give a feedback to developer, so there is condition where consumer desire and the given product is totally different because it is hard for costumer to determine all the explicit need in the early step

c) Spiral Methodology

Spiral methodology has fixed some problem in waterfall methodology, the steps are the same, but in this method the four steps (panning, analyzing, design, and implementation) are done repeatedly with smaller scope for problem (only half will be done for every step). Every step will give different result which not far on structure but the inside of the plan get fixed each iteration, so it will get to a certain point where the system is ready to apply.
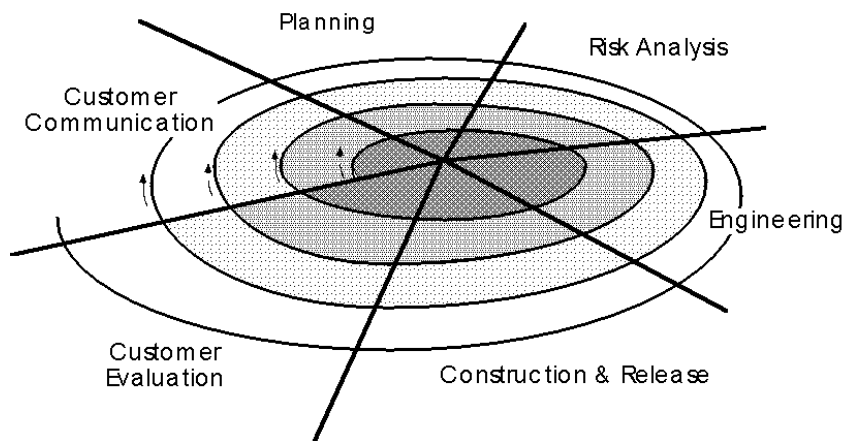

Figure 2.3 Spiral Methodology

The methodology enables feedback from every steps, and opportunity for the problem to be fixed. Besides if there is a further development, it can be adapted to the designed system. User is given

the opportunity to see temporally result of the project and five some feedback.

The weakness of this methodology is no boundaries or certain guidance where to stop the iteration process, the more input or need given in every cycle cause the development process is longer and further from the beginning of development plan.

2.3 Effectiveness of Information System

According to Northcraft & Neale (2001), effectiveness is ability of a company to achieve goals or company missions. Effective management is reflected by selection of the right work to do and the ability to choose the right target. In survey about effectiveness of information system, the examined factors are the system should follow user needs, the output of the system should follow user needs, the easiness of the system, user satisfaction of information system. Those factors are the based to measure user satisfaction.

If the user feels satisfied by the information system used then the information system is effective. The effective implementation of information system according to Remenyi (2007) needs harmonic relation between upper level of management, user, and information system staff.

2.4 The Unified Theory of Acceptance and Use of Technology (UTAUT)

From previous researched, Technology Acceptance Model or known by TAM (Davis, 1989) has produced user acceptance methodology from information system. Some empirical study has be done to increase the trust level. In 2000, Venkatesh and Davis publish methodology about next user acceptance which is the continuation of previous generation of TAM, it is TAM 2. In 2003, Venkatesh, Morris, and few researchers publish an idea of user acceptance methodology which is UTAUT.

UTAUT (Unified Theory of Acceptance and Use of Technology) is one of the newest acceptance technology model developed by Venkatesh, Morris, and a few

researchers. UTAUT methodology is a synthesis or synchronizes of elements from 8 acceptance technology model with the purpose to gain the unity of perception about user. Eight models as the reference of UTAUT methodology are:

- Theory Reasoned Action (TRA)
- Theory Acceptance Model (TAM)
- Motivational Model (MM)
- Theory of Planned Behavior (TPB)
- Combined TAM and TPB
- Model of PC Utilization (MPTU)
- Innovation Diffusion Theory (IDT)
- Social Cognitive Theory (SCT)

UTAUT model consists of 4 main variables, which is:

1) Performance expectancy
2) Effort expectancy
3) Social influence
4) Facilitating conditions

It consists of 4 additional variables, which is:

1) Gender
2) Age
3) Experience
4) Facilitating Conditions

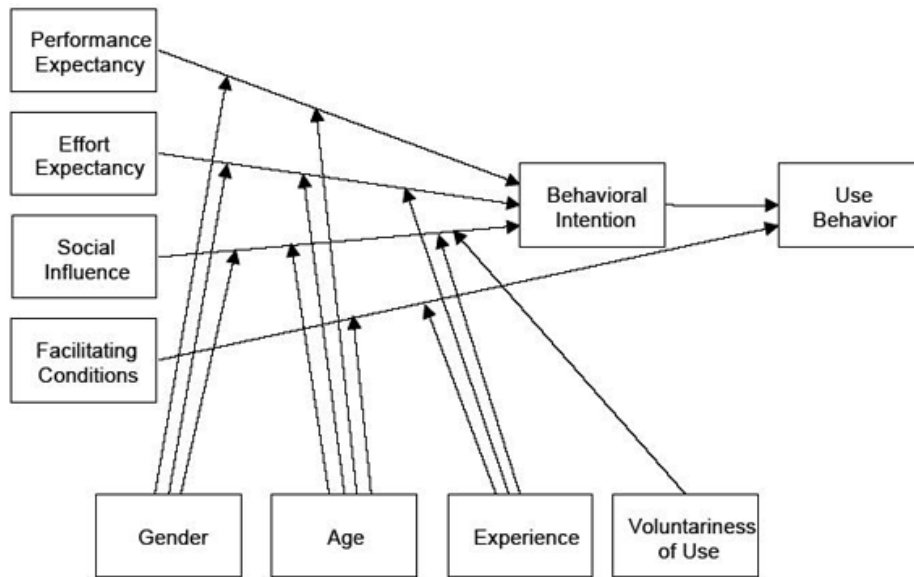In UTAUT methodology describe the connection between main variables and additional variables like the picture below.

Figure 2.4 UTAUT Model (Source: Venkatesh et al., 2003)

Table 2. 1 UTAUT Variables (Source: Venkatesh et al., 2003)

UTAUT 2003	Definition
Performance Expectancy	The degree to which an individual believes that using the system will help him or her to attain gains in job performance.
Effort Expectancy	The degree of ease associated with the use of the system.
Social Influence	The degree to which an individual perceives that important others believe he or she should use the new system.
Facilitating Condition	The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.

Behavioral Intention	The degree to which a person has formulated conscious plans to perform or not perform some specified future behavior.
Use Behavioral	The Degree to which a plan will be used when benefit has been identified
Gender	Gender has quite big psychology intention to use the system
Age	Age has an effect to their individual behavior
Experience	Learn a brief develop skills is needed while using the system
Voluntariness of Use	Voluntary use the system without any instruction

2.5 Importance Performace Analysis (IPA)

Importance Performance Analysis (IPA) Method first introduced by Martila and James (1997) to measure the relation between consumer perception and the quality increase priority of product/service which is known by quadrant analysis (Brandt, 2000 and Latu & Everet, 2000). IPA has accepted generally and used in several field of study because it is easy to applied and analysis result display convenient for improvement proposal (Martinez, 2003), IPA has main function to display information related to service factors that consumer think affect their satisfaction and loyalty, and service factors that consumer think need to be improved because unsatisfied condition.

IPA combine interest level factor measurement and satisfaction level in 2D graphic give ease data explanation and practical suggestion. IPA graphic interpretation is easy, where the IPA graphic divided into 4 quadrants according
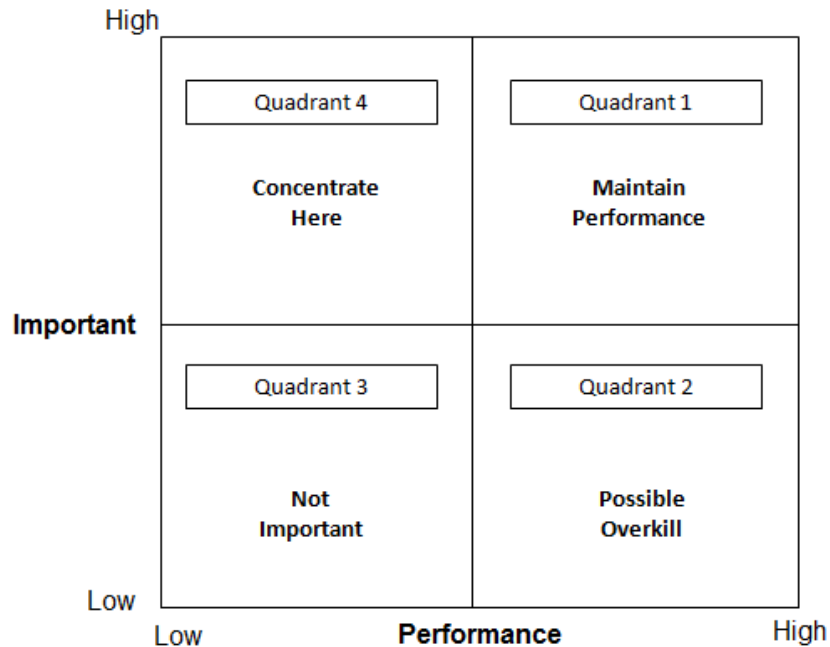
to measurement result as the picture below

High

Important

Low

Low   **Performance**   High

Quadrant 4	Quadrant 1
Concentrate Here	Maintain Performance
Quadrant 3	Quadrant 2
Not Important	Possible Overkill

Figure 2.5 Important Performance Analysis Quadrant (Source: Brandt, 2000)

The following is explanation for each quadrant (Brandt, 2000):

o First quadrant, high importance & high performance. Factors in this quadrant assessed as support factor for consumer satisfaction so the management has to make sure the institution performance could keep the achievement.

o Second quadrant, low importance & high performance. Factors in this quadrant considered not important so the management need to allocate resource related to those factors to other factors which have higher priority which still need improvement, such as fourth quadrant.

o Third quadrant, low importance & low performance. Factors in this quadrant have low satisfaction level and not too important for consumer, so management does not have to priority or given to much attention on those factors.

o Fourth quadrant, high importance & low performance. Factors in this

quadrant considered as importance factor by consumer but the present condition does not satisfied so the management has to allocate sufficient resources to improve performance several factors. Factor that situated in this quadrant is the priority to improvement.

There are 2 methods to display IPA data (Martinez, 2003):

- Place quadrant intersection line on average value on satisfaction level point and handling priority point to identify the dispersion data located in which quadrant. These part used average value on satisfaction level measurement scale and handling priority as a separation line between quadrant.

- Place quadrant intersection lie on average value for observation on satisfaction level point and handling priority point to identify specifically each factor located in which quadrants. These part used average value of satisfaction level measurement result and handling priority as the separate line between quadrant. These are the procedure related with the used of IPA method:

  1) Determine the factors to be analyze

  2) Perform survey through questioner deliverable to user

  3) Calculate average value of satisfaction level and handling priority

  4) Make IPA graphic

  5) Perform evaluation to suitable factor by each quadrant

2.6 Feasibility test

2.6.1 Validity Test

Validity test will show the degree to which value represent the results of measurements that you want to be measured (Agung, 1990). Validity in general becomes questionable related to the psychology or non-physics measurement result. Related to obtainable result is expected describe or provide value for another characteristic which become the main attention.

Validity varieties in general divided into 3 big categories are content validity, criterion-related validity, and construct validity.

Validity test is measuring the correlation between variable and total variable value. Process of measuring construct validity is by searching correlation between each question with total value by using a product moment correlation technique (Masri Singarimbun, et al., 1989) is

$$r = \frac{N\left(\sum XY\right) - \left(\sum X \sum Y\right)}{\sqrt{\left[N \sum X^2 - \left(\sum X\right)^2\right]\left[N \sum Y^2 - \left(\sum Y\right)^2\right]}}$$

Where

r = Product moment correlation

X = Question Value

Y = Total question value

XY = Question value multiply by total value

N = Total Users

Validation criteria of the question can be determine if

- r Value > r Table, then the question is valid

- r Value < r Table, then the question is not valid

2.6.2 Reliability Test

Reliability is index which shows the degree of a measurement tools is credible and reliable. Each measurement should have the ability to give relatively consistent result. These technique could be obtain by divided each valid variables in random into two part.

Value for each variable at each section will summed, so the total result could be obtain for each section variable. Afterwards determine the correlation between first section total value and second section total value by using product moment correlation. The result correlation value is lower than the correlation value obtained if the measurement is not divided.

Process of finding the reliability for entire variable is by analyze the correlation value that obtain from this Equation:

$$Y_{tot} = \frac{2\,(Y_{os})}{1 + Y_{os}}$$

Where

Y_{tot} =Total reliability variable value

Y_{os} = First and second reliability value

2.7 Analysis Method

2.7.1 Pearson Correlation Coefficient (Pearson Product Moment)

The purpose correlation between one variable with other variable is determine which these two variables are independently statistic. Pearson product moment is a tool to measure the correlation value between one factor and other factor. The equation for Pearson Product coefficient correlation

$$r = \frac{SP}{\sqrt{SSxSSy}}$$

Where

r: sample correlation coefficient (Pearson Product Moment Coefficient Correlation)

SP: Total product = $\sum(Xt - X)(Yt - Y)$

SSx : Total Square root from variable $X = \sum(Xt - X)^2$

SSy : Total Square root from variable $Y = \sum(Yt - Y)^2$

Correlation value would be used for determine the nearest relation between those two factor. The scores are between -1 and +1. Positive value will show the positive relationship. It is means the higher value of X factor will represent the higher value at Y factor. The negative value will show contradiction with positive value. -1 value represents strong negative relationship, 0 value represents there is no relationship between X and Y, and +1 value represent strong positive relationship. "The relation between

2 variable is one of linear association degree measurement between two variable" (Aczel,1999)

Coefficient Determination (R^2) is needed to identify the influence level between X variable and Y variable by "Squaring correlation coefficient (r) with the value that has been calculated before" with this equation:

$$R^2 = r^2$$

Where:

R =Determination Coefficient

r = Correlation Coefficient

2.7.2 Analysis Correlation

Analysis Correlation would be used to describe the scoring point from population correlation p. this analysis is used to analyse the connection between linear between 2 variable. Normal distribution is needed to test 2 variables. The equation is

$$t_{n-2} = \frac{r}{\sqrt{(\frac{1-r^2}{n-2})}}$$

Where:

n: Total sample

r: Coefficient sample correlation

Hypothesis statistic:

H0: p = 0;

H1: p ≠ 0;

Hypothesis test will resolve with 90% degree of satisfaction at t-test value

Accept H0 if t-value at critical point (0.05; n-2) ≤ t- measure

Reject H0 if t-value at critical point (0.05; n-2) ≥ t- measure

2.7.3 Simple linear regression

Sambas and Maman (2007) Simple linear regression is regression model by studying the connectivity between 2 variable which is independent variable and dependent variable. The equation model is

$$Y = \alpha + \beta X$$

Where:

Y: Dependent variable

X: Independent Variable

α: Constant Output/ Intercept

β: Regression coefficient

In other words α and β are parameter which unidentified output so statistic is needed

2.7.4 Statistic test T (Coefficient Regression test)

Test T is used to show the length of effectiveness of each independent variable by individually explaining the dependent variable.

To achieve decision criteria is comparing the sig-T with 0.05

If Sig-t/2 < 0.05; reject H0, so regression coefficient become significant

If Sig-t/2 > 0.05; reject H0, so regression coefficient become not significant

2.7.5 Determinant Coefficient (R^2)

Determinant Coefficient (R^2) will be used for measuring the length of the model to explaining the variation of dependent variable. Determination coefficient result either 1 or 0. If R^2 is leaving 1 then the ability of independent variables become limited. If R^2 is reaching 1 then the independent variables become predictable by almost all information are given.

2.7.6 Slovin Formula

Slovin method will be used for finding sample size from a population. The equation is

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

Where:

N = Population

n = Sample Size

e = Confidence level

2.8 Litterateur Review and Conceptual

2.8.1 ERP Usage in Practice: Understanding End-Users 'Acceptance of ERP system in Chinese large companies by applying UTAUT model

"ERP usage in practice: Understanding End-Users 'Acceptance of ERP system in Chinese Large Companies by Applying UTAUT Mode" is a case study of ERP system at ZHONGBAI holding group and FiberHome Technologies groups using UTAUT method. It made by Bo Chen and Zili Zeng. Their paper was investigate and research factor about the affected and the end-users' acceptance of ERP system during post-implementation phase of the ERP implantation life cycle. The data used to test the hypothesis were collected from users of ERP system at ZHONGBAI holding group and FiberHome Technologies group by using questionnaire method as data collection and statistic as data validation.

2.8.2 Tingkat Efektivitas Sistem Informasi Remote Trading Menggunakan Metode UTAUT Pada PT. Ciptadana Securities

"Tingkat efektifitas sistem informasi remote trading menggunakan metode UTAUT pada PT. Ciptadana Securities (The effectiveness degree of Remote trading information system using UTAUT method at PT. Ciptadana Securities)" is a case study of remote trading information system at PT.

Ciptadana Securities. It made by Maria Gabby and Stephanie. Their paper evaluated the effectiveness of remote trading system and supported their company by giving advices to improve remote trading system improvement for their company. The data used to test the hypothesis were collected from users of remote trading system at PT. Ciptadana Securities by using questionnaire method as data collection and statistic as data validation.

2.8.3 The Entrepreneurs perception on information technology innovation adoption: an Empirical Analysis of the role of precipitating events on usage behavior

"The Entrepreneurs perception on information technology innovation adoption: an Empirical Analysis of the role of precipitating events on usage behavior" is a case study of using Entrepreneurial potential model for Small Medium Enterprise at Malaysia. The objective is to investigate the influence of external factors that potentially inhibits or facilitate the performance of a behavior, as well as effect of the propensity to act on determination toward intention for action. The data used to test the hypothesis were collected from a varied spectrum of Malaysian industry and entrepreneurs (SMEs owners) by using questioner method as data collection and statistic as data validation.

2.8.4 Conclusion

The conclusion from 3 papers above the author will implement UTAUT method by using questionnaire as data collection and statistic as data validation. The author will use Maria Gaby and Stephanie thesis concept for this thesis paper.