



Financial Analysis of Information Technology Investments: "Assessing Benefits through Cost-Benefit Analysis and Ranti's Generic IS/IT Business Value Approach"

Ni Made Estiyanti¹, Ni Made Wiranti², Eka Grana Aristyana Dewi³

^{1,2,3}STMIK Primakara, Denpasar Bali, Indonesia

¹University of Debrecen, H-4032 Debrecen, Hungary

E-mail: estiyanti@primakara.ac.id

Article Info	Abstract
Article History Received: 2023-12-03 Revised: 2024-01-15 Published: 2024-02-09	Technology drives economic growth and increases industrial competitiveness and has long been recognized for its dominance of industrial productivity. PT XYZ is a company engaged in the transportation services sector in Indonesia; from 2012 to 2017, PT XYZ carried out a massive digital transformation process by investing in information technology to improve its quality. This investment includes ERP, SAP implementation and improvement, RTS implementation and improvement, web-based information technology platforms, and mobile applications. This study aims to analyze the benefits of information technology investment made in PT XYZ using secondary data from the Company's annual financial statements accessed through the Company's website. The results of this study were conducted by analyzing financial statements from 2012 to 2020 using the Cost Benefit Analysis method and Ranti's Generic IS / IT Business Value method. Based on the Analysis, investment in information technology benefits the Company without distinguishing between tangible and intangible benefits identified in the form of 8 sub-categories in 5 categories based on Ranti's Generic IS/IT Business Value.
Keywords: <i>Technology Investment;</i> <i>Cost Benefit Analysis;</i> <i>Ranti's Method.</i>	

Artikel Info	Abstrak
Sejarah Artikel Diterima: 2023-12-03 Direvisi: 2024-01-15 Dipublikasi: 2024-02-09	Teknologi mendorong pertumbuhan ekonomi dan meningkatkan daya saing industri telah lama diakui karena dominasinya terhadap produktivitas industri. PT XYZ adalah perusahaan yang bergerak di sektor jasa transportasi di Indonesia, pada tahun 2012 hingga tahun 2017 PT XYZ melakukan proses transformasi digital secara besar-besaran dengan berinvestasi di bidang teknologi informasi untuk meningkatkan kualitasnya. Investasi ini berupa ERP, <i>implementation and improvement SAP, implementation and improvement RTS, platform</i> teknologi informasi berbasis web, serta aplikasi mobile. Penelitian ini bertujuan untuk menganalisis manfaat dari investasi teknologi informasi yang dilakukan di PT XYZ dengan menggunakan data sekunder berupa laporan keuangan tahunan perusahaan yang diakses melalui website perusahaan. Hasil dari penelitian ini dilakukan dengan menganalisis laporan keuangan dari tahun 2012 hingga tahun 2020 dengan menggunakan metode <i>Cost Benefit Analysis</i> serta metode <i>Ranti's Generic IS/IT Business Value</i> . Berdasarkan analisis yang dilakukan dapat diketahui bahwa investasi di bidang teknologi informasi ini bermanfaat bagi perusahaan, tanpa membedakan antara manfaat berwujud dan tidak berwujud yang diidentifikasi dalam bentuk 8 sub-kategori yang termasuk dalam 5 kategori berdasarkan <i>Ranti's Generic IS/IT Business Value</i> .
Kata kunci: <i>Technology Investment;</i> <i>Cost Benefit Analysis;</i> <i>Ranti's Method.</i>	

I. INTRODUCTION

Technology drives economic growth and increases industrial competitiveness and has long been recognized for its dominance of industrial productivity. Information technology (I.T.) has become essential to a company's capabilities and can create a sustainable competitive advantage (Witra and Subriadi, 2021). In recent years, many information technology innovations have occurred worldwide. Organizations today face rapidly changing market conditions characterized by high merger rates and strong competitors (Dr. Kishor Chandra Mehe, 2018). The application of

technology is to facilitate the Company's internal operations and customer service (Agustin and Estiyanti, 2022).

PT XYZ is a company engaged in the transportation sector in Indonesia. PT XYZ penetrates the opportunity to optimize services by utilizing *digital technology* to increase productivity and efficiency. Before the information technology system was improved, PT XYZ's financial performance fell due to a loss of IDR 83 billion. PT XYZ began to improve the information technology (I.T.) system. The development of information technology systems is accompanied by changes in employee work

culture and the development of digital applications.

From 2012 to 2017, PT XYZ did a lot of funds for investment in information technology and digital infrastructure, and PT XYZ budgeted costs based on the *IT Master Plan* and I.T. service plan written in the Company's Long-Term Plan (RJPP). This investment is in the form of ERP, implementation, and improvement of SAP, 2012 successfully released the Rail Ticketing System (RTS), RTS makes it easier for passengers to order via web-based internet, and in July 2013, the Company released e-ticketing with short-distance routes in Jabodetabek. Not stopping there, in 2014, in early September, PT XYZ launched a mobile application; this application is used for online ticket booking and makes it easier for users to get the latest information related to trains that can be easily accessed through devices.

In 2012 the budget allocation for I.T. was Rp. 70 billion, in 2013, the Company budgeted Rp. 43.6 billion; in 2014, PT XYZ allocated an investment budget of Rp. 56.41 billion, in 2015, PT XYZ budgeted funds for investment in information technology of Rp 90.70. In 2016, the Company allocated separate funds for investment in the information technology sector worth Rp 76.40 billion. In 2017, the Company also allocated separate funds worth Rp 74.37 billion, specifically for investment in the information technology sector.

Companies that utilize information technology require significant investments of funds with returns on investment that are often intangible and difficult to evaluate. Conversely, the Company must be able to increase the cost-effectiveness and effectiveness of the Company's business processes (Hendarti et al., 2011). Previous research conducted by Ni Made Estiyanti et al. in 2023 related to the Analysis of the benefits of technology investment with the title "*Information Technology Investment Benefit Analysis Using the Cost Benefit Analysis Method and Ranti's Generic IS/IT Business Value Method*" by using Ranti's method *Generic IS/IT Business Value*, and methods *Cost Benefit Analysis* to identify the benefits derived from the investments made. (Estiyanti et al., 2023). Another research was also conducted by Ravika Ayu Ashari et al. in 2021 with the title "*Feasibility Study of One-Stop Application Development*" using the method *Cost Benefit Analysis*, which results in the development of the One-Stop project is considered feasible because the benefits obtained are more significant than

the costs incurred (Ashari, Sutomo and Nurcahyawati, 2021).

To fill the research gap, this study will analyze the benefits of information technology investment in PT XYZ) with two methods, including; *Cost Benefit Analysis (CBA)* and Ranti's *Generic IS/IT Business Value method*.

Cost Benefit Analysis is a method of calculation in an investment in information technology development, and this uses the principle of comparing money or costs incurred with the benefits obtained by the Company (Indrajit, 2004). Ranti's method *Generic IS/IT Business Value* is the framework used to identify the benefits of an I.T. investment without the need to distinguish between benefits *tangible* and *Intangible*, which has often been a barrier in quantifying the benefits of an information technology investment (Ranti and Darmadji, 2012).

II. METHOD

The research method used in this study is Cost Benefit Analysis (CBA) which includes; Net Present Value (NVP), Return on Investment (ROI), Benefit Cost Ratio (BCR), Payback period (P.P.), and Economic Value Added (EVA). CBA is one method that will be used to measure I.T. investment and then continue with Ranti's *Generic IS/IT Business Value method*.

Ranti's generic IT/IS business value method because it includes financial and non-financial perspectives without distinguishing between tangible and intangible benefits, which sometimes becomes an obstacle to measuring the benefits of an I.T. investment. The data collection techniques used in this study were documentation and literature studies. The types of data used in this study are qualitative and quantitative. The data source used in this study is secondary data obtained through the annual report of P.T. XYZ from 2012 to 2020.

III. RESULT AND DISCUSSION

A. Result

The results obtained an NPV (*Net Present Value*) of 2,865,772. This result shows that the NPV value > 0 or positive then it can be known the level of investment feasibility in PT Kereta Api Indonesia (Persero), ROI (*Return on Investment*) of 4.7%, it can be concluded that investment is acceptable, P.P. (*Payback Period*) in the first year 0.138 years or 51 days means that incoming cash flows can cover the investment value, (*Benefit Cost Ratio*) as much as $1.39 > 1$. The value of EVA is negative in the

first year of investment. This is because the rate of return obtained cannot cover the cost of capital incurred. After all, NOPAT is smaller than Capital Charges, but the value of EVA is positive from 2013 until 2017. The rate of return generated is greater than the level of costs incurred. The benefits

of information technology investment in PT XYZ based on Ranti's *Generic IS/IT Business Value Table* are increasing revenue caused by increasing customer trust (IRE-03), improving external services from knowing customer problems (IES-02), and improving external services from customer satisfaction (IES-05), improving *image* caused by improving service quality (IIM-01) using well-known brands (IMM-04), as well as providing discounts (IMM-02), improving the quality of service (IQU-03), improving internal service of service for employees (IIS-03).

B. Discussion

1. Cost Benefit Analysis

Cost Benefit Analysis is a calculation method for investment in information technology development. This uses the principle of comparing money or costs incurred with the benefits obtained by the Company (Indrajit, 2004). A cost-benefit analysis assesses techno-economic feasibility by Comparing benefits with costs (Gao et al., 2021). The following are the results of the Cost Benefit Analysis Method analysis:

a) NPV (Net Present Value)

NPV (*Net Present Value*) is a method of Estimating whether the project's predicted financial return will be more than the current investment, indicating that the project is worthwhile. Reflects the cash value of a project's net income calculated according to cash flow (Dai et al., 2022). The value of the investment is thus determined with a clear view of the financial benefits of the initial investment cost, i.e., when the NPV is more significant than zero (Olaniyi, 2020).

Tabel 1. NPV

Year	Cash flow	Discount Rate
0	(70,000)	
1	740,721	
2	48,963	
3	144,102	6%
4	(34,044)	
5	2,809,440	

$$NPV = \left[\frac{C^1}{(1+r)^1} + \frac{C^2}{(1+r)^2} + \frac{C^3}{(1+r)^3} + \dots + \frac{C^n}{(1+r)^n} \right] - C_0$$

$$NPV = \frac{740,721}{(1+0,06)^1} + \frac{48,963}{(1+0,06)^2} + \frac{144,102}{(1+0,06)^3} + \frac{34,044}{(1+0,06)^4} + \frac{2,809,440}{(1+0,06)^5} - 70,000$$

$$NPV = 698,793 + 43,577 + 120,991 + (26,966) + 2,099,377 - 70,000$$

$$NPV = 2,935,772 - 70,000$$

$$NPV = 2,865,772$$

Based on the *NPV (Net Present Value)* calculation of 2,865,772, it can be concluded that information technology investment is acceptable because this result shows that the NPV value is > 0 or positive.

b) ROI (Return on investment)

Return on investment is a ratio used to measure the percentage of benefits generated by an investment compared to the total costs incurred.

$$ROI = \frac{\text{Net Profit after tax}}{\text{Total Asset}} \times 100\%$$

$$ROI = \frac{425,105}{8,961,062} \times 100\%$$

$$ROI = 4,7\%$$

ROI (*Return on Investment*) of 4.7%, then it can be concluded that investment is acceptable because it provides benefits of 4.7% of the total investment cost in the first year.

c) P.P. (Payback period)

In this method, the factor that is convincingly accepted or rejected by an investment is the *payback period* for the cost of the investment.

$$PP = \frac{\text{Investment amount}}{\text{net cash inflow}} \times 1 \text{ Tahun}$$

$$PP = \frac{70,000,000,000}{505.052.021.466} \times 1 \text{ Tahun}$$

$$PP = 0,138 \text{ (51 hari)}$$

P.P. (*Payback Period*) in the first year of 0.138 years or 51 days means that incoming cash flows can cover the investment value. This means that the return-on-investment capital takes less than one year.

d) BCR (Benefit Cost Ratio)

Benefit Cost Ratio compares revenue (Benefit) and total cost (Cost). This

method is used to determine the feasibility of whether a project or investment is profitable or not.

Tabel 2. BCR

Year	DF	PV	PV
		Benefit	Cost
2012	0.9433	6,571,922	4,740,374
2013	0.8899	7,654,834	5,269,272
2014	0.8396	8,797,593	5,934,452
2015	0.792	11,040,915	7,822,792
2016	0.7472	10,807,840	7,958,950
2017	0.7049	12,646,270	9,390,325
Total		57,519,374	41,116,165

$$BCR = \frac{PV \text{ Benefit}}{PV \text{ Cost}}$$

$$BCR = \frac{57,519,374}{41,116,165} = 1,39$$

Benefit Cost Ratio) of 1.39 means the BCR value is greater than the discount rate. It can be concluded that investment is worth continuing.

e) EVA (Economic Value Added)

Economic value-added is a method of Analysis used to measure financial performance. EVA, or economic value added, is a performance measure that combines the achievement of value with the cost of achieving that added value (Karamoy, Tampi, and Mukuan, 2016). EVA creates value for companies when there is an increase in operating profit without additional capital, either by reducing capital used at the same level of activity or by investing in projects that generate more capital expenditure (Voon Choong and Muthaiyah, 2021). Here is the calculation of *Economic Value Added*:

$$EVA = NOPAT - CAPITAL CHARGES$$

Tabel 3. EVA

Year	NOPAT	Capital Chargers	EVA
2012	449,426	775,674	-326,248
2013	591,385	418,008	173,377
2014	989,209	699,086	290,123
2015	1,425,124	1,041,022	384,102
2016	1,058,101	865,087	193,014
2017	1,769,698	1,403,957	365,741

Performance appraisal through the EVA method results in varying EVA values. This is due to the amount of

capital owned each year. The EVA value was positive from 2013 to 2017, and the resulting rate of return was more significant than the cost level. Conversely, the value of EVA in 2012, the rate of return obtained, could not cover the cost of capital incurred. This is because NOPAT is smaller than *Capital Charges*. It is known that from 2013 to 2017, the Company obtained a positive EVA.

2. Ranti's Generic IS/IT Business Value method

Ranti's Generic IS/IT Business Value method is a method used to show the purpose of information technology investment according to each category or sub-category. The benefits of information technology investment in P.T. XYZ based on the Generic IS/IT Business Value Ranti Method can be seen in the table below:

Code	Sub- Category	Information
IRE-03	Increase revenue caused by customer trust	The number of passengers continues to grow yearly in line with the better quality and encourages consumer confidence in PT XYZ.
IES-02	Improve external services by knowing customer issues	A CRM application system integrated with all customer service channels makes it easier for companies to know the problems experienced by customers.
IES-05	Improve external service from customer satisfaction.	With a CRM application system, all complaints received must get a response with a KPI of 90% within 30 minutes. CRM must be able to be responded to to maintain customer satisfaction.
IIM-01	Improving image is due to improving service quality.	The quality of this service has been generated by the reputation of PT XYZ over the past few years.
IIM-02	Image enhancement due to Discounting	On certain days the company shares ticket price-cutting promos, for example, during Independence Day, the Company's anniversary. Certain events, e.g., Expo, PRJ. As well as the Travel Fair event, which provides discounted ticket prices, if you buy

		tickets via mobile applications or websites during the event
IIM-04	Improving image is caused by using well-known brands	Using awards (from well-known institutions) from several years of hard work resulted in PT XYZ's better reputation for customers.
IQU-03	Improve the quality of service.	Increase quality with innovation and mobile application development with service features such as e-boarding
IIS-03	Improve internal services from services to employees	With service carried out by the information system unit, this helps find out what services employees need and the problems experienced.

IV. CONCLUSIONS AND SUGGESTIONS

A. Conclusions

1. We obtained an NPV (*Net Present Value*) of 2,865,772. This result shows that the NPV value > 0) or positive then it can be known the level of investment feasibility in PT Kereta Api Indonesia (Persero), ROI (*Return on Investment*) of 4.7%, it can be concluded that investment is acceptable because it provides benefits of 4.7% of the total investment cost in the first year, P.P. (*Payback Period*) in the first year 0.138 year or 51 days means that incoming cash flows can cover the investment value, (*Benefit Cost Ratio*) as much as 1.39 >1, positive EVA value in 2013 to 2017. The resulting rate of return is greater than the rate of costs incurred. The rapid rate of return is due to calculations based on financial statements as a whole, not specifically for information technology investment.
2. The benefits of information technology investment in PT XYZ based on Ranti's *Generic IS/IT Business Value* Table are increasing revenue caused by increasing customer trust (IRE-03), improving external services from knowing customer problems (IES-02), and improving external services from customer satisfaction (IES-05), improving *image* caused by improving service quality (IIM-01), using well-known brands (IMM-04), as well as providing discounts (IMM-02), improving the quality of service (IQU-03), improving internal service of service for employees (IIS-03).

B. Suggestions

Further research using primary data can help improve the accuracy of CBA calculations, especially payback periods because the data reflects the actual situation of the project or Company being carried out. Having primary data can calculate the actual cash flow generated by investments made by a company or organization.

REFERENCES

- Agustin, A.N.A. and Estiyanti, N.M., 2022. Analisis Dampak Investasi Teknologi Informasi Mobile Banking Jenius Pada PT. Bank Tabungan Pensiunan Nasional (BTPN) Tbk. *Teknologi Informasi dan Komputer*, [online] 8(3), pp.295–305. Available at: <<https://jurnal.undhirabali.ac.id/index.php/jutik/article/view/2083>>.
- Ashari, R.A., Sutomo, E. and Nurcahyawati, V., 2021. Studi Kelayakan Pengembangan Aplikasi Satu Pintu Menggunakan Cost Benefit Analysis Pada Startup Satu Pintu. *JSIKA*, [online] 10(02), pp.1–10. Available at: <<https://jurnal.dinamika.ac.id/index.php/jika/article/view/3809/1653>>.
- Dai, H., Li, N., Wang, Y. and Zhao, X., 2022. The Analysis of Three Main Investment Criteria: NPV IRR and Payback Period. 648(Icified), pp.185–189.
- Dr. Kishor Chandra Mehe, A.B., 2018. Impact of Information Technology Investment on Performance of Commercial Banks in Ethiopia: Case of Dashen. *Orissa Journal of Commerce*, XXXIX(II), pp.1–14.
- Estiyanti, N.M., Ariyanti, N., Wenur, M., Anugrah, P. and Dewi, C., 2023. Information Technology Investment Benefit Analysis Using the Cost Benefit Analysis Method and Ranti s Generic IS / IT Business Value Method. 6(April), pp.2322–2329.
- Gao, T., Xiao, K., Zhang, J., Zhang, X., Wang, X., Liang, S., Sun, J., Meng, F. and Huang, X., 2021. Cost-benefit Analysis and technical efficiency evaluation of full-scale membrane bioreactors for wastewater treatment using economic approaches. *Journal of Cleaner Production*, [online] 301, p.126984. <https://doi.org/10.1016/j.jclepro.2021.126984>.

- Hendarti, H., Nugroho, A.A., Legiastuti, D. and Nikmah, 2011. Analisis Investasi Sistem Informasi Dengan Menggunakan Metode Information Economics (Studi Kasus : PT . NASA). *Seminar Nasional Aplikasi Teknologi Informasi 2011*, 2011(Snati), pp.1-6.
- Indrajit, D.R.E., 2004. *Kajian Strategi Cost Benefit Teknologi Informasi*. Yogyakarta: ANDI.
- Karamoy, J., Tampi, D.L. and Mukuan, D.D.S., 2016. Analisis Economic Value Added (Eva) Pada Pt Bank Negara Indonesia Tbk. *Jurnal Administrasi Bisnis UNSRAT*, 4(2), pp.1-10.
- Olaniyi, E.O., 2020. Investment Analysis of Waste Heat Recovery System Installations on Ships' Engines. *Journal of Marine Science and Engineering*, 8(881), pp.1-21.
- Ranti, B. and Darmadji, P., 2012. Analisis Kelayakan Ekonomis Cloud Computing Pada Lembaga Keuangan Mikro Di Indonesia Dengan Metode Ranti'S Generic Is/It Business Value Dan Economic Value Added: Studi Kasus Pada Bank Perkreditan Rakyat Di Jakarta. *Jurnal Sistem Informasi*, 7(2), p.95.
<https://doi.org/10.21609/jsi.v7i2.299>.
- Voon Choong, Y. and Muthaiyah, S., 2021. Economic Value Added (EVA) And Market Value Added (MVA) Towards Value Creation. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, [online] 12(10), pp.6046-6050. Available at:
<<https://turcomat.org/index.php/turkbilm/article/view/5429>>.
- Witra, W.P.P. and Subriadi, A.P., 2021. Gender and information technology (I.T.) investment decision-making. *Procedia Computer Science*, [online] 197(2021), pp.583-590.
<https://doi.org/10.1016/j.procs.2021.12.176>.