Research on the Value Evaluation of China's Enterprises under the EVA Model: A Case Study of Hikvision Company

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ABSTRACT

With the support of national policies, China's software industry is developing at a sustained and high speed. An accurate grasp of investment opportunities in the software industry requires the state to have a correct understanding of the intrinsic value of listed companies. In this paper, literature analysis, case analysis, qualitative analysis and quantitative analysis are used to carry out the research. Taking Hikvision Company as the research object, the EVA value evaluation model is used to carry out a quantitative analysis of the profitability of Hikvision from 2016 to 2020, and to reasonably forecast the EVA value of HNVIS from 2021 to 2025. The research results show that every year since the company's listing, the EVA of the company has been positive and continuously rising, which is in line with the rapid development of the company in recent years and the continuous expansion of the scale of assets and liabilities. This indicates that the company has good operating results and good profitability. It also indicates that the enterprise value assessment based on the EVA model has certain reference significance, which is beneficial to improving the management level, realizing value creation and promoting the sustainable and healthy development of the enterprise.

Keywords: *EVA model, Enterprise value assessment, Net operating profit after tax, Total capital, Weighted average cost of capital*

1. INTRODUCTION

In today's globalized economy, traditional enterprises rely on the application of software technology not only to improve the management level but also to enhance their international competitiveness. The success of the software industry has made China's economic transition from a resource economy to an era of the knowledge economy. The realization of scientific and technological development and innovation capability has brought about great changes in the mode of economic growth. In recent years, with the support of national policies, China's software industry is developing at a sustained and high speed. An accurate grasp of investment opportunities in the software industry requires China to have a correct understanding of the intrinsic value of listed companies.

Hikvision Company was identified as a key software company in China in 2013 and is a representative security company listed on a small and medium-sized board in Hangzhou. In this paper, literature analysis, case analysis, qualitative analysis and quantitative analysis are used to carry out the research. Taking Hikvision Company as the research object, through the main items in the financial statements to understand the business and financial situation of the enterprise, the EVA value evaluation model is used to carry out a quantitative analysis of the profitability of Hikvision Company from 2016 to 2020, and the EVA value of Hikvision from 2021 to 2025 is reasonably predicted. Select EVA value assessment method to assess and analyze the operating results and investment value of listed software companies in China. The purpose is to be able to use EVA to evaluate the performance of a single company, so as to select an enterprise with investment value. The application of EVA valuation model is beneficial to improving the management level, creating value and promoting the sustainable and healthy development of enterprises.

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2. ENTERPRISE VALUE EVALUATION MODEL FRAMEWORK BASED ON THE EVA THEORY

2.1 The Origin of EVA and Its Concept

Value assessment is a comprehensive evaluation or assessment of an organization's market value. Stewart (1991) put forward the concept and theory of Economic Value Added (EVA) for the first time on the basis of synthesizing DCF model, MM theory and CAPM theory. EVA not only considers the risks and uncertainties but also considers the opportunity cost. It considers capital investment such as equity and debt as also a cost, which must be deducted in financial accounting. Only when the company's profit is greater than the company's cost of capital, the company's production activities can be regarded as bringing a positive return on investment to shareholders and creating positive value.

In the aspect of empirical research, overseas scholars from different countries analyze the relationship among EVA, market value and value assessment by analyzing a large amount of financial data from different years and different types of enterprises. It is found that EVA is a reliable tool to measure the market value of a company, which means that the EVA value assessment model has universal applicability. By collecting financial data from thousands of western countries, some scholars have found that EVA has the most significant results in assessing corporate value compared with other financial accounting methods [1,2,3,4,5,6,7,8]. There are also some scholars who evaluate the market value of enterprises by studying the financial indicators of specific enterprises in eastern countries [9,10,11,12].

However, the existing literature seldom applies EVA evaluation method to evaluate the intrinsic value of software companies, so the practical research of EVA evaluation method needs further improvement. Compared with other value assessment methods, the EVA value assessment method can effectively assess the market value of an enterprise, diagnose the problems in the development process of the enterprise more accurately, assess the market value of the enterprise more accurately, and provide more sufficient financial data and support for the reform and further development of high-tech enterprises.

2.2 Enterprise EVA Value Evaluation Model

2.2.1 Basic Assumptions of EVA Value Assessment Model

EVA value evaluation model must be under specific assumptions in order to play its role, so its establishment depends on two assumptions [13]. First, the operation of the enterprise is continuous and stable. The value of an enterprise is assessed when the internal factors such as operation, internal control and risks of the enterprise do not change. Second, the external environment facing the business development of the enterprise is kept at a certain level, so that the cost rate and discount rate are basically the same. Third, the capital structure of an enterprise is also stable. Only in this way can the equity capital and debt capital of an enterprise be in a relatively stable proportion relationship, and thus can the enterprise value be accurately evaluated in depth.

2.2.2 Calculation Formula of Enterprise EVA

The specific calculation formula of EVA is: EVA= net operating profit after tax (NOPAT)- total capital (TC)× weighted average cost of capital (WACC) (1)

In order to improve the accuracy and scientificalness of the calculation and make the evaluation results better reflect the fair value of the enterprise when applying the EVA value evaluation model. Based on the characteristics of the company, this paper makes reasonable adjustments to the accounting items such as research and development expenses, financial expenses, various impairment allowances, deferred income tax assets (liabilities) and construction in progress of the company.

Description of Formula (1): NOPAT refers to the adjustment of net profit, which involves the adjustment of various subjects, including interest expense and non-operating income and expenditure. TC is the actual investment in the process of enterprise development, and it is the performance of pursuing return. The cost of equity is the accumulation of income from business operation and shareholders' equity; Capital is the interest expense incurred by an enterprise when it borrows money from its creditors through various debt forms. WACC is a value weighted according to their respective proportions and considering the influence of taxation on the cost of creditor's rights and equity capital. It is an important parameter of discount value.

3. THE VALUE ASSESSMENT OF HIKVISION BASED ON THE EVA MODEL

3.1 Introduction of Hikvision

Hikvision, all known as "Hangzhou Hikvision Digital Technology Co., Ltd", is the largest provider of security products and industry solutions in China [14]. Hikvision

was established in December 2001 and listed in the SME segment of Shenzhen Stock Exchange in mid-May 2010. It is a technology company focusing on technological innovation, intelligent internet of things solution and big data service provider with video as the core, and a witness and promoter of video surveillance from digitalization, networking, and high definition to intelligence. Hikvision was identified as a key software enterprise in China in 2013. Since its official landing in the A-share market in 2010, the revenue of Hikvision has also increased from RMB3.6 billion in 2010 to RMB63.4 billion in 2020, a nearly 17-fold increase.

Based on research and development, the Company has gradually formed core technologies of image-based algorithms, as well as technologies of big data, cloud storage and cloud computing, in-depth learning, binocular recognition, etc. It provides products such as video capture, transmission, storage control, alarm management software, etc. It also provides professional segmentation products and intelligent visualization management solutions (IVM) for numerous social segmentation industries and simultaneously develops businesses in the fields of internet electronics, robotics, automotive electronics, etc.

Hikvision has 32 provincial business centers and more than 300 city branches on the Chinese mainland, and 66 branches in Hong Kong, Macao and Taiwan and overseas countries/regions (up to December 31, 2021), providing products and services to customers in more than 150 countries and regions around the world and playing an extremely important role in major projects such as G20 Hangzhou Summit, Beijing Olympics, Shanghai World Expo, APEC Conference, Beijing Daxing Airport, Hong Kong-Zhuhai-Macao Bridge, Nuremberg high-speed railway station in Germany, and Ping'an City in Seoul in Korea [15].

3.2 Calculation of EVA Value of Hikvision in 2016-2020

3.2.1 Calculation of Net Operating Profit after Tax (NOPAT) of Hikvision

Since Hikvision Company was identified as a key software company in China in 2013 and obtained the approval of the tax authority, it implemented a 15% preferential income tax policy. Net operating profit after tax (NOPAT) is the net operating profit before interest and after tax of the whole enterprise. The calculation formula of net operating profit after tax is shown in Equation (2):

Net operating profit after tax = (net profit+finance expenses+income tax) ×(1-T)+ minority shareholders' profit and loss+research and development expenses+increase in various impairment allowances+increase in deferred income tax liabilities-increase in deferred income tax assets-non-recurring profit and loss×(1-T) (2)

Based on Equation (2), the calculation of net operating profit after tax by Hikvision is shown in Table 1:

Table 1. Hikvision's net operating profit after tax Unit: RMB10,000

Project	2016	2017	2018	2019	2020
Net profit	742027.31	937750.16	1138169.29	1246518.43	1367831.95
+Finance costs	-22606.38	26541.13	-42425.79	-64006.81	39625.48
+Income tax	88990.52	110931.88	105674.00	129027.84	159465.18
Income tax rate	0.15	0.15	0.15	0.15	0.15
Total after tax	687149.73	913939.69	1021204.88	1114808.54	1331884.22
+Minority Shareholders' Profit and Loss	-198.88	-3335.34	2882.36	5059.66	29279.28
+Research and development costs	243340.06	319422.31	448278.07	548381.17	637865.18
+Increase in each impairment allowance	-3168.86	15023.34	-2296.17	-5159.33	-239.80
+Increase in deferred income tax liabilities	181.83	-233.32	2496.19	5108.81	4189.18
–Increase in deferred income tax assets	11585.75	10142.65	8023.82	-15420.03	-13157.62
–Non-recurring gains and losses×(1-T)	15713.32	25247.96	39657.45	32050.90	49273.43
Net operating profit after tax	900004.81	1209426.07	1424884.06	1651567.98	1966862.25

3.2.2 Calculation of Total Capital (TC) of Hikvision

Total capital = ordinary equity+ minority equity+ short-term borrowings+ long-term borrowings due within one year+ long-term borrowings+ bonds payable+research and development expenses+ various provisions+ deferred income tax liabilities-deferred income tax assets-non-recurring gains x (1-T)-construction in progress (3)

The calculation formula of total capital is shown in Formula (3), and the calculation results are shown in Table 2.

Table 2. All items involved in the calculation of Hikvision's total capital Unit: RMB10,000

project	2016	2017	2018	2019	2020
Equity of ordinary shares	2428863.49	3035807.29	3759015.46	3453379.40	4113097.06
Minority shareholders' equity	19803.90	24604.86	37398.17	56882.50	68543.22
Total equity capital	2448667.39	3060412.15	3796413.63	3510261.90	4181640.28
Short loan	3229.13	9711.47	346565.57	264008.25	399924.66
Due within one year of non current liabilities	1534.08	154640.73	317817.11	8612.32	350768.03
Money borrowed for long term	172220.76	49000.00	44000.00	460416.86	196116.78
Bonds payable	295444.95	312092.00	—	—	—
Total debt capital	472428.92	525444.20	708382.68	733037.43	946809.47
+Each impairment allowance	35564.50	50587.84	48291.67	19789.13	36310.95
+Research and development costs	243340.06	319422.31	448278.07	548381.17	637865.18
+Deferred income tax liabilities	—	—	—	5108.81	9297.98
–Deferred income tax assets	37525.51	47907.06	53434.69	68884.93	82038.10
–Non-recurring profit or loss ×(1-T)	15713.32	25247.96	39657.45	32050.90	49273.43
-Construction in progress	31648.25	143631.91	41609.24	63155.55	142523.52
Total capital (TC)	3115113.79	3739079.57	4866664.67	4652487.06	5538088.81

3.2.3 Calculate the weighted average cost of capital (WACC) of Hikvision

Cost of debt capital(K_d)= ratio of short-term borrowing to debt capital × short-term borrowing rate+ratio of long-term borrowing to debt capital × long-term borrowing rate (4)

Cost of equity capital (K_e)= risk-free return rate+β× market risk premium (5)

$$WACC=K_d \times (1-T) \times \frac{D}{(D+E)} + K_e \times \frac{E}{(D+E)} \quad (6)$$

Formula description: This paper uses RMB loan benchmark interest rate within 1 year as the short-term borrowing rate in formula (4) and long-term RMB loan benchmark interest rate over 5 years as the long-term borrowing rate in formula (4) to calculate the after-tax debt capital cost for 2016-2020. According to the market conditions, this paper uses the 10-year national debt yield to maturity as the risk-free return rate in formula (5), selects the growth rate of GDP in 2016-2020 as the market risk premium in formula (5), and uses theβvalue of Hikvision in 2016-2020 disclosed in choice Financial Terminal as theβvalue in formula (5) to calculate the cost of equity capital of the enterprise. After-tax cost of debt capital is $K_d \times (1-T)$ in formula (6), the proportion of debt capital in total capital is $\frac{D}{(D+E)}$in formula (6), and the proportion of equity capital in total capital is $\frac{E}{(D+E)}$ in formula (6).

Taking the above results into the calculation formula (6) of the weighted average cost of capital, the results of calculating the available WACC are shown in Table 3.

Table 3. WACC of Hikvision Unit: RMB10,000

Project	2016	2017	2018	2019	2020
Cost of debt capital after tax K_d (1-T)	0.0416	0.0393	0.0372	0.0395	0.0341
Debt capital as a proportion of total capital D/D+E	0.1617	0.1465	0.1573	0.1728	0.1846
Cost of equity capital K_e	0.1092	0.1561	0.1260	0.1210	0.1092
Equity capital as a proportion of total capital E/D+E	0.8383	0.8535	0.8427	0.8272	0.8154
WACC	0.0983	0.1390	0.1120	0.1069	0.0953

3.2.4 Calculation of Economic Value Added (EVA) of Hikvision

Taking the above-mentioned net operating profit after tax, total assets and weighted average cost into Equation (1), the EVA calculated for Hikvision in 2016-2020 is shown in Table 4.

Table 4. EVA of Hikvision Units: RMB10,000

Project	2016	2017	2018	2019	2020
Net operating profit after tax (NOPAT)	900004.81	1209426.07	1424884.06	1651567.98	1966862.25
Total capital (TC)	3115113.79	3739079.56	4866664.68	4652487.06	5538088.81
Weighted average cost of capital	0.0983	0.1390	0.1120	0.1069	0.0953
Economic value added (EVA)	593789.12	689694.01	879817.62	1154221.69	1439082.38

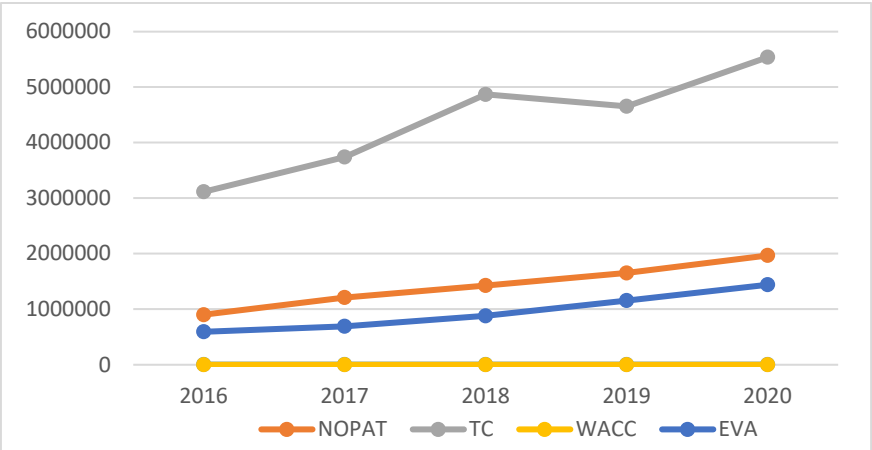

Figure 1 EVA Value of Hikvision from 2016 to 2020 Unit: RMB10,000

As can be clearly seen from Table 4 and Figure 1, both the value of EVA and its net operating profit after tax from 2016 to 2020 are positive numbers, which are far greater than 0, and show a rising trend year by year. It can be seen that the overall operating results of the company are relatively good, which has created a large profit for the shareholders of the company. It also shows that the value of the company is increasing year by year. On the whole, the value of EVA is smaller than that of net operating profit after tax, which is the true value of the enterprise after excluding the cost of capital.

3.3 Forecast of EVA Value of Hikvision 2021-2025

From 2016 to 2019, the company's net profit was positive and showed an increasing trend year by year, indicating that the company was able to maintain a steady growth trend under the current favorable economic situation in China. This paper assumes that Hikvision regards net operating profit after tax as increasing year by year based on the average growth rate of 21.8% in net operating profit after tax from 2016 to 2020 in the next 5 years; Assuming that the average growth rate of total capital in 2016-2020 is 16.21% as the growth rate in the next 5 years; It is assumed that the average value of WACC for 2016-2020 is 11% as the value of WACC for the next 5 years. The predicted results are shown in Table 5.

Table 5. Forecast of Hikvision EVA from 2021 to 2025 Unit : RMB10,000

Project	2021	2022	2023	2024	2025
Net operating profit after tax	1096205.86	1473080.95	1735508.79	2011609.80	2395638.22
Total capital	3620073.74	4345184.36	5655551.02	5406655.21	6435813.01
WACC	11%	11%	11%	11%	11%
EVA forecast	697997.75	995110.67	1113398.17	1416877.73	1687698.79
Present value factor	0.90	0.81	0.73	0.65	0.59
Present value of EVA	628197.97	806039.65	812780.67	920970.52	995742.28
EVA total present value	4163731.09				

Based on the forecast of China's economic development, it is assumed that China's economic growth rate can be maintained between 6% and 7%, while from 2021 to 2025, Hikvision sees the overall growth rate of its enterprises as relatively high.

According to the value evaluation model (7): the enterprise value can be expressed as the present value of the initial investment plus the specific discount rate EVA. The present value of the initial investment is the total capital on the base date, and the present value of the specific discount rate EVA is the total present value of EVA calculated in Table 5.

$$V=TC+\sum_{t=1}^{n}\frac{EVA_t}{(1+WACC)^t} \quad (7)$$

The enterprise value in 2020 can be calculated as 553888.81+4163731.09 = 9701819.90 yuan.

4. CONCLUSION

In this paper, the EVA model is used to evaluate the enterprise value. It can be concluded that the value of EVA in the past 5 years of the company is more than 0 and shows an upward trend year by year. The results of the value evaluation show that the company has been in good operating condition in recent years and has created great value for shareholders. The quality of corporate financial information directly affects the effectiveness of EAV value assessment, and the securities market supervision system will also affect EVA to a certain extent. From the analysis in this paper, it is concluded that the EAV assessment method and index system is a relatively novel financial instrument method, which provides new thinking for people to solve financial problems. Due to the limitation of available data, this paper only selects the financial data for a total of five years from 2016 to 2020. The time span of vertical comparison is relatively small, which cannot fully reflect the overall operation and development of the Company. Secondly, in the process of quantitative analysis, the author selects external sources of information, which are limited to corporate websites, disclosure of listed companies and other information sources. The items that have less impact and are not disclosed in the annual report are not excluded from the calculation, so the evaluation results are inevitably subject to error. In a word, the application of EVA model to enterprise value assessment is not only beneficial to providing a basis for enterprise analysis and investment decision-making but also beneficial to the continuous improvement of the enterprise management system and healthy and sustainable development. In the continuous innovation of modern enterprise systems, it is hoped that EVA evaluation method will be popularized.

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