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ROLE OF FUNDAMENTAL AND TECHNICAL ANALYSES IN INVESTMENT DECISION MAKING ON CAPITAL MARKET

Introduction

Investors are interested in making good investment decisions on capital market; they look for answers to such questions as what share should be bought and when it should be bought and then sold. The answer to the first question is given by a thorough fundamental analysis, while the answers to the remaining two questions are obtained through technical analysis which aims at reading from the market the signs of a trend reversal¹. A successful investor applies both fundamental and technical analyses which are complementary with each other.

The aim of the article is to present the role of fundamental and technical analyses as the tools applied in investment decision-taking on capital market. Empirical research was conducted for the case of Fabryka Farb i Lakierów Śnieżka S.A paint and varnish manufacturer (later referred to as the Company). In order to determine the Company's fundamental value, a discounted cash flow method was applied whose results were compared with the share value on the Warsaw Stock Exchange on the date of valuation. Then, technical analysis of the Company's share price was conducted in a long-, medium- and short-term investment horizon.

1. Fundamental analysis as a tool applied in long-term investment decision-making

Fundamental analysis as a supporting tool to make investment decisions is applied mainly by investors who are interested in the allocation of their capital in a long- or medium-term horizon. The analysis involves the investigation of all key factors in the company valuation process in order to refer company's value to its price on the market so that the best investment

¹ W. Tarczyński, *Rynki kapitałowe. Metody ilościowe*, Agencja Wydawniczo-Poligraficzna PLACET, Warszawa 2001, p. 45.

decision is made². It investigates economic and financial factors that have a direct impact on the share price on the capital market. The aim of fundamental analysis is to estimate the internal value of a given asset and to find one whose price is either over- or under-valued depending on the desired investment position of the investor. The assumptions of fundamental analysis are that in the investment decision-making process investors are driven by the will to maximize risk and that the internal value of assets that was estimated by the analysis will eventually equal the valuation dictated by the capital market³.

Fundamental analysis is conducted from the general to the specific. Thus, it starts with a macroeconomic analysis, i.e. with the assessment of the general economic situation and the investigation of the impact of environment on investment decisions. That is a difficult stage of the analysis as a thorough investigation of events that took place in the history of economy should lead to the understanding of relations between them in order to determine whether investments in any financial instruments on capital market are profitable in a given moment. A popular method that is applied to analyse macro-surrounding is the PEST analysis which distinguishes four factors that influence company development and its situation on the market. They are: political, economic, social-cultural and technological factors⁴.

In the next stage, the company's sector is analysed. The analysis consists in investigating whether the asset in the given sector is attractive from the investors' point of view. The attractiveness is influenced by the risk level and the effectiveness of the sector. Sector analysis included monitoring of factors that are the most significant in this context: the scale, direction and pace of changes, the reaction of consumers to changes in product prices and quality, the degree of market saturation and the price elasticity of demand⁵.

After the sector analysis is completed, the next stage is started which is more crucial and complex, i.e. company analysis. The stage consists in the situational assessment of the company where particular attention is paid to company's share on the market and the level of its profitability with the consideration not only of the current situation but also of the change direction and development pace in the last few years. The analysis is supported by SWOT

² K. Kowalke, *Analiza fundamentalna – wykorzystanie na rynku akcji w Polsce*, CeDeWu Sp. z o.o., Warszawa 2016, p. 69.

³ K. Kowalke, *Analiza fundamentalna – wykorzystanie na rynku akcji w Polsce*, CeDeWu Sp. z o.o., Warszawa 2016, p. 69.

⁴ Ibidem, pp. 71-72.

⁵ K. Borowski, *Analiza fundamentalna. Metody wyceny przedsiębiorstw*, Difin SA, Warszawa 2014, p. 32.

analysis, which considers company's strengths, weaknesses, opportunities and threats taking into account internal and external factors⁶.

Company's financial analysis is the next stage. This is undoubtedly the most important investigation tool in company assessment. The financial analysis investigates company resources, its financial condition and the results of operations⁷. The procedure starts with the study of the dynamics and structure of particular components of the resources; then the statement of financial performance is analysed for a given report period. The next step consists in monitoring cash flow in the most significant areas of company operations, which is the basis for the assessment of company's financial condition⁸. The final step of the financial analysis is the index analysis which provides an image of the financial situation in a given activity area of the company through the interpretation of indexes in its basic activity areas and generates conclusions with regard to the whole object under investigation. The assessment of company operations by index analysis is effective only when a joint analysis is conducted for all index groups⁹.

The final stage of the fundamental analysis is company valuation, whose main objective is to estimate company value and the internal value of shares. The determination of the difference between the fundamental value of company shares, i.e. its internal value, and its price on the Stock Exchange is a significant challenge for investors. For example, after the bankruptcy of one of the biggest American banks – the Lehman Brothers in 2008, a financial crisis started which spread around the world and resulted in a substantial slump and consequently, an undervaluation of numerous companies¹⁰.

The stock exchange price of a company should tend to the fundamental value determined by analysts. It is frequently close to the value of shares but it happens to be different as it equals the amount that is negotiated by the seller and the buyer of the shares. Thus, it may be concluded that a share is valued as much as the investor is going to pay for it, and investors' sentiments are determined by general trends on the market and the positive or negative information that comes from the company¹¹.

⁶ Ibidem, p. 36.

⁷ Ibidem, p. 36.

⁸ Ibidem, p. 151.

⁹ K. Borowski, op. cit., p. 37.

¹⁰ M. Panfil, A. Szablewski, *Wycena spółek z WIG30. Specyfika, metody, przykłady*, Poltext Sp. z o.o., Warszawa 2014, p. 29.

¹¹ Ibidem.

One of the most popular company value assessment methods is the Discounted Cash Flow method (DCF). Contrary to the accounting valuation approach, the DCF-valuation assessment is focused on the fact whether in the future - and to what extent – company assets are going to generate benefits for investors in the form of a satisfactory rate of return on shares in relation to the expenditure related to the commitment of their own capital. Thus, the model assumes that the objective of a company is to generate income in the future. For an investor who buys shares the crucial thing is the result of company operations which results in the company's value in the future¹². The DCF method is based on two main assumptions: a prediction of future financial benefits that a company may generate on its assets and a discount rate, which is relevant to the structure of financing sources and reflects the capital cost which is the basis for financing company assets. The discount rate is the capital cost of the company, i.e. the alternative cost of the committed capital that constitutes the minimum return that can be obtained in a given risk class. Thus, discount rate is the total weighted average cost of capital (WACC). The estimation of the discount rate is frequently a key problem in the DCF method due to a significant number of variables concerning the rate¹³.

2. Discounted Cash Flow (DCF) assessment method as the main objective of fundamental analysis – illustrated by the Śnieżka S.A. paint and varnish manufacturer

The Śnieżka company has been listed on the Warsaw Stock Exchange for 16 years, which makes it possible to analyse investing in its shares both in the long-, medium- and short -time horizon

DCF-based company valuation procedure consists of seven steps¹⁴:

1. Financial and strategic analysis.
2. Assumptions and forecasts in the financial report for the needs of the DCF method.
3. Free cash flow forecast.

¹² M. Wróblewski, *Problemy trafności prognozowania przepływów pieniężnych w wycenie spółek giełdowych metodą DCF*, Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, Nr 307, Katowice 2016, pp. 129-130.

¹³ Ibidem, p. 131.

¹⁴https://econopedia.pl/fp/wycena/wycena-przedsiębiorstwa-metoda-dcf-fcff/?fbclid=IwAR1e3bquKB5PL2aCHlcqSU3t6jCYfQemin7Zloct6FzI5O1YsHo1gXbeMyQ#Wycena_przedsiębiorstwa_oraz_pojedynczej_akcji_metoda_DCF_przepływy_FCFF_wstęp (accessed: 2 January 2020); M. Panfil, A. Szablewski, op. cit., pp. 82-87.

4. Cost of equity assessment.
5. Determination of average weighted capital cost as the basis for the discount rate development.
6. Discounting cash flow and residual value and the determination of enterprise value.
7. Interpretation of valuation results.

The condition for a reliable financial and strategic analysis is the analysis of company financial reports for a period of at least five fiscal years. It is also necessary to learn about the history of the company and its development strategy¹⁵. In order to execute thoroughly this step of valuation, annual consolidated financial reports of the Company for 2014-2018 were acquired from the Notoria Serwis database. Selected financial data regarding the Company are given in Table 1.

Table 1. Selected financial data for 2014-2018 (thousands PLN)

Selected elements of the report	2014	2015	2016	2017	2018
Sales revenue	545972	550131	575636	566998	586777
EBIT	58525	65191	64663	73912	79647
Net profit / loss of parent company's shareholders	41049	47991	53092	55290	61632
Depreciation	17854	18105	17971	15933	18723
Operating flows	62636	78738	72564	62932	80715
Investment flows	-18145	-15663	-30131	-27723	-56346
Financial flows	-54849	-64572	-43873	-22384	-40322
Assets	332857	323271	338077	369787	404481
Fixed assets	175252	168055	179351	189013	234952
Operating assets	156852	155216	158726	180774	169529
Equity of parent company's shareholders	202511	204118	215869	224020	262484
Long term liabilities	8160	5561	4028	4336	5159
Short term liabilities	117288	109635	113727	137513	130410
Number of shares (thousands)	12618	12618	12618	12618	12618

Source: Authors' research based on data from the Notoria Serwis database.

In the course of an introductory analysis of the Company's financial report one can notice that in the period under analysis, the average sales revenue growth rate was 2%, which means that the sales revenue increased by 2% every year.

The average EBIT growth rate was 8%, while the nett profit of parent company's shareholders increased by as much as 11%. The reasons for the improvement of the Company's

¹⁵https://econopedia.pl/fp/wycena/wycena-przedsiębiorstwa-metoda-dcf-fcff/?fbclid=IwAR1e3bquKB5PL2aCHlCqSU3t6jCYfQemin7Zl0ct6FzI5O1YsHo1gXbeMyQ#Wycena_przedsiębiorstwa_oraz_pojedynczej_akcji_metoda_DCF_przepływy_FCFF_wstep (accessed: 2 January 2020).

financial situation included: the increase in the share in the sales structure of premium as well as of average price shelf products which have a higher margin and an adequate pricing policy, including the adjustment of product prices in response to the growing prices of titanium white¹⁶.

According to the analysis of the data from the cash flow account, the average growth rate of operating flows was 7%, while investment flows increased every year by as much as 33% a year. However, there was an average drop of 7% in financial flows.

The analysis of financial data in the balance sheet shows that the balance sheet total decreased in 2015 but in the subsequent years it increased gradually with an average growth rate of 5%. In 2018 there was a significant growth in the value of fixed assets: from 189 013 thousand to 234 952 thousand PLN. The value of operating assets increased annually by 2% on the average. The equity of the parent company's shareholders gradually increased on the average by 7% every year; long-term liabilities in 2014-2016 decreased from 8 160 thousand to 4 028 thousand PLN; however, in 2018 they started to grow to 5 159 thousand PLN. Short term liabilities constituted a dominating part of the total of Company's liabilities and their average growth rate was 3%.

In the second step of the valuation, assumptions and the necessary values were determined. They are given in Table 2.

¹⁶ Grupa Kapitałowa Śnieżka, *Sprawozdanie Zarządu z działalności za 2018 rok*, Warszawa 2019, p. 19.

Table 2. Assumptions and values necessary to conduct DCF - based valuation of the Company (thousands PLN)

Selected report components	2014	2015	2016	2017	2018
Fixed assets	175252	168055	179351	189013	234952
Current assets	156852	155216	158726	180774	169529
Inventories	66576	71971	68102	79468	84129
Trade receivables	74203	69975	78409	77428	77235
Trade liabilities	41525	50559	51864	54618	57226
Cash and equivalents	13424	11057	9588	21444	5563
Total liabilities and reserves	125448	125448	125448	125448	135569
Equity	202511	204118	215869	224020	268912
Interest-bearing short-term liabilities	71950	55559	57166	75241	65492
Interest-bearing long-term liabilities	4004	1338	0	0	0
Total interest-bearing liabilities	75954	56897	57166	75241	65492
Net debt	62530	45840	47578	53797	59929
Capital involved	265041	249958	263447	277817	328841
Debt / capital ratio	23,59%	18,34%	18,06%	19,36%	18,22%
Net working capital NWC	99254	91387	94647	102278	104138
Change in NWC	-	-7867	3260	7631	1860
EBIT	58525	65191	64663	73912	79647
CAPEX	-18145	-15663	-30131	-27723	-56236
Depreciation	17854	18105	17971	15933	18723

Specification	Value
CIT	19.00%
Risk-free rate	3.20%
Market premium	5.00%
Beta	2.10
After-tax debt cost (with tax shield effect)	3.72%
Growth rate after forecast period	1.50%

Source: based on financial reports.

The determination methodology of the selected values and assumptions is given below:

- debt / capital ratio – is a ratio of net debt to capital committed. It is used to calculate the average weighted capital cost. The committed capital was calculated as the sum of the accounting value of equity and the net debt¹⁷;
- net working capital NWC – in company valuation it is necessary to determine the value change in net working capital from period to period as this is the component of the formula used to calculate free cash flow balances. NWC was determined in the following way¹⁸:

$$\begin{aligned}
 NWC = & \text{inventories} + \text{trade receivables} \\
 & + \text{deferred expenditure} - \text{trade liabilities} \\
 & - \text{accrued liabilities}
 \end{aligned}$$

¹⁷https://econopedia.pl/fp/wycena/wycena-przedsiębiorstwa-metoda-dcf-fcff/#Krok_21_Stosunek_długu_do_kapitałów (accessed: 2 January 2020).

¹⁸https://econopedia.pl/fp/wycena/wycena-przedsiębiorstwa-metoda-dcf-fcff/#Krok_22_Kapitał_obrotowy_netto_KON (accessed: 2 January 2020).

- after-tax debt cost – is the factor that has a significant impact on company value. The outside capital cost is usually determined by analysts; in the article it was determined as the WIBOR 3M rate increased by 2%¹⁹.
The value of interest-bearing outside capital was reduced by interest expense tax which constitutes tax deductible expenses that decrease the tax base. The dependence is the result of the tax shield;
- risk-free rate – it was assumed for the purpose of the valuation that the risk-free rate equals the yield on a 10-year State Treasury Bond
- market risk premium – it is assumed in the literature on the subject that the market risk premium for developed markets ranges from 4.5% to 5.5%. The value of 5% was assumed for the purpose of this valuation;
- systematic risk factor (beta) – is a component of the capital asset pricing model CAMP, which was applied to determine the cost of equity. In order to find the beta coefficient, the following formula was applied²⁰:

$$\beta_i = \frac{COV(r_i, r_m)}{\sigma^2(r_m)}$$

where:

COV (r_i , r_m) –covariance of the rate of return on the market portfolio and company's i^{th} share,

$\sigma^2(r_m)$ –variance of the rate of return on the market portfolio.

Before starting the determination of Beta parameter, input data were prepared in the form of the historic closing price of the Company and of the WIG-budownictwo index where the Company is listed and which is the market portfolio. The company's and the WIG-budownictwo index share price were given for five years, i.e. from 2014-2018. On the basis of the closing prices, stock

¹⁹https://econopedia.pl/fp/wycena/wycena-przedsiębiorstwa-metoda-dcf-fcff/#Krok_22_Kapitał_obrotowy_netto_KON (accessed: 2 January 2020).

²⁰ S. Ostasiewicz, Z. Rusnak, U. Siedlecka, *Statystyka. Elementy teorii i zadania*, Wydawnictwo Akademii Ekonomicznej im. Oskara Langego we Wrocławiu, Wrocław 2006, pp. 363-364.

daily return was calculated for the Company and the WIG-budownictwo index. Having calculated the rates of return, the Beta coefficient was determined from the above formula;

- growth rate after forecast period - is a significant factor necessary to calculate the residual value. The growth rate after the forecast period was estimated in relation to the GDP growth rate²¹.

Forecasting the selected values for 2019-2028 from the financial report is the next step of valuation. For the purposes of this article, the forecasts for the selected values were taken from the analysis of the Dom Maklerski BDM S.A. They are presented in Table 3.

Table 3. Financial forecasts for 2019 - 2028 (million PLN)

Specification	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Sales revenue	731.9	826.9	863.8	901.4	931.1	957.2	978.9	998	1017.6	1037.2
EBIT	96.7	106.9	113.4	122	126.4	129.5	132.6	135.1	137.4	139.7
Depreciation	22.2	25.1	32.4	33.9	34.3	33.8	33.6	33.5	33.6	33.7
CAPEX	-77.5	-72.9	-37.4	-35.5	-35.5	-35.5	-35.5	-35.5	-35.5	-35.5
NWC change	-	-1.5	19.1	10.4	-2.8	-2.3	8.7	13.9	14.4	19.1
Debt/Assets	61.8%	56.4%	40.2%	27.2%	18.3%	10.3%	3.9%	-1.9%	-6.5%	-9.9%
CIT (T)	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%
Risk-free rate (rf)	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%
Market premium (rm - rf)	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
BETA	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
After-tax debt cost rd(1-T)	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%

Source: based on the analysis of Dom Maklerski BDM S.A. (https://www.bdm.pl/analizy-i-informacje/analizy/fundamentalna?page_c30=3 (accessed: 3 January 2020)).

In the next valuation step, on the basis of the forecast data, the values of Company's free cash flows were calculated by formula²²:

$$FCFF_t = ZO_t(1 - T_t) + A_t - \Delta KO_t - I_t$$

where:

FCFF_t – Company's free cash flows in time period t;

ZO_t – operating profit in time period t;

T_t – CIT rate in time period t;

A_t – depreciation in time period t;

²¹https://econopedia.pl/fp/wycena/wycena-przedsiębiorstwa-metoda-dcf-fcff/#Krok_28_Stopa_wzrostu_po_okresie_prognozy (accessed: 3 January 2020).

²²https://econopedia.pl/fp/wycena/wycena-przedsiębiorstwa-metoda-dcf-fcff/?fbclid=IwAR1e3bquKB5PL2aCHlCqSU3t6jCYfQemin7Zl0ct6FzI5O1YsHo1gXbeMyQ#Krok_3_Prognozy_finansowe (accessed: 3 January 2020).

ΔKO_t – change in net working capital in time period t ;

I_t – investment expenditure (CAPEX) in time period t .

The calculations are presented in Table 4.

Table 4. Value of free cash flows for the Company (million PLN)

Specification	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
EBIT	96.7	106.9	113.4	122.0	126.4	129.5	132.6	135.1	137.4	139.7
CIT (T)	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%
NOPLAT	78.3	86.6	91.9	98.8	102.4	104.9	107.4	109.4	111.3	113.2
Depreciation	22.2	25.1	32.4	33.9	34.3	33.8	33.6	33.5	33.6	33.7
CAPEX	-77.5	-72.9	-37.4	-35.5	-35.5	-35.5	-35.5	-35.5	-35.5	-35.5
NWC change		-1.50	19.10	10.40	-2.80	-2.30	8.70	13.90	14.40	19.10
FCFF	178.0	186.1	142.6	157.8	175.0	176.5	167.8	164.5	166.0	163.3

Source: based on the analysis of Dom Maklerski BDM S.A. (https://www.bdm.pl/analizy-i-informacje/analizy/fundamentalna?page_c30=3) (accessed: 3 January 2020).

The next valuation step was the equity cost determination. Here, CAPM model was applied which is given by²³:

$$r_e = r_f + \beta(r_m - r_f)$$

According to the formula, the equity cost equals risk-free rate increased by market premium multiplied by the beta risk coefficient. In the assumptions of the valuation the same value of equity cost was adopted in all projection periods²⁴.

Then, the Company's Weighted Average Cost of Capital WACC was determined which was used as discount rate in DCF model. The formula applied was as follows²⁵:

$$WACC = r_d(1 - T)\frac{D}{K} + r_e(1 - \frac{D}{K})$$

where:

D – net debt;

K – invested capital;

²³ M.Panfil, A. Szablewski, *Wycena Przedsiębiorstwa od teorii do praktyki*, Poltex Sp. z o.o., Warszawa 2011, p. 92.

²⁴ Ibidem.

²⁵https://econopedia.pl/fp/wycena/wycena-przedsiębiorstwa-metoda-dcf-fcff/?fbclid=IwAR1e3bquKB5PL2aCHlCqSU3t6jCYfQemin7Zl0ct6FzI5O1YsHo1gXbeMyQ#Krok_3_Prognoz_y_finansowe (accessed: 3 January 2020).

$r_d(1-T)$ – after-tax debt cost;

r_e – equity cost.

The determined equity cost and the average weighted capital cost are given in Table 5.

Table 5. Equity capital and WACC

Specification	2019	2020	2021	2022	2023	2024	2025p	2026	2027	2028
	1	2	3	4	5	6	7	8	9	10
Debt/Assets (D/P)	61.8%	56.4%	40.2%	27.2%	18.3%	10.3%	3.9%	-1.9%	-6.5%	-9.9%
Risk-free rate (rf)	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%
Market premium (rm - rf)	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
BETA	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10
After-tax debt cost $r_d(1-T)$	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%
Equity cost (re)	13.7%	13.7%	13.7%	13.7%	13.7%	13.7%	13.7%	13.7%	13.7%	13.7%
WACC	7.5%	8.1%	9.7%	11.0%	11.9%	12.7%	13.3%	13.9%	14.3%	14.7%

Source: based on the analysis of Dom Maklerski BDM S.A. (https://www.bdm.pl/analizy-i-informacje/analizy/fundamentalna?page_c30=3 (accessed: 3 January 2020)).

After the determination of WACC, which is a discounting factor in the DCF model, cash flows to the Company were discounted. With the application of WACC each estimated future flow was discounted, the results of which are given in Table 6.

Table 6. Discounted cash flows to the Company (million PLN)

Discounted cash flows	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	1	2	3	4	5	6	7	8	9	10
DFCF	165.6	159.3	108.0	104.0	99.9	86.3	70.0	58.1	49.7	41.5
Total DCF	942,3									

Source: based on the analysis of Dom Maklerski BDM S.A. (https://www.bdm.pl/analizy-i-informacje/analizy/fundamentalna?page_c30=3 (accessed: 3 January 2020)).

In the next step of the DCF valuation, the Company's terminal value was determined and discounted. The computation results are presented in Table 7 and their formulas were as follows²⁶:

$$DTV = \frac{FCFF_{n+1}}{\frac{WACC - g_{fcff}}{(1 + WACC)^n}}$$

$$FCFF_{n+1} = FCFF_n(1 + g_{fcff})$$

²⁶ M. Panfil, A. Szablewski, *Wycena Przedsiębiorstwa ...*, op. cit., pp. 306-308.

Table 7. Determination of the discounted terminal value and value of the Company (million PLN)

Specification	Value
Discounted terminal value (DTV)	319.1
Growth rate after forecast period	1.50%

Specification	Wartość
Value without corrections	1261.4
Minority capital	33.4
Net debt	61.7
Company value (V)	1166.3
Number of shares issued	12.6
Value of shares	92.6

Source: based on the analysis of Dom Maklerski BDM S.A. (https://www.bdm.pl/analizy-i-informacje/analizy/fundamentalna?page_c30=3 (accessed: 3 January 2020)).

When all elements of the DCF model were determined, the Company's value and the value of its single share could be calculated. To do this, the discounted terminal value and the total discounted cash flows were added. The formula applied was²⁷:

$$V = \sum_{t=1}^n \frac{FCFF_t}{(1 + WACC)^t} + DTV$$

Then, the value of net debt and minority capital were deducted from the result obtained and, as a result, the Company's value was received of 1166.3 million PLN. Finally, the value of 1166.3 million PLN was divided by the number of 12.6 million shares issued and the value of one Company's share of 92.6 PLN was obtained. This is the valuation for 13.01.2020, while the Company's share price was 85.0 PLN on that day. This indicates that the shares of the Company are undervalued and it may be profitable to buy them as their value on the Stock Exchange will probably increase towards its fundamental value.

3. Technical analysis as a tool applied in mid- and short-term decision making processes

Investors who are interested in short-term investments usually use technical analysis as a tool to support decision-making. Technical analysis studies the psychology of crowd, which makes it possible to determine the pattern that precedes price movement on the market and eventually to make a profitable transaction²⁸.

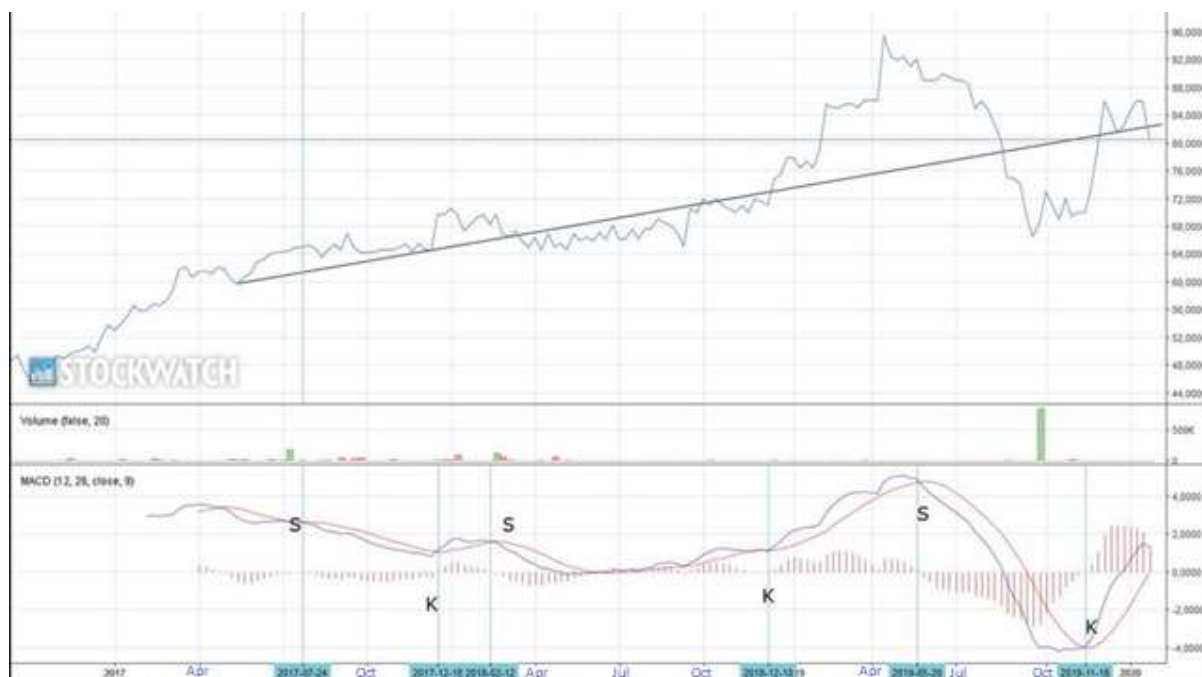
²⁷https://econopedia.pl/fp/wycena/wycena-przedsiębiorstwa-metoda-dcf-fcff/?fbclid=IwAR1e3bquKB5PL2aCHlcqSU3t6jCYfQemin7Zloct6FzI5O1YsHo1gXbeMyQ#Krok_3_Prognozy_finansowe (accessed: 3 January 2020).

²⁸M. Krzywda, *GPW IV. Analiza techniczna w praktyce.*, Wydawnictwo Złote Myśli Sp. z o.o., Gliwice 2010, p. 151.

The Śnieżka Company debuted on the Warsaw Stock Exchange on 29 December 2003. It was first listed on 31 December 2003 and the debut price was 29.50 PLN. The share prices has been fluctuating in the range of 1.74 PLN to 99.00 PLN since its debut²⁹.

The Company's share price was analysed in various time horizons and a long-term perspective of three years is given in Figure 1.

Figure 1. Śnieżka Company's share price in long-term perspective of 3 years



Source: <https://www.stockwatch.pl/analiza-techniczna/> (accessed: 5 February 2020).

The analysis of the graph of the share price in a long-term perspective shows that there was a rising trend in the period under investigation. The trend was confirmed three times: in November 2017, February 2018 and November 2019. The long-term trend included three intermediate-term correction trends, after which the rising trend was continued. The corrections took place from August to November 2017, February to November 2018 and the deepest correction was from May to September 2019. The head and shoulders graph pattern for the correction period predicts a reversal of the growth trend, which is additionally implied by the fact that the level of the minimum price is below the previous resistance levels.

As regards the share price graph in the long-term horizon, MACD (*Moving Average Convergence Divergence*), one of the most common oscillators, was used. It is calculated as the

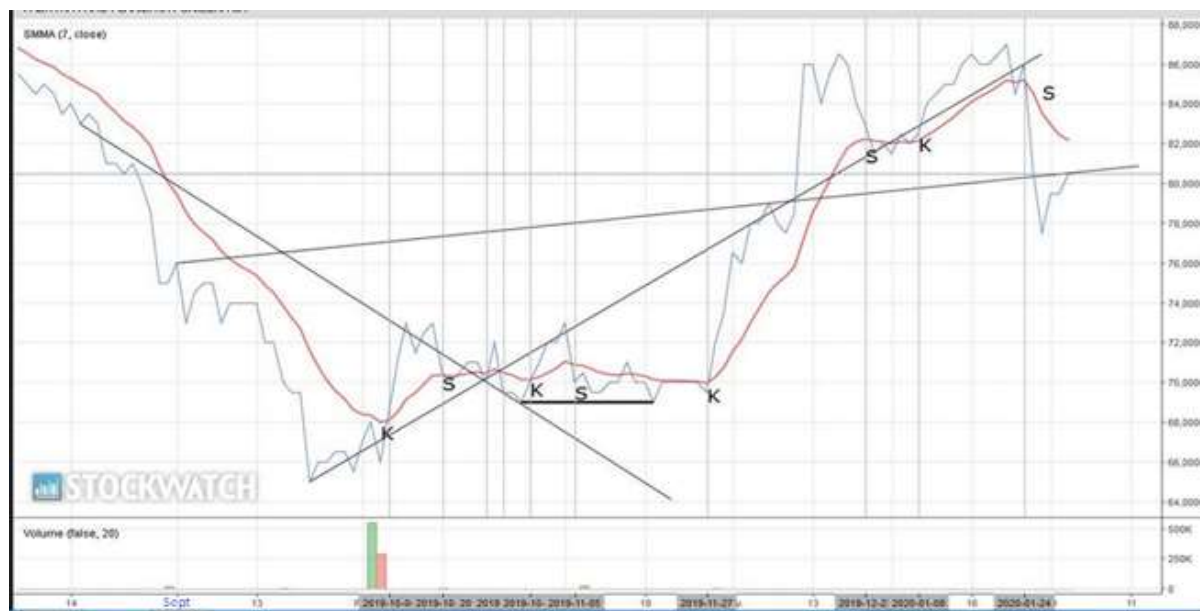
²⁹<https://www.serwis-korporacyjny.sniezka.pl/relacje-inwestorskie/akcje-ffil-sniezka-sa-na-gieldzie/oferta-publiczna-akcji> (accessed: 5 February 2020).

difference between two exponential moving averages³⁰. The share price graph presented in the figure shows that the MACD indicator generates the first sell signal in July 2017 when it crosses the signal line from below. Next sell signals appear in February 2018 and May 2019, while buy signals are visible in December 2018 and November 2019 and have lasted till now.

In the next step technical analysis was conducted of the Company's share price in a mid-term horizon of six weeks. The graph in Figure 2 shows a horizontal trend in the period under investigation. After a decrease in the share price, a double bottom formation is formed in the next month, which heralds a reverse in the downward trend. This actually happens in November and an upward trend starts.

In order to indicate the potential time for buying or selling the shares, Simple Moving Average (SMA) was applied. The SMA index is based on the arithmetic average of share prices in a given number of sessions³¹. It is visible in Figure 2 that the first buy signal appears at the beginning of October when the SMA line crosses the Company's share price from the bottom. Further buy signals appear at the end of October, in November and January. Sell signals were generated in mid-October, at the beginning of November, in December and at the end of January.

Figure 2. Graph of the Company's share price in a mid-term horizon (6 months)



Source: <https://www.stockwatch.pl/analiza-techniczna/> (accessed: 6 February 2020).

³⁰ <https://www.bdm.com.pl/ispag/encat/macd.html> (accessed: 6 February 2020).

³¹ <https://www.bdm.com.pl/ispag/encat/sma.html> (accessed: 6 February 2020).

Technical analysis was also conducted for a short-term investment period of three months, from November 2019 to January 2020. The share prices in this period are given in Figure 3.

Figure 3. Graph of the Company's share price in a short-term horizon (3 months)



Source: <https://www.stockwatch.pl/analiza-techniczna/> (accessed: 6 February 2020).

The analysis of the graph in Figure 3 shows that in the period under analysis the share price is in an upward trend. A significant growth started at the beginning of December, it was followed by an insignificant correction and then in mid-December the trend again gained momentum. Another correction took place at the beginning of January 2020 after which the price returned to its upward trend and then there was a sharp drop at the end of January. The correction was used to determine Fibonacci internal retracements which define potential support levels for corrective movements³². The price graph shows that after reaching a minimum at the end of January the price started to increase and when approaching the first Fibonacci level of 0.236 it stopped around the price of 79 PLN. However, there was no reversal of the trend and the price continued to rise. At the beginning of February, when it reached another level of 0.382, the trend stopped again. Afterwards it began to go down and after crossing the first level it reached its minimum at the price of c. 78.5 PLN. Then, the share price

³² <https://www.investmentuniversity.pl/aktualnosci/analiza-techniczna-pozioomy-fibonacciego> (accessed: 7 February 2020).

went up and approached Fibonacci level of 0.382 which should draw investors attention as a correction was probable.

Thus, technical analysis indicates that in the long-term investment horizon the conclusions from the fundamental analysis were confirmed as the Company's share price is in an upward trend and the MACD indicator still generates a buy signal. However, the situation changes in the medium-term horizon. The share price is in a horizontal trend and the SMA indicator generates a sell signal. For a short-term investor a fundamental approach ceases to be essential as in such a short period of time the market may significantly differ from the assessment obtained through the valuation. As a result the share price is in an upward trend but - as it can be concluded from the Fibonacci levels – a correction may soon take place.

Conclusions

The role of fundamental and technical analysis in investment decision-making on capital market depends mainly on the investment time-horizon adopted by investors. The same analytical tools may generate different signals for investors who adopted either long- or short-term horizon. A joint use of both analytical methods is an optimal solution as the fundamental analysis gives answer to the question what asset is worth investing in and the technical analysis points at the best moment for this investment. Although share prices on the Warsaw Stock Exchange should approach their fundamental value, their value is most frequently significantly different. This is because of the fact that capital market reflects human perception of value and shares are worth as much as investors are willing to pay for them. Technical analysis indicates that such a discrepancy exists and it defines its scale³³.

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³³ M. Kahn, *Analiza techniczna. Wprowadzenie do wykresów giełdowych*, Wydawnictwo Nieoczywiste, Warszawa 2018, p. 33.

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Abstract

The article discusses the role of the fundamental and technical analysis in investment decision-making on the capital market. An empirical investigation was conducted and exemplified by the Śnieżka S.A paint and varnish manufacturer. In order to estimate the fundamental value of the company, the discounted cash flow method was applied and the obtained company's share value was compared with the current price on the Warsaw Stock Exchange. The technical analysis was conducted in different investment time horizons and an attempt was made to determine an investment recommendation for each of the horizons.