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Measuring Corporate Synergy from Integration of Two Companies. A Romanian Case Study

Abstract. *Corporate synergy assumes that a new company, resulting from the combination of two others will be worth more than the sum of its parts. Our research aimed to find and to quantify the synergy effect of the combination of two Romanian companies operating in the paper industry. We initially posed the scientific inquiry: Does corporate synergy truly exist, and if so, what is the magnitude of this effect on the combined value of companies? First, we assessed each company independently, emphasising the present value of cash flows as indicative of the post-integration value of merged companies, excluding the synergy effect. Then we compared the value derived from the straightforward combination of the two companies with the synergistic value attained from the newly merged entity. Our findings demonstrated a quantifiable corporate synergy effect emerging from the merger, as the difference between the two values reflects positive effects of integration. Finally, the Monte Carlo simulation provided the confirmation of the values of the individual companies post-integration, alongside an additional corporate synergy component. Our approach also has a practical scalability for generic M&A practices. Data was collected and processed based on public information presented as references.*

Keywords: *business combinations, additive M&A, Monte Carlo iterations.*

JEL classification: G34.

1. Introduction

Mergers and acquisitions (M&A) are operations through which one or more companies transfer all their assets to an absorbing company, while ensuring the distribution of shares or stocks of the acquiring company to their associates or shareholders (Law on Commercial Companies no. 31/1990). The synergy concept suggests that the overall performance and value of the newly formed entity, post-merging, will be greater than of the sum of their separate individual parts. If two companies merge to form greater efficiency or scale, this result can be named a synergistic merger. Therefore, a merger is the difference between the value of the entity resulting post-merger and the sum of the collective values of the separate entities before the merger. The total value of synergy resulting from merger is equal

to the difference between the value of the newly formed entity and the sum of the value of each individual entity.

Corporate synergies created by an M&A deal are presumed to reduce operating costs and to increase revenues, usually through economies of scale and scope. As such, improved efficiencies should manifest in advanced research and development acumen, in better procurement and transfer of advanced technology, with a more streamlined, market-driven production, a better talent management, more agile sales and marketing corporate skills, and an improved overall distribution and administration of the business. Investment case assumes that merged company has a stronger market position by cross-selling an improved and a diversified range of products that are delivered to new clients or to an expanded variety of products and services to existing clients but at higher margins and at better commercial terms. As a result of synergy, the resulting company could strengthen its competitive position and facilitate a better access to new production capacities, suppliers, and critical resources. The merger improves diversification of sales channels, integration of customer relations management, unification, and interfacing of information systems, and provides opportunities to discover, reveal, and commercialise latent value within the component companies. The larger firm could develop new opportunities to serve its existing customers with additional products or sell existing ones to different customers in segments that were otherwise inaccessible before the merger. An integrated coordination of managerial and professional talents of the two companies can become a superior advantage of the merged entity.

2. The Acquisition and Integration Between Two Romanian Companies

Our research valued the acquisition and integration between two Romanian companies. The buying company, Vrancart (VNC), is one of the most important producers of corrugated cardboard paper and personal hygiene paper. The acquired company, Rom Paper (RP), is a competitor but also a complement, with a diverse portfolio range of products, from napkins to box and table papers, to folded towels and cosmetics, toilet paper, and professional rollers. The complementarity of the expanded product range of the two companies is synergistic, almost perfect. The motivation presented convincingly to the public by the absorbing company was to increase revenues and enlarge coverage of distribution channels by expanding the existing product portfolio. Following operational and financial integration and better overall management, the new company should be better positioned to extract cost synergies, to develop additional capacity for new investments in equipment and to refine the human resources acquisition, retention, and development. After reviewing the literature on synergies of M&A transactions, this research article presents an independent evaluation of analysed companies: the sum of these evaluations (without synergy), the evaluation of integrated company with its promising synergy, and the resulting quantification of synergy value from merger. The simulation provided the value of independent companies without synergy, the value of the

integrated company with synergy, and, by difference, the value of synergy. We valued the companies:

Our research results are in conformity and consistent with an empirical study directed on a collection of more than 700 companies involved in activities of M&A. The study concluded that 49.3% of companies preferred to use for evaluation the method of discounted cash flow (DCF), followed by 33.3% of companies that used a combination of both discounted cash flows and multiples. Only 5% of the participants' companies declared that they used additional methods (Mukherjee, Kiymaz, Baker, 2005).

3. Companies' Assessment before Merging

In order to assess a realistic company value during the merging process, a various range of evaluation methods and techniques are used, from simple to more sophisticated ones. These methods often yield different values due to implicit assumptions, despite aiming for their fair value. These methods are generally grouped into three categories:

- Assets oriented methods
- Revenues oriented methods
  We utilised this method in our article, to estimate the value of companies and the synergy of their merger.
- Methods focused on price and value multiples (PER, PBR, EBITDA/EV, etc.).

Identifying potential synergy effects implies identifying the strengths and weaknesses of the business processes of the companies involved in the merger process. This understanding supports the development of a future performance vision for the resulting company. Synergy is not inherent in ownership or corporate assets, but rather the result of combining existing resources. Such resources include: human resources - specific knowledge of business processes and their interactions with other individuals and systems within the company; technology - equipment and machinery, as well as business methods and software; organisation - hierarchical levels, decision-making lines, functions, and culture. The value of the resulting assets is based on the ability to generate future cash flows.

The synergy, resulting from the present value of free cash flow, is determined as follows:

Synergy Value = Company Value after integration, with synergy – Sum value of independent companies, without synergy

The company's free cash flow represents the amount available to the company's capital providers. We applied a traditional Free Cash Flow to the Firm (FCFF) analysis method, with a conservative estimated terminal value for the stable growth period. FCFF is the cash flow from operations minus capital expenditures. Next, to validate our estimate, we concluded a Monte Carlo simulation with 10,000 iterations, from which we extracted the average, maximum and the minimum value. Distributions were then represented graphically as the value of independent

companies, the value of companies after integration, and the value of synergy, respectively. Further, the company's EBIT- operating income and interest expense were randomised, based on the standard error of their annual variation over the last five years. We also randomised the capital market risk premium, based on the standardised annual error of the series of daily differences between the profitability of the BET index (Bucharest Stock Exchange Index) and the local risk-free interest rate for the last 10 years (2009–2018). Further, in relation to the random values resulting from the randomisation for the respective risk premium, EBIT, and interest, the independent firms were re-evaluated without synergy, and the integrated company with built-in new operational and financial strengths resulting from merger. The resulting corporate synergy is the difference between the two previous valuations. The useful relevance of our research findings presents several applicable conclusions and some critical practical recommendations for a range of options for assessing corporate synergy from an M&A.

4. Body of Knowledge and Review of the Literature

In their article, Cirjevskis (2020) evaluates competency-based synergies as market-added value revealed in M&A transactions in the cosmetics industry. This article analyses the demand for new technologies and products with opportunities to acquire the basic skills needed by merging companies. The evaluation of synergies was done through a Real Options Model on three case studies: (1) the acquisition of Body Shop by l'Oréal in 2016 and subsequent sale in 2017, (2) the acquisition of The Body Shop by Brazil Natura Grup in 2017 and (3) the acquisition of Avon Products by Nature of 2019. The article combines the author's previous research on empirical evidence of synergy, based on new skills in the global ITC industry (Facebook's acquisition of Instagram in 2012, Facebook's acquisition of WhatsApp in 2014 or Microsoft's acquisition of LinkedIn in 2016) with an empirical study of the cosmetics industry (the acquisition by l'Oréal of The Body Shop in 2006 and its subsequent sale in 2017). The main conclusion contents that assessment of competency-based synergy options provides practitioners with an estimate of synergy in terms of added market value, both in terms of cost savings and/or increasing revenues.

Assessing M&A synergy through real options is also the goal of research by Loukianova et al. (2017). While most work on the synergistic effects of M&A transactions focusses on a particular type of synergy, their research proposes a model to assess simultaneous cumulative effect of different types of operational synergies (cross-revenue, cross-branding, costs reduction through scale, higher growth in more lucrative market segments) and financial (tax savings, carrying forward losses, assets disposal, lower tax rate, thus increasing the borrowing capacity by lowering the interest rate and reducing the cost of capital, and finally, increasing the present value of the company).

The model for applying real options techniques to assess the value of the target company, which includes the synergistic effects of M&A transactions, is defined:

Value of the target company = Value of independent company + Value fusion synergy + Value real synergy option

Authors evaluated five types of real options: growth, abandonment, deferral, flexibility (to change the operating scale), and switching (to change operating processes). Thus, the use of the evaluation framework through real options offers an additional perspective of evaluating the synergy, from the perspective of the acquiring company. The logic of the argument is that the buying company is, in fact, in a position as if it were creating valuable real options that were undetected initially but once they are identified, they are then incorporated into the basic model of free cash flows. These are now greater than before from the increase in value from real options. In addition, evaluation by real options may reveal other sources of corporate synergy, for example, a stronger competitive position, an additional bankability for investment, an attractive future M&A potential, a stronger proposal for value-added integration, and a clearly released synergy from the combination. The authors developed models for evaluating eight types of synergies that commonly arise from M&A transactions. All of these were integrated into a single model designed to assess the ex-post cumulative effect of M&A transactions in the pharmaceutical industry. The resulting evaluation model could be used by the companies before signing the M&A agreement in a bidding strategy, to estimate more confidently the maximum acquisition and/or control premium that the absorbing company should pay for the target company.

Fiorentino and Garzella (2014) aimed to analyse the use and efficiency of merger and acquisition synergy assessment models. Through a survey of questionnaires and interviews with M&A experts, the authors concluded that historically, the failure rates of mergers and acquisitions have remained consistently high. Then, from the review and critical evaluation of the literature, they determined that the net present value is the most frequently used and most appropriate evaluation model for a potential successful M&A. To reduce the failure rate of mergers and acquisitions and increase the probability of success of an M&A process, the procedure and the efficient use of synergy evaluation models are essential. The article highlights the need to warn investors of the potential risks of inaccurate (too optimistic) synergy estimates. This article is the first comprehensive investigation of synergy assessment models in the M&A sector. From the analysis of existing research on M&A's, authors identified the critical variables behind the M&A investment decision process:

- enterprise diversification/integration of the acquiring enterprise (58% of studies);
- size of the company, size of the value gain at the acquiring company (52% of studies);
- acquisition experience of the acquiring company (28% of studies);
- payment method for target companies (18% of studies).

In the last 20 years, the average premium for attracting shareholders of the target company was 40% - 50%, motivated by the synergy potential, which can be created in the merger of the two companies (Laamanen, 2007). If the acquisition will produce

positive profits, the premium paid should not and cannot be higher than the potential for synergy extraction. The authors also analysed the importance of purchasing power, based on organisational learning from complementary sciences and technologies for strategic business renewal. Finally, they analysed cross-border M&A research, which has become predominant in recent years.

The purpose of our scientific approach was to translate the aforementioned principles of evaluating a synergy in the case of two Romanian companies. We applied all described precepts to quantify the effects of the synergy of the merger of two companies, which through their shareholders decided to transfer the universality of assets to one of them (Vrancart), through a merger by absorption (of Rom Paper). As a result of the integration of the two analysed companies, we assessed the potential synergy resulting from all the effects presented above, apart from fiscal savings from lower taxes and a higher debt capacity of integrated entity. From an operational point of view, the increase in revenue (EBIT) that resulted from the addition of an extra level of processing of products manufactured on the personal paper line. The merger will expand the range of higher value-added, more competitive products from expected new investments in equipment, production flows, and improved customer and upgraded supplier relationship systems. By integrating the two firms, the new company will offer a larger diversification of production for personal use paper, an extension of the assortment of final products, and a more efficient operation from procurement to final product, through lower costs and higher, sustainable EBIT. Financial synergy combines an increase of investment capacity of the new, larger company with a stronger prospect for higher risk-adjusted return on the stakeholders invested capital (ROI).

5. Synergy in the Case of Company Integration

Figure 1 below is a synthesis by the authors of the logical framework of decision-making process for a synergistic merger, after Damodaran (2012), with the two types of potential synergistic effects of a successful integration of two companies – financial and operational synergy: operational synergy, leading to economies of scale. Companies show to be less efficient, in the face of the rigours of market competition.
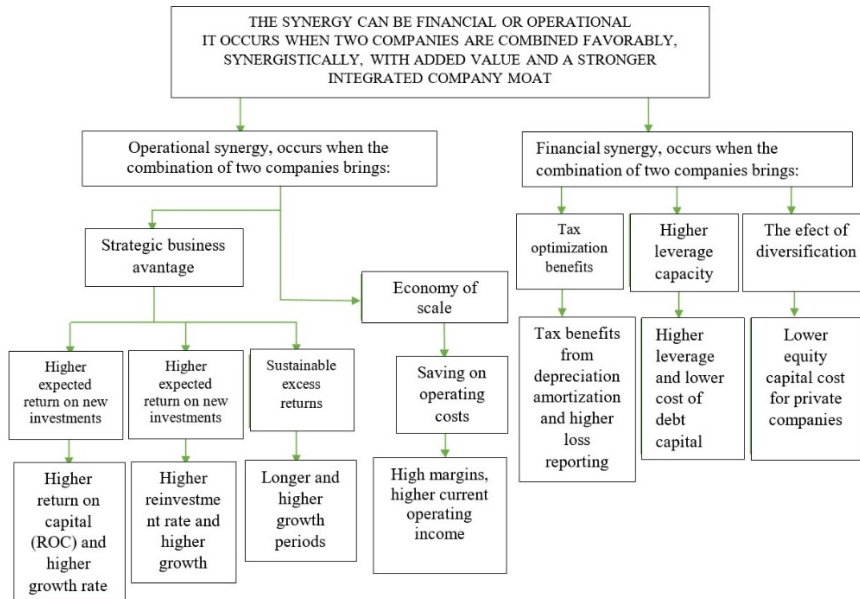
Figure 1. Evaluation of a synergy
Source: Processing according to Damodaran (2012).

In our study, the two companies compete in the same broader market, but is expected that new product portfolio becomes better diversified by merger. A good M&A transaction adds synergistic economic value - as we confirmed to be the case for the two companies we studied, VN and RP - manifested at operational level by two economies, of scale and scope:

- The economy of scale is demonstrated when the higher level of production of the two combined companies is offered at proportionally lower costs, i.e. a more efficient manufacture. Both fixed and variable costs are allocated to a larger number of products.
- The economy of scope occurs when the merged company produces two or more distinct products, at a lower cost than it would have been incurred if the products had been offered separately by each company. Practically, following the merger, a larger variety of product range can be manufactured more efficiently, than done independently.

A strong evidence for M&A success requires a careful investment diligence when the new company's earnings increase, only as a result of the financial merger transaction in itself.

6. Evaluation of Independent Companies, Without Synergy – Methodology

In the initial phase of the research process, we conducted an evaluation of the two companies involved in the M&A process, focussing solely on their individual merits and not considering synergy. We discounted the expected FCFF for each

company, without synergy. The discount rate is equivalent to the weighted average cost of respective company's capital. Next, the evaluation considered two growth periods:

- A higher growth stage, for a period of five years (post-integration period) with growth rates of 5% for VNC and, respectively, 4.5% for PR;
- A stable growth stage, for an indefinite period (after the 5th year), with an increase in risk-free interest rate (Romania sovereign bond yield for 10 years, 4.8%)[1];
- Romania's corporate statutory profit tax rate of 16%.

For pre-merged companies, the following variables were estimated and provided in Table 1:

Table 1. β coefficient, interest coverage, rating and risk premium

Risk and Rating	VNC	RP
The Beta coefficient (β)	0.52	0.55
EBIT/Interest ratio	4.89	1.79
Credit risk rating	A3/A-	B3/B-
Credit rating risk premium	1.75%	7.50%

Source: Investing.com for VNC and author's calculations for RP.

- Romania's a market risk premium (ERP = Equity Risk Premium) of 10,04%[2];
- Romania's sovereign risk premium for sovereign debt, not included in risk-free for Romania R_f (CDS = Country Default Spread) of 3.26%[3];
- The Beta coefficient (β) for VNC is estimated at 0.52[4] and for RP we calculated an average β coefficient of systematic risk per sector of 0.55;
- Credit risk premium (DS = Default Spread) is based on (EBIT/Interest coverage ratio)[5];
- At each specific interest coverage rates, VNC has A3/A- rating, a credit risk premium of 1.75% and RP with B3/B - rating, a credit risk premium of 7.5%.

Results can be observed in table 2 below.

Table 2. Rating and spread, dependent on the interest rate
(for small companies with a relatively high degree of indebtedness)

Greater than	≤ up to	Rating	Spread (%)
-100,000	0.5	D2/D	20
0.5	0.8	C2/C	16
0.8	1.2	Ca2/CC	12
1.25	1.5	Caa/CCC	9

[1] https://tradingeconomics.com/romania/government-bond-yield

[2] http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

[3] Idem

[4] https://www.investing.com/equities/vrancart-adjud

[5] http://pages.stern.nyu.edu/~adamodar/, Optimum Capital Structure (Cost of capital approach)

Greater than	≤ up to	Rating	Spread (%)
1.5	2.0	B3/B-	7,5
2	2.5	B2/B	6,5
2.5	3.0	B1/B+	5,5
3	3.5	Ba2/BB	4,25
3.5	4.0	Ba1/BB+	3,25
4	4.5	Baa2/BBB	2,25
4.5	6.0	A3/A-	1,75
6	7.5	A2/A	1,25
7.5	9.5	A1/A+	1,1
9.5	12.5	Aa2/AA	1
12.5	100,000	Aaa/AAA	0.75

Source: Damodaran, 2008.

The cost of financial debts before tax, is provided in table 3 according to the relation:

$$k_d = R_f + DS + CDS$$

Table 3. Cost and rate of debt, income and reinvestment rate

Debt ratios and income reinvestment	VNC	RP
The cost of debt	9.06%	9.31%
The cost of debt before tax	9.81%	15.56%
Debt rate (Long term Debt / Equity)	23.57%	22.70%
Total Income (in Romanian Leu)	303,313,044	69,176,442
EBIT (Earnings before interest and tax) (in Leu)	22,998,127	666,975
Reinvestment rate (b)	51.56%	54.89%

Source: Author's calculations.

Debt rates, total revenues, EBIT, and reinvestment rates for both companies were estimated by calculations, based on data from the COFACE platform[6]. The higher growth rates 'g' were estimated by multiplying rates of return on invested capital (ROIC) by reinvestment rate (b):

$$g = ROIC \times b$$

*where ROIC = Return on Invested Capital, and b = Reinvestment Rate.

Above assumptions help estimate cost of capital and growth rates for both companies (g). Next, with local capital market return (Market Return), risk free rate (R_f) and reinvestment rate (b), resulting expected cost of equity (k_e) according to CAPM model, is provided in table 4.

$$k_e = R_f + (Market_{Return} - R_f) \times \beta$$

*with β = beta coefficient

And the weighted average cost of capital (WACC) solved with percentage of equity (% of Equity Capital), long-term debt (% of Long-term Debt) and τ as statutory income tax rate:

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[6] http://www.coface.ro/en/Our-offer/Business-Information/InfoQuick-Online-Reports

$$WACC = k_e \times \% \, Equity + k_d \times (1 - \tau) \times \% \, Long - term \, Debt$$

Table 4. Cost of capital and cost of debt

Cost of debt and equity capital	VNC		RP
The cost of equity k_e	10.02%		10.32%
After tax cost of long-term debt k_d	7.82%	8.24%	
The cost of invested capital WACC	9.50%	9.85%	

Source: Author's calculations.

The present value (PV) of companies is estimated by two components[7] :

A. Cash flow available to each company (FCFF = Free Cash-Flow to the Firm):

$$FCFF = EBIT \times (1 - \tau) \times (1 - Reinvestment \, Rate)$$

For the five-year growth period, FCFF has a constant increase of $g = 5\%$ (VNC) and $g = 4.50\%$ (RP).

For the present value of the five FCFF (PV_{FCFF}), we applied an annuity valuation model with constant growth for a period of 5 years, with growth annuity factor "ag":

$$PV_{FCFF} = FCFF \times ag$$

$$ag = \frac{1 - \left(\frac{1 + g}{1 + k}\right)^n}{k - g}$$

B. TV_5 - the terminal value at the end of year 5 is estimated for each company based on FCFF in year 5, on growth rates (the higher one, 5%, respectively, 4.5% and the stable one, $R_f = 4.8\%$, after year 5) and on weighted average cost of capital (WACC).

The growth rate of the terminal value is often lower than the constant growth rate, as any benefits gained from synergies through new business, investment, or financial opportunities (cost reductions) prove to be transitory and can be replicated as competitors adapt to the market and the industry evolves over time.

The reinvestment rate for stable growth period is given by reinvestment rapport $b = \frac{R_f}{g}$

$$FCFF_5 = EBIT \times (1 - \tau) \times (1 + g)^5$$

Depending on the stable growth rate $R_f = 4.8\%$ and the reinvestment rapport (b), during this period, at the end of year 5, the terminal value (TV_5) will be:

$$TV_5 = FCFF_5 (in \, year \, 5) \times (1 + R_f) \times \frac{1 - \frac{R_f}{g}}{WACC - R_f}$$

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[7] In our computations, we use extensively Excels tables provided by Damodaran:
http://pages.stern.nyu.edu/~adamodar/, synergyvaluation.xls

The independent valuation of present value of two companies results from the present value of FCFF (PV_{FCFF}), plus terminal present value of PV_{TV} $\left(PV_{TV} = \frac{TV}{(1+WACC)^5}\right)$:

- With present value of FCFF: PV_{FCFF} = 211,406,689 lei
- With present value of Terminal Value: PV_{TV} = 5,036,491 lei
- With present value independent companies: PV_{IC} = 216,443,189 lei

*where the value of the company after integration, without synergy simply adds the values obtained for each company, considered independent and without synergy.

7. Integrated Company Valuation with Evaluation of Corporate Synergy

The final phase incorporated the synergy effects into the growth rate and into the estimated cash flows. Company resulting from the integration is revalued, with the built-in synergy resulting from present value of estimated cash flows stream. For revaluation of the combined entity that includes the corporate synergy, we assumed new hypotheses as valuation inputs:

A. Beta β coefficient for the combined firm will be a beta β coefficient for indebted firm (β_L = levered beta[8]), estimated based on the values of beta β coefficients for each independent firm, leverage ($LT\ Debt/Equity$), weight of terminal value and corporate tax τ:

$$\beta_L = \beta\ unlevered \left(1 + (1-\tau)\frac{LT\ Debt}{Equity}\right) \times \frac{TV\ of\ independent\ companies}{TV\ of\ combined\ company}$$

B. Return on invested capital, before tax (τ) of combined entity resulted at ROIC = 15% and incorporates the synergistic effects of integration on performance of achieving intended economies of scale at fixed costs. Calculated results are displayed in Table 5:

Table 5. Rating and risk premium as dependent on EBIT

Risk, income, and reinvestment ratios	VNC + RP (after synergistic integration)
Beta coefficient β	0.52
EBIT / Interest coverage	4.31
Rating notch grade	Baa2/BBB
Credit risk premium rating	2.25%
The cost of debt before tax	10.31%
LT Debt / Equity Rate	23.14%
Total Income (in lei)	372,489,486
EBIT	23,665,102
ROIC	15%
Reinvestment rate	53.22%

Source: Author's calculations.

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[8] R.S. Hamada, „Portfolio Analysis and Market Equilibrium", Journal of Finance, 1969

C. An average reinvestment rate (b) of 53.22% (= (51.56% + 54.89%)/2) results in a combined growth rate for the later phase of five years, of:

$$g \text{ of combined growth} = 6.71\% \text{ (respectively, } 15\% \times 53.22\%)$$

Based on these assumptions and a sustainable operating income EBIT as a sum from the two companies, the free cash flows (FCFF) and their present value (PV_{FCFF}) with growth annuities, the terminal value (TV) and its present value (PV_{TV}) were estimated by the same models as for the independent companies. The results are presented in Table 6:

Table 6. EBIT and PV of FCFF, in lei

EBIT	23,665,102
PV of FCFF for higher growth	42,829,805
Terminal value (TV)	297,335,932
Present value (PV_{FCFF} & PV_{TV})	230,053,617

Source: Author's calculations.

According to the figures presented in Table 7 below:

Table 7. Value of companies before and after integration, in lei

The value of independent companies	216,443,189
The value of companies after integration	230,053,617
The value of synergy	13,610,428

Source: Author's calculations.

$$\text{Value of corporate synergy} = \text{Value of new merged company} - \text{Value of independent companies, with no synergy}$$

Finally, our research estimated a tangible corporate synergy effect of 13.6 million lei, which represents an added value for combined, merged company (after integration) of 6%.

These research findings provide the estimated dimension of the VNC and RP merger success, justifying the merger decision. Our research used the linear model (Damodaran, 2012) of total synergy. The total synergy valuation model also aligns with the "Financial Synergy Valuation" application provided by the Corporate Finance Institute.[9]

Total synergy (S_C) is divided between the seller's synergy premium (acquired company = S_B) and the buyer's synergy premium (acquiring company = S_A). In the merger process, the acquiring company often pays an acquisition price that exceeds the value of the acquired company, due to the additional premium paid to the shareholders of the acquired company. The acquisition price per absorbed share is in many cases 40-60% higher than the actual share price, serving as an incentive for shareholders to part with their existing shares.

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[9] https://corporatefinanceinstitute.com/resources/templates/excel-modeling/financial-synergy-valuation/

The acquiring company is willing to pay this incentive premium to the shareholders of the acquired company because it expects the total synergy value (S_C) resulting from the merger to exceed the merger price (P) and the value of the acquiring firm before the merger (V_A).

$$S_C > P + V_A, \text{ where } P = V_B + S_B$$

Therefore, $Sc = V_C - (V_B + S_B) - V_A$, where V_C = the value of the firm resulting from the merger

The buyer's synergy premium is thus the difference between the total synergy and the seller's premium:

$$S_A = V_C - V_B - S_B$$

Shareholders of the acquiring company bear the primary risk of the merger decision and should receive at least a synergy premium equivalent to that of the shareholders of the acquired company. Based on this fair value criterion, the total synergy in a merger (S_C) should be twice the premium paid for the acquired firm.

From these considerations, we divided by two the total synergy premium resulting from our evaluation:

$$S_A = S_B = \frac{13,610,428}{2} = 6,805,214 \; lei$$

Our results are also in line with the statistics from the Book Review: "The Synergy Solution" by Martin Fridson, CFA, 2022, which reveals that, in a sample of 1,267 merger and acquisition transactions between 1995 and 2018, companies with initially positive annual returns recorded post-merger average returns of +8.4%, compared to -9.1% for companies with initially negative returns. Both companies that merged, VNC and RP, had previously positive returns.

Fiorentino and Garzella (2014) argue[10] that the practices of synergy evaluation models in M&A are surprisingly overlooked in empirical research. Furthermore, synergy evaluation models and the strategic factors affecting their assessments are a relatively underexplored subject in the literature (Bruner, 2002; Mukherjee et al., 2004; Villalonga, 2004). There is a need for extensive research at the intersection of accounting, finance, and management (Damodaran, 2005).

As an alternative to our research according to the Damodaran model, an event study of the merger's impact on the stock market profitability of the acquiring company, VRANCART, listed on the Bucharest Stock Exchange, can be conducted. Additionally, the nonlinear Casta model (Casta et al., 1998, 2001, 2003, 2005) of synergy evaluation can be used as a result of the difference between the value of the goods resulting from the merger and the value of the goods estimated separately for the component firms. These are our future research projects through which we hope to confirm the results of the present research.

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[10] Raffaele Fiorentino, Stefano Garzella, The Synergy Valuation Models: Towards the Real Value of Mergers and Acquisitions, International research journal of finance and economics, issue 124

8. The Monte Carlo Simulation of Synergy Value

The Monte Carlo simulation provides the most detailed analysis, resulting in a comprehensive picture for all possible combinations of risk and return. A cumulative probability distribution allows for easy observation of the probability level for an expected outcome of a project. The probability that the present value of the firm resulting from the merger exceeds the sum of the present values of the merged firms, and the defined total synergy premium should exceed 50 percent. However, the final decision for a merger depends on the investor's risk behaviour (Rainer, 2011).

To confirm robustness of our evaluations in the previous section, we performed a Monte Carlo simulation with 10,000 iterations for the combined evaluation of independent companies without synergy, for the evaluation of the company resulting from integration with synergy, and for the evaluation of the synergy. Further, value of EBIT and value of interest were randomised according to standard error of respective annual variation over last five years:

- σ_{VNC} = 8.98%
- σ_{RP} = 56.47%
- $\sigma_{Market\ risk}$ = 23.06%

Next, we randomised the Romanian capital market risk premium, as dependent on the standardised annual error of the series of daily differences between the profitability of the local stock market BET index and the risk-free interest rate for 10 years (2009 - 2018). In relation to the random values resulting from the randomisation for the risk premium, EBIT and interest, we first re-evaluated the independent companies without synergy, then the integrated company with developed synergy. The value of corporate synergy resulted as the difference between the two previous valuations. Finally, we computed the percentage share of synergy versus value of the newly merged company. Evaluations were then subjected to a Monte Carlo simulation with 10,000 iterations, with statistical results presented in Table 8:

Table 8. Synergy statistical values from 10,000 iterations Monte Carlo Simulation

	The value of independent companies (in lei)	The value of companies after integration (in lei)	Synergy value (in lei)	%
Mean	221,521,926	235,665,331	14,143,405	5.99%
StDev	33,358,161	35,631,709	2,505,083	0.42%
Max	367,511,349	391,274,079	29,350,277	7.63%
Min	129,785,046	137,753,911	6,185,980	3.57%
Skewness	0.5040	0.5056	0.7292	0.9158
Kurtosis	0.4151	0.4134	1.2440	6.8133

Source: authors calculation, after Monte Carlo 10,000 iterations.

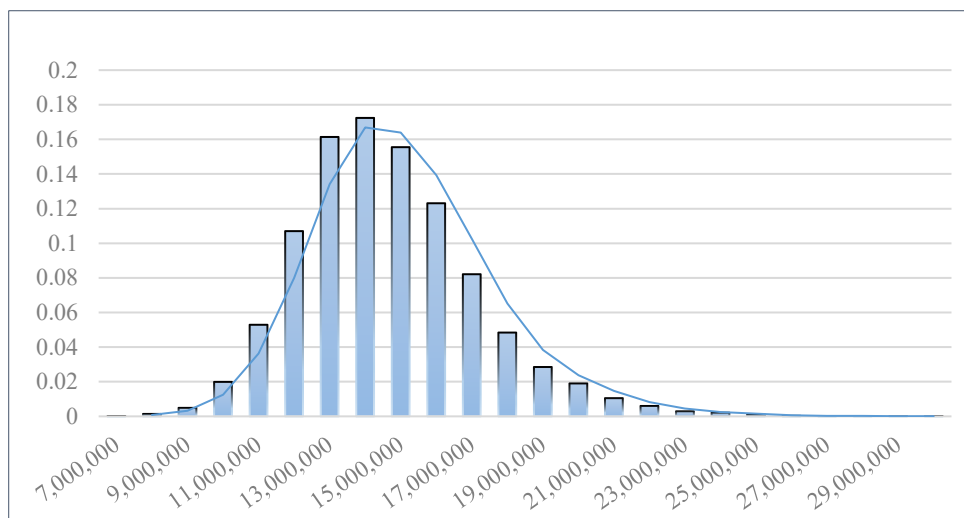Figure 2 shows the distribution of simulated values of synergy of integration:

Figure 2. Distribution of simulated synergy values
Source: Author's processing.

Consequently, we concluded that the value of the corporate synergy is on average 14.14 million lei, close to the value resulting from evaluations from the second section (13.61 million lei). A percentage change of 5.99% is close to the initial value of 5.92%.

The graphical representation in Figure 2 has the appearance of an approximately normal distribution with coefficients of Skewness = 0.73 and Kurtosis = 1.244, respectively, a positive asymmetric curve (with mean > median) and more vaulted than normal, leptokurtic (1.244 > 0). We can consider the distribution of the simulated values of the synergy as normal distribution, as the asymmetry and vaulting indicators are within the limits ± 1.96.

9. Conclusions

In our research we aimed to identify and then quantify the synergy effect from merging two companies operating in the Romanian paper industry. We investigated the operational and financial synergy of the integration of VNC and RP. We answered the scientific question, if there is a synergy effect in this merger and what is the order of magnitude of this potential strategic benefit relative to the simple arithmetic value of the combination of the two companies.

From an operational point of view, the integration is leading to a vertical consolidation of the acquirer company group's activities. As a result of the integration, the new company will develop a better client coverage and an easier, shared access to the networks of higher value adding existing and new clients. The merger will generate both economies of scope and scale. The new company, through

access to new markets and segments, can better focus on differentiation and diversification of new products and services.

Our empirical examination concluded that there is a measurable effect of synergy, which is created in the merger of the two companies. First, our research method valued each company independently and then added the present values of the two post-integration cash flows of the merged companies, without the synergy effect. The resulting value of the simple combination of the two companies was then compared with the synergistic value of the merged company. We concluded that the favourable difference between the two values reflects the positive synergistic effects resulting from the operational and financial integration of VNC and RP. Finally, we validated the results by a Monte Carlo simulation with 10.000 iterations.

The research results of our evaluation of the M&A process of VNC and RP also confirm a decision-making process for a value-added investment positive recommendation. Based on our research results, the integration of the two companies makes strong economic sense, both operational and financial. The merger operation results not only in the acquisition of a successful company (which could have been a very good separate investment), but also in obtaining an after-integration synergy effect, that our calculations estimated of being 6% or around 14 million lei. Concluding the Monte Carlo simulation, our value results were close to the initial calculated values. That brings credibility to our first estimates regarding the value of the company's synergy emerged from the integration. In our study, the two companies operated in the same market, and through this merger, the product portfolio becomes more consistently profitable and efficiently diversified. In the case of mergers that synergistically add economic value, as we found to be the case for the two companies studied VNC and RP, the two economies of scale and of scope proved favourable at operational level, following this successful merger. However, the conclusion suggests that while many acquisitions promise to deliver synergy, in reality, they often fail to do so, is well summarised by Damodaran (2012, page. 47) "…in most acquisitions, they often promised and rarely offered synergy. In all acquisitions, however, there is some evidence of synergy, but most mergers fail to provide any synergy… ". Although, the result of our research for the two Romanian companies confirms the existence of a measurable operational synergy effect, i.e., integration process leads to creation of valuable post-merger opportunities, which otherwise would not have been created and delivered, without recommended merger, whose economic feasibility was confirmed by our research.

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