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ASSET PRODUCTIVITY ASSESSMENT: A CASE STUDY IN A DISPOSABLE PRODUCT FACTORY

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ABSTRACT

This article reports a case study on the comparative measurement of factory assets' productivity of a disposable plastic products' factory within four indicators: ROI (Return on Investments), ROA (Return on Assets), EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) and EVA (Economic Value Added). It was intended to answer a question related to the evolution trend of these indicators in the context of the company researched during the second half of 2014. Thus, the inherent concepts to the mentioned analysis parameters are initially disclosed. After that, the methodological aspects of the case study (descriptive and qualitative) are discussed. Then, the steps taken to calculate the above indicators are described. Finally, the results obtained are presented and discussed. It was concluded that the trend was inadequate on the productivity of assets, because the values obtained indicate low productivity of the used assets. Furthermore, it was found a divergent evolutionary trajectory of the measured parameters, indicating conflicting scenarios among them. At the end of this study, some limitations were highlighted and the conclusions of the study are mentioned.

Keywords: *Productivity of assets. Comparative. Disposable Factory.*

1 INTRODUCTION

Assessing the company's performance based on the profit earned in a given period can lead managers and shareholders to the wrong conclusions. Especially in those companies that use large amounts of assets, the value of the profit may not reflect whether the result generated was consistent with the economic potential of the company or not. In this regard, Anthony and Govindarajan (2002, 320) point out that "the emphasis on profits, without considering the assets employed to generate them, is an inadequate principle of control" in companies that operate in asset-intensive sectors. Therefore, managers should be concerned with measuring the assets'

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productivity and extract from this assessment subsidies to select initiatives that maximize investor wealth.

This context of high investment in assets is also identifiable in industrial ventures, due to the need for investments in fixed assets (machines, buildings, etc.) and in current assets (inventories and financing of sales in the long term) to support the manufacturing activities and commercialization. As a result, it would be up to the manager to assess the adequacy of the assets' productivity that he manages by means of accounting metrics such as ROI, ROA, EVA and EBITDA. However, even if they can be used for this purpose, this study proclaims the assumption that these four indicators may present conflicting results with each other or have different evolutionary trajectories over a period in a given company. This is problematic since one indicator may reveal one promising situation and another may show unfavorable trajectory. And this was the reason for the investigation of this possibility within a large industrial company, in which managers focused exclusively on the performance measured by EBITDA and the other indicators were not measured.

In order to clarify this doubt, this research aimed to answer the following question: was the evolution of the ROI, ROA, EVA and EBITDA indicators during the second half of 2014 similar or divergent in the context of a plastic disposable products factory? In order to obtain the answer it was established as aim to measure the performance of the company surveyed through the four accounting indices cited.

The main aspect that justifies this comparative approach is that in the company studied, EBITDA was used as the main metric for the assessment of the operational performance, besides serving as a single parameter to establish the variable remuneration of the managers. This procedure is in line with the one mentioned by Kraus and Lind (2010), among others, that EBITDA has been used to manage companies, estimate the value of ventures and serve as a basis for the payment of bonuses to executives, among other applications. However, Tortella and Brusco (2003) and Bassan and Martins (2014), among others, record that EVA has also been used to measure companies' performance, analyze results and determine the value of variable compensation of managers.

Thus, within the industry in question, these similar utilities between the mentioned indicators can raise doubts about the pertinence (or not) of the parameter to be prioritized in order to assess the operational performance and to base the calculation of the employees' annual bonus. For example, if the developments (or trends) of these indicators diverge (in a favorable and unfavorable indicators), or if the scenarios resulting from these forms of assessment are conflicting (positive versus negative), perhaps executives' remuneration is tied to that of leads to the path that does not allow to fully optimize the funds available in the organization. In addition, even if this study is confined to a specific company (i.e., it is a case study), it was considered that this research gap deserves to be explored with attention, since the same doubt may be present in other companies that use EBITDA as an indicator of performance and/or link it to employee compensation.

To this end, a bibliographic review was initially carried out, addressing the main concepts essential to understanding the subject. Subsequently, after mentioning the organization studied, the following steps are described to assess performance based on the selected indicators and the management information obtained are discussed. Finally, some limitations related to the methodology used are discussed and the conclusions are presented.

2 REVIEW OF THE LITERATURE

The comprehension of this study involves the understanding of the motivations to carry out the assessment of the assets' productivity and the knowledge of the indicators used, as evidenced below.

2.1 Reasons to prioritize assets' productivity

Drucker (2004) comments that companies' managers are paid to create wealth rather than control costs. In this direction, the companies need to be directed as living organisms, as entities in continuity, whose objective is the creation of wealth. To this end, administrators need

information that will enable them to exercise appropriate judgment about the productivity of the funds used.

Anthony and Govindarajan (2002) argue that the purpose of assessing asset's productivity is to provide useful information for making decisions about the assets used and to motivate executives to make the right decisions and to evaluate the performance of a company's units. They also highlight that, except in some types of service provider organizations, in which the capital used is irrelevant, the essential aim of profit-oriented companies is to achieve a satisfactory return on capital invested. Thus, in order for the manager to assess the performance relative to the profit obtained by the company in relation to the result achieved by the competitors (or other divisions of the organization itself), it is necessary to consider the volume of the assets used.

In addition, a study by management consulting company A. T. Kearney (2002, p.90) cites that "asset's productivity is the way to identify the efficiency with which the company transforms asset's investments into sales and profits. The reasons for worrying about this issue are as diverse as the results that increased productivity is capable of generating."

Thus, the mentioned research shows that the main reasons to be considered are:

a) Generation of shareholder value: research with companies in the asset intensive sectors detected a strong correlation between the total return to the shareholder and the assets' productivity. This correlation was initially evident in a consumer goods company that carried out an asset productivity increase program, reduced operating costs by 12%, increased factory capacity by 20%, reduced fixed assets by 10%, and postponed capital investments of $150 million.
b) Boosting profitable growth: companies that focus on maximizing productivity of existing assets achieve growth in profit and share value. The focus on asset's productivity, which also increases overall productivity, ensures that capital investments are done efficiently.
c) To identify and promote synergies in mergers: merging companies can use a program to increase the assets' productivity to extract synergistic benefits that allow identifying and eliminating overlaps between partners.
d) To promote cost leadership: measuring asset productivity can be used to promote cost leadership, because companies that spend poorly are the main candidates for productivity gains. When they eliminate unproductive assets and extract higher levels of productivity from the others, they reduce both fixed costs and variable costs.

2.2 Financial indicators used

Even if we consider that financial aspects that are responsible for the performance of a company (Bortoluzzi, Ensslin & Ensslin, 2011, Skrinjar, Bosilj-Vuksic & Indihar-Stemberger, 2008), in this study, only financial indicators were prioritized in order not to expand the focus too much.

In this direction, Casarotto Filho (2002) argues that by crossing information on the balance sheet with the performance of the period (it was verified in the income statement) it is possible to obtain disparate indicators of productivity of asset accounts, aiming to optimize the performance of the funds used.

To that end, Anthony and Govindarajan (2002) record that in deciding the investment base to be used in performance assessment, two questions should be asked: (1) what are the practices induce unit executives to use their assets efficiently and to acquire the correct volume of new assets? (2) what are the best procedures to assess the performance of the unit as an economic entity? Such authors understand that when the company's profit (or unit) is correlated with the assets used, executives strive to improve their performance in this respect, and senior management wants their decisions to be made in the best interests of the company.

In addition, A. Kearney's (2002) survey mentions that there are three ways of measuring the productivity of a company's fixed assets:

1) To confront sales with the amount made up of equity, facilities and equipment in net terms (PP & E net), that is, depreciation is already discounted. This measure, better known as net capital, is used by companies to examine the productivity of competitors and to estimate their performance. By this form of assessment, we get the answer to the

question: how many dollars in assets are needed for every dollar obtained from the sale of a product? However, there is a setback for this measure: although it may identify a problem, it does not provide clarification about exactly "what" it is.

2) To examine the returns of the company: it is to assess the relation between the net profit and the PP & E Liquids. This calculation reveals what types of income the company is getting for money invested in assets.
3) To measure the return on Assets (ROA) is also a measure applicable to fixed assets.

From the aforementioned paragraphs, the indicators described in the sequence were used in this research.

As for ROI (Return on Investments), Kassai, Kassai, Santos and Assaf Neto (2000, p. 174) assert that this index is the "simplest expression of the measure of return on investment", is a rate determined from data accounting. For this purpose, an equation is used in which the result of the period is divided by the value of the investment. That is, "the operating profit comes only from the normal activities of a company, excluding the amount of financial charges." On the other hand, the value to be considered as investments is the amount equivalent to the net asset, which is given by "total assets minus operating liabilities (suppliers, taxes, salaries, dividends, accounts payable, etc.)."

Regarding the adoption of ROI as a parameter of assessment of the return of invested funds, favorable opinions are found regarding this. Warren, Reeve, and Fess (2001, 277) mention that ROI is useful for measuring return on investment because it involves factors such as revenues, expenses, and invested assets controllable by the managers of each company division. Thus, "by measuring the profitability relative to the sum of the assets invested in each division, the rate of return on investment can be used to compare divisions. The higher the rate of return on investment, the better the division's performance in using its assets to generate profit."

Horngren, Foster and Datar (1999) report that the analysis of ROI components may indicate that this performance measure can be improved by increasing revenues or decreasing costs or decreasing investments. They assert that ROI can often offer better performance subsidies when analyzing the components in which it originates.

However, the ROI has aspects that can be considered unfavorable to its use. Lopo, Brito, Silva and Martins (2001, p. 241) note that the ROI brings with it the limitations arising from legally required accounting criteria (such as inventory valuation method, depreciation method used or accounting for expenses with Research and Development as the period expenses or capitalization for subsequent amortizations) and it is influenced by the age of the assets, since "companies with older permanent assets, especially when the effects of inflation are ignored, may present more favorable indicators." Such authors argue, however, that the main disadvantage of this indicator is that ROI "ignores the company's financing policy. Therefore, it disregards the influence of the capital structure in balancing risks and returns, aspect that affects the share price".

In relation to the ROA (Return on Assets), Young and O'Byrne (2003, p.239) note that it is "a particularly interesting approach as it involves a progressive breakdown of ROA and produces important insights" on sources of wealth generation. They point out that ROA is a measure of operating profitability, since the numerator (the net operating profit after tax, also known as NOPAT - Net Operating Profit After Tax) measures what would be the company's profit if all its assets had been financed with investor capital. Thus, the NOPAT, "neutralizes the influence of the financing of the assets on the profit. In that sense, it measures the profitability of the company's net assets, regardless of how they are financed".

As to the importance that can be attributed to the detailed knowledge of these two factors, Padoveze and Benedicto (2004, p 104) attest that, if "margin" is the fundamental element to obtain profitability, the way to achieve it is the "turnover". The authors also state that the word "turnover" symbolizes the productivity of the investment realized, represented by the speed with which the assets are operationalized, and are able to transform the inputs into sales. That is, "since total assets represent investments in the company, the more sales it makes, the more productive the company's assets are. The more a company manages to bill with the same investment value, the more likely it is to make a profit'". Thus, the greater the turnover obtained,

the greater the opportunity to reduce the profit margin in the sale of the products, leading to a greater competitiveness due to the lower prices that can be practiced.

According to Schmidt, Santos and Martins (2014), EVA (Economic Value Added) is a financial management system that measures the return that own and third party equity bring to their owners. It measures the difference between the return on capital invested in a company and the cost of that capital. Bruni (2013) reports that the EVA proposes an adjustment in the calculation of net income, incorporating the opportunity cost of equity capital. Thus, broadly, the EVA can be presented as net profit deducted the opportunity cost of equity. This parameter prioritizes "value generation", which, for Padoveze (2013), exists when the corporate profit is equal to or higher than its cost of capital (or opportunity cost). Therefore, creating value for the shareholder happens when the company gets the desired profitability, or more. When the company in a given year cannot achieve the desired profitability, it is understood that there is destruction of value.

As for the calculation of this indicator, Young and O'Byrne (2003) understand that EVA is equal to NOPAT minus the cost of equity capital. In the case of Net Operating Profit After Tax (NOPAT), it should be considered as the operating profit of the company, already deducted income tax, which represents how much the current operations of the company generated profit. About the cost factor of capital emphasize that it is equal to the invested capital of the company (also called capital or capital used) times the weighted average cost of capital. The weighted average cost of capital is known as WACC (Weighted Average Cost of Capital). It is equal to the sum of the costs of each capital component - short- and long-term debt and shareholders' equity - weighted by its percentage share, at market value, in the capital structure of the company. These authors also assert that the capital invested is the sum of all the company's financings, separated from short-term non-onerous liabilities (such as suppliers, salaries and miscellaneous provisions). That is, the capital invested is equal to the sum of the net equity that belongs to the investor with the short and long-term loans and financing belonging to creditors.

Young and O'Byrne (2003) also report that invested capital is deducted from short-term liabilities other than current assets (ie all current assets, except cash). Although almost all liabilities are to some degree onerous (if it were not so the company's creditors, assuming competitive market, they would break), separating the interest component from certain accounts as suppliers rarely justifies the effort. In addition, the entire cost of goods and services purchased from suppliers, including interest portion, is reflected either in the cost of goods and services sold, or in general, administrative and sales expenses. Consequently, the company is charged, although indirectly, for such financial costs. When the return generated by the use of "net" assets (ie the sum of cash, working capital needs and fixed assets) exceeds the cost of invested capital, EVA is positive. The return on net assets (RONA - Return On Net Assets) is calculated as follows: RONA = NOPAT / Net Assets. When the RONA is greater than the WACC, the EVA will be positive. Otherwise it will be negative. This is because: EVA = (RONA - WACC) x Invested Capital.

It should be noted that in the literature other possibilities of calculating EVA can be found, such as those cited by Kassai *et al.* (2000), Ehrbar (1999), Copeland, Koller and Murrin (2000), Stewart (2005), among others. It is important to note that the researches of Martins and Martins (2015), Keef, Khaled and Roush (2012), Miller (2009), Pierru (2009) and Bade (2009) describe limitations related to the use of this concept in certain situations.

In terms of the informational benefits provided, Wernke, Maia and Lembeck (2013) mention that EVA has the capacity to provide a way to assess the performance of the entity that takes into account the company's capital structure and its remuneration rates. Thus, it can be considered an adequate indicator to show the performance of the managers in the use of the capital made available by the investors and/or raised with the banking institutions. In addition, it is able to provide a comprehensive view on the appropriateness of funds invested in assets and on the impact of funding rates on the main sources of funds. Stewart (2005) argues that the most important advantage of EVA is that it is the only measure of performance that connects directly to the intrinsic market value of a company. In view of this, this is the measure that the author recommends for the definition of goals, for the allocation of capital, for the assessment of performances, for bonus plans and for communication with the big investors.

On the other hand, Regis, Santos and Santos (2010) attribute to the EVA some limitations, highlighting that (*i*) it may lead to a restriction on the company's growth, given that the expectation of rapid results may prevent interest in larger projects; (*ii*) it may imply difficulties in obtaining loans from financial institutions, since the EVA calculation highlights the remuneration of third-party capital and the more indebted the company is, the greater the attributable risk, and (*iii*) such indicator gives an exaggerated emphasis on the generation of profits, it is applicable only to companies governed by economic purposes.

Martins, Diniz and Miranda (2012) commented that in addition to being dependent on accounting criteria and therefore bearing the same problems of standards, accounting models, lack of monetary correction and others, it does not take into account the market value of Net Equity for its calculation. This is perhaps the biggest failure in your application because, when calculated on the book values, you are also calculating the value added in relation to the capital invested in the company, and therefore does not represent the economic value added to the current investor.

Kumar (2013) compared the EVA with accounting measures (such as Net Income, Net Operating Profit after Income Tax, Cash Flow from Operations and Earnings per Share) in 23 industries in India during the years 2000 to 2009. He found, that the EVA could not be considered superior to the mentioned indicators in terms of evidencing the reasons that generated higher aggregate market value (MVA).

As for the EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization), this corresponds, according to the Alcade (2010)'s understanding, to the cash generated by the genuinely operational assets, since profit before interest (assets or liabilities), taxes on profit and before depreciation, amortization, corresponds to the cash potential that a company's operating asset is capable of producing, before including the cost of any capital. Thus, EBITDA does not correspond to the cash flow generated physically, since, in general, sales are not received in cash and expenses also are not. It represents the cash produced by the assets, before computing the financial income and expenses and after receiving all the revenues and payment of all expenses.

Colombo, Hoffmann, Platt Neto and Bolfe (2014) report that EBITDA is an indicator released by companies worldwide, in addition to being frequently cited among analysts for showing the profitability of the business. As EBITDA was not mandatory in the financial statements, it remained devoid of legal regulations regulating its calculation and disclosure until 2012. Therefore, Instruction no. 527 of the Brazilian Securities and Exchange Commission (CVM) was published in order to govern, in Brazil, the voluntary publication by the listed companies of this statement.

As for the benefits from this indicator, Alcalde (2010) lists the following aspects:

a) Easiness to obtain, as some adjustments in the traditionally published accounting result are sufficient.
b) It allows comparing companies, of the same sector or not, since it tries to exclude the effects of fund raising for commercial activity and strictly accounting decisions (such as depreciation, amortization or exhaustion criteria used). As a result, it would standardize results from disparate contexts and make it possible to compare the efficiency or productivity of different entities.
c) Especially for analysts outside the company, EBITDA may be a shorter way to estimate the company's possible cash generation and compare it to its indebtedness. That is, to measure the degree of commitment of cash generation with the payment of creditors.

However, White, Sondhi and Fried (1997), Eastman (1997), Stumpp (2000), King (2001), Szuster, Cardoso, Szuster, Szuster and Szuster (2008) and Martins et al. (2012) listed some unfavorable points associated to EBITDA, among which are the following aspects:

1) The use of this indicator is not recommended for companies that use assets with a short useful life or that lack equipment whose technologies need to be constantly updated or replaced.
2) In the case of ventures that usually finance the acquisition of fixed assets in financial institutions (as is the case of the company cited in the case study of this research), disregarding the interest of these credit operations as "operational" tends to be

problematic. By making this exclusion in the EBITDA statement, an expressive increase in the result is generated, even if such financial expenses are part of the daily life of this type of business.

3) The strong dissemination of this indicator is more related to the attempt to assess companies for the purpose of acquisition, associating their value with a "multiple". However, business in distinct or disparate industries should never be compared as simply as this. That is, it is a mistake to claim the value of a company selling based on a multiplier "x" on its sales (in monetary value or in physical quantities).
4) The EBITDA result can be strongly influenced by accounting policies related to postponing/anticipating the date of recognition of expenses / revenues or accounting for assets (write-offs and depreciation, for example). As a result, the manager may be attempted to "improve" the value of this parameter to get a better picture of the company to the market or investors or to increase its performance bonus (if linked to EBITDA).
5) Another aspect that contributes to the use by financial analysts is the "impression" that the result corresponds to "cash generation". However, EBITDA does not equate to the company's probable free cash flow, because it does not consider the reinvestment needs that are usually mandatory in most commercial ventures.

2.3 Previous research

As for studies with approaches similar to the one applied in this article, queries were made to the Scopus, Science Direct and Capes Journals Portal databases. From the keywords "ROI" ("Return on Investments"), "ROA" ("Return on Assets") "EVA" (or "Economic Value Added") and "EBITDA" (or the description of that acronym) researches have brought 30 texts that addressed these terms when using "Advanced Search" with "and" between them. Only four studies (Mendéz, 2007; Hong, 2010; Hazarika, 2014; Wernke, Junges & Schlickmann, 2015) reported the joint measurement of indicators.

The first study investigated whether EBITDA could be considered a value aggregation metric. For this purpose, it used a sample of 23 Chilean companies whose annual performances were measured in terms of EVA, EBITDA and EBITDA Margin in the period 2000/2004. In the comparison between these two indicators, the researcher concluded that there is a certain relationship between these in most of the 23 companies surveyed, but that in seven of them, this did not occur. Thus, he recommended parsimony in this respect and suggested new research with this approach (Mendéz, 2007).

The second article studied a group of Korean companies from various sectors to investigate the relationship between knowledge assets (employees, structural assets and marketing resources) and metrics such as EVA, EBITDA, MVA (Market Value Added) and stock price. They concluded that there was a more significant relationship between the performance of these indicators and the knowledge assets in non-manufacturing companies and a less relevant link in manufacturing companies (Hong, 2010).

The third study analyzed the relationship between EVA, MVA, EBITDA and Capital Invested in telecommunications companies traded in the Dubai (United Arab Emirates) stock market between 2008 and 2013. The author concluded that there was significant relationship between EVA and MVA only (Hazarika, 2014).

The fourth study compared the evolution of EVA and EBITDA in a Brazilian manufacturing company, month by month, in 2014. The authors concluded that the two indicators presented divergent evolution and conflicting results in that context searched (Wernke et al., 2015).

Therefore, articles comparing the ROI, ROA, EVA and EBITDA performance in Brazilian privately held manufacturing companies were not found in the searches performed in the cited databases. With this, it is understood that there is a research gap that deserves to be explored with the emphasis intended in this study.

3 METHODOLOGY

As for the typology of aims, this research can be classified as descriptive, since, according to Scapens (1990), this category emcompass those studies that describe the accounting systems, techniques and procedures currently used in practice. According to Gil (1999), this modality aims to describe characteristics of a particular population or phenomenon, or the establishment of a relationship between variables. In this direction, Andrade (2002) points out that the descriptive research is concerned with observing the facts, recording them, analyzing them, classifying them and interpreting them, without the interference of the authors of the study. As for the procedures adopted, it is characterized as a case study, which, according to Yin (2005), is an empirical investigation that investigates a contemporary phenomenon within its real life context, especially when the limits between the phenomenon and the context are not clearly defined. In this case, it concentrates on certain object(s) and its conclusions are limited to its context.

Within the approach to the problem, research can be classified as "qualitative," as Richardson (1999, p. 80) calls the studies that "can describe the complexity of a given problem, analyze the interaction of certain variables, understand and classify dynamic processes experienced by social groups". Thus, based on the quantitative data (accounting and financial) collected, it was possible to carry out a qualitative analysis through a comparative study between the performance indicators targeted.

The selection of the company searched was based on the criterion of easy access to data, since one of the authors is an employee of the company. Data collection was carried out in March 2015 and, initially, the technique of informal conversations (unstructured) was used with the manager and the accountant to know the current situation with regard to the accounting reports available and the performance assessment forms used. Then, the data required to perform the work in the existing internal controls and in the published financial statements were collected, as well as other more specific information provided by the entity's management. That is, numerical data were collected by researchers in specific internal controls (such as financial statements, funding control worksheets, loan and financing contracts, ERP reports used in the company, etc.) and gathered in a database specifically elaborated in Excel spreadsheet. The data collected was complemented by additional information obtained from the discussions held with the two professionals mentioned (such as the current form of performance's assessment, the expectation of shareholder remuneration to be considered in the calculation of the EVA and other relevant non-documentary aspects). In this way, we have complied with Yin (2005)'s recommendation, which highlights that, in case studies, the researcher must follow three principles for the collection of information: (*i*) to use several sources of evidence (triangulation); (*ii*) to create a database and (*iii*) to maintain the evidence linkage.

In addition, as regards the formal aspects, in order to attest to the methodological rigor of this case study, the parameters recommended by Marques, Camacho and Alcantara (2015) were used. That is:

a) As for the object of study: it sought to understand the phenomenon proposed in its real context; the reason for adopting this research strategy was explained; there is a link between the phenomenon in question and the context of the research; the research question is clearly formulated and the type of study is evidenced (descriptive).
b) As for data collection: there are multiple forms of evidence (interviews with manager and accountant, data from internal controls and accounting etc.) that allow the triangulation of data; it is possible to attest to the reliability of the data by the internal and accounting controls used; operational measures (such as measured assets productivity indicators) were evidenced to validate the study construct; there is an explanation as to how the data were obtained and there is the possibility of replicating the data collection in another context.
c) As for the data analysis: the results of the research reflect the data collected and there was use of previous theory to base the analyzes.

d) As for the results: contributions were reported in the generation of knowledge in relation to previous studies and made alerts for points that still need to be continued in this type of research (mentioned in a subsequent section).

In this direction, the procedures performed to carry out the research are presented in detail in the following items.

4 PRESENTATION OF DATA AND DISCUSSION OF RESULTS

The research was carried out in the "ABC" industry (a fictitious name at the request of the administrators), a closely held corporation that operates in the manufacture of disposable plastic products, headquartered in the southern municipality of Santa Catarina. Due to the characteristics of its activity, this type of venture requires high value investments in assets (mainly machinery, physical facilities and working capital) and EBITDA was the main performance measurement metric used by managers. As a result, managers were suggested that the evolution of this indicator be compared with other indicators, as described in the following sections.

4.1 Survey of initial data

Initially, data related to the Balance Sheet for the six months of the second half of 2014 were obtained, together with the accounting of the company surveyed, as summarized in Table 1, in summary form.

Table 1
Balance Sheet for the months of the second half of 2014

(In thousands of reais)

Assets	jul/14	aug/14	set/14	oct/14	nov/14	dec/14
Current	297,710	315,591	349,913	329,750	369,590	343,504
Non-Current	439,949	453,192	422,187	417,922	418,304	419,626
Total Assets	737,659	768,783	772,100	747,672	787,894	763,130
Liabilities	**jul/14**	**aug/14**	**set/14**	**oct/14**	**nov/14**	**dec/14**
Current	307,228	318,995	339,730	358,665	384,360	344,449
Non-Current	310,842	317,962	299,545	252,658	267,961	293,931
Net Equity	119,589	131,826	132,825	136,349	135,573	124,750
Total Liabilities	737,659	768,783	772,100	747,672	787,894	763,130

Note. Source: data provided by the accounting of the company surveyed.

Subsequently, the Income Statement for the months encompassed by the survey was obtained, as shown in Table 2 in synthetic format.

Table 2
Monthly Income Statement for the months of the second half of 2014

(In thousands of reais)

Items	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
Net operating revenue	74,120	64,778	68,362	78,191	70,073	60,295
Cost of goods sold	(55,355)	(53,189)	(52,417)	(59,527)	(54,346)	(48,198)
Gross operating profit	18,765	11,588	15,944	18,664	15,728	12,097
Profit (loss) before Income Tax	26	3,300	1,833	3,924	245	(3,745)
Net profit (loss)	26	12,662	994	3,631	415	(8,242)

Note. Source: data provided by the accounting of the company surveyed.

As highlighted above, the main performance measurement metric used by the company's management was EBITDA, whose performance over the last six months of 2014 was as evidenced in Table 3.

Table 3
EBITDA for the months of the second half of 2014 (in thousands of reais)

Months	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
EBITDA	12,099	9,459	9,105	10,966	7,817	5,404

Note. Source: data provided by the accounting of the company surveyed.

4.2 RSI/ROI Calculation

The Return on Investment indicator (RSI or ROI) expresses how much each real invested of equity capital (PL) and onerous third-party capital (short and long-term loans and financing) was able to generate profits in the period. As for the second half of 2014, the results obtained based on the data collected were presented in Table 4.

Table 4
Return on Investments (RSI) or Return on Investments (ROI) of the second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)						
Items/months	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
a) Profit before Income Tax (R$)	26	3,300	1,833	3,924	245	- 3,745
b) Investiments (b.1+b.2+b.3) - R$	395,304	411,136	405,767	402,546	419,112	395,461
b.1) Loans/financing CP	83,776	89,738	83,610	115,822	117,966	82,453
b.2)Loans/financing LP	191,939	189,572	189,332	150,375	165,573	188,258
b.3) Net Equit	119,589	131,826	132,825	136,349	135,573	124,750
c=a/b) RSI/ROI	0.006%	0.803%	0.452%	0.975%	0.058%	-0.947%

Note. Source: prepared by the authors.

The results of this indicator showed that, in July, the company's profit of R$ 26 represented only 0.006% of the amount invested in the month (R$ 395,304). This result can also be interpreted as follows: each R$ 100.00 invested in the company provided a return of only R$ 0.006. In August, the return on investment increased to 0.803% and fell to 0.452% in the following period. In October the RSI/ROI increased to 0.975%, but fell to 0.058% in November and, in December, was negative (-0.947%).

On the basis of these indices, it is valid to suggest to shareholders that they compare the results found in this indicator with those of similar companies (benchmarking) or that they compare the results obtained with the desired TMA (Minimum Rate of Attractiveness). If they conclude that the performance was inadequate, they should study measures aimed at (*i*) increasing the value of "Operating Profit" (such as initiatives aimed at reducing costs and expenses, increasing employee productivity and equipment, reducing idle capacity, etc.); (*ii*) reduce the value of "Investments" (with measures that reduce the need to raise funds in an onerous manner, decrease the value of "Total Assets" and increase "Operating Liabilities", such as obtaining higher payment periods with suppliers, among other possibilities).

4.3 RSA/ROA Calculation

The indicator known as "Return on Assets" (RSA/ROA) expresses the return achieved with the funds invested by the entity in assets over a given period. The calculation of this index involves the determination of the "Sales Margin" and the "Assets Turnover", as detailed in Table 5.

Table 5
Return on Assets (ROA) - second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)						
Items/months	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
a) Sales margin (1/2)	0.03%	19.55%	1.45%	4.64%	0.59%	-13.67%
1) Net profit (after Income Tax) - R$	26	12,662	994	3,631	415	-8,242
2) Net sales (R$)	74,120	64,778	68,362	78,191	70,073	60,295
b) Assets Turnover (3/4)	0.10	0.08	0.09	0.10	0.09	0.08
3) Net sales (R$)	74,120	64,778	68,362	78,191	70,073	60,295
4) Assets (R$)	737,659	768,783	772,100	747,672	787,894	763,130
c=a/b) RSA/ROA	0.003%	1.647%	0.129%	0.486%	0.053%	-1.080%

Note. Source: prepared by the authors.

The RSA/ROA can be interpreted in the month of July as follows: each R$ 100.00 allocated to the Assets provided R$ 0.003 (or 0.003%). In August this performance was the best of the focused semi-annual series, as it increased to 1.647%. However, in the month of September it decreased to 0.129%; in October was 0.486%; in November it fell again to 0.053%, and ended the semester with the worst performance (with -1.080%). Similar to the aforementioned RSI/ROI results of the previous section, the results may be considered inadequate since they represent a low return on the volume of resources destined to the company's assets.

To improve Return on Assets performance, managers should consider alternatives that aimed at (*i*) increasing sales (expanding sales of the most profitable products or selling waste and by-products to other companies); (*ii*) reducing costs (minimizing the consumption of raw materials or reducing the value of the respective acquisition cost, reducing the consumption of electricity in production, reusing inputs from the manufacturing process, etc.); (*iii*) the reduction of expenses (reducing administrative expenses such as telephone, mail, internet, electricity, water, payroll, etc., sales expenses such as advertising, commissions, taxes on invoicing via tax avoidance, etc. and financial expenses such as bank fees, interest payments etc.); (*iv*) the reduction of Current Assets (measures to reduce the volume of funds used in inventories or to reduce the collection period of sales contribute to the asset has a lower value in the period, which increases the "turnover" indicator of assets); (*v*) the lower investment of funds in Fixed Non-current Assets (actions that reduce idle installed capacity, such as increasing the number of work shifts, demobilization of inactive machinery, or sale of idle or non-productive real estate, etc.).

4.4 EVA Calculation

The EVA informs that the company creates wealth only when the result of its operational activities is sufficient to cover, in addition to the respective costs and expenses, also the cost of raising funds (own and third parties) used in the venture. Thus, EVA can be defined as the amount resulting from the deduction of the "cost of capital" from the "profit" obtained by the company at any time. If the result is negative, there will be destruction of investors' wealth; if the EVA is positive, it means the company has generated wealth for shareholders.

Among the possibilities of methodologies regarding the determination of EVA, to calculate this indicator within the company under study was chosen the formula: EVA = [RSAL (in %) - CMPC (in %)] x Invested Capital (in R$), due to the availability of data. Then, due to the need to obtain the values related to the factors of this equation, the following steps were followed.

4.4.1 Adjusting the accounting balance to the EVA standard

To determine the EVA by means of the equation mentioned, it is necessary to adjust the accounting balance sheet to a specific format to determine the value of the "Invested Capital". Regarding this, Table 6 shows the composition of the capital invested by the company in the second half of the year focused.

Table 6
Invested Capital on the second half of 2014 (values in thousands of reais)

Items/months	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
(a) Onerous Liabilities	275,715	279,310	272,942	266,197	283,539	270,711
(a.1) Loans and Financ. (CP)	83,776	89,738	83,610	115,822	117,966	82,453
(a.2) Loans and Financ. (LP)	191,939	189,572	189,332	150,375	165,573	188,258
(b) Net Equity	119,589	131,826	132,825	136,349	135,573	124,750
(c=a+b) INVESTED CAPITAL	395,304	411,136	405,767	402,546	419,112	395,461

Note. Source: prepared by the authors.

That is, the value of "Invested Capital" is made up of own resources (Net Equity) and funds raised in an onerous way with third parties (short and long term loans and financing). For

example, in July 2014, the invested capital is made up of R$ 83,776 of Short-Term Loans and Financing, R$ 191,939 of Long-Term Loans and Financing and R$ 119,589 in Net Equity, totaling R$ 395,304 in that period.

*4.4.2 T*he Return on Net Assets Calculation (RSAL/RONA)

The second step to calculate the EVA referred to the determination of the indicator known as RSAL/RONA, whose researched reality is evidenced in Table 7.

Table 7
Return on net assets (RSAL) on the second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)

Items/periods	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
a) Profit for the period	26	12,662	994	3,631	415	-8,242
b) Invested Capital (or Net Assets)	395,304	411,136	405,767	402,546	419,112	395,461
c=a/b) Return on Net Assets (RSAL)	0.006%	3.080%	0.245%	0.902%	0.099%	-2.084%

Note. Source: prepared by the authors.

As seen previously, in order to calculate the RSAL/RONA, it is necessary to divide the profit of the period by the value of the "Invested Capital" (also known as Net Assets or RONA). For example, in July/2014 the net profit for the period was R$ 26, with the invested capital of R$ 395,304. Therefore, the return on net assets (RSAL/RONA) was 0.006% in that month (R$ 26 / R$ 395,304 X 100).

4.4.3 Weighted Average Cost of Capital Calculation (CMPC/WACC)

The CMPC/WACC is the weighted average cost of raising funds (from third parties and own) that the company incurred during the period. In this sense, it was necessary initially to survey all sources of funds used by the company during the last six months of 2014. However, it is interesting to note that credit operations could be settled during the focused semester and/or contracted other(s). As a result, after obtaining the grid of foreign funds used by the company during the semester surveyed, it was possible to calculate the CMPC/WACC of all the months covered, including also the capital in the calculation, as exemplified in Table 8.

Table 8
CMPC/WACC Calculation referring to July 2014

Sources of Funds	Outstanding balance R$	Participation in Invested Capital	Interest Rates (%)	CMPC or WACC (%)
Banco Badesc	11,040	2.79%	1.47%	0.04%
BES Inv. Do Brasil S.A.	10,219	2.59%	1.39%	0.04%
Bic Banco	15,026	3.80%	1.44%	0.05%
BTG Pactual	20,105	5.09%	1.47%	0.07%
Others...	99,736	25.23%	-	-
Net Equity	119,589	30.25%	2.94%	0.89%
Total Invested Capital	395,304	100.00%	-	1.83%

Note. Source: prepared by the authors.

Since in July 42 credit operations were contracted, due to space constraints, it was decided to highlight in Table 8 only some of these sources of financing (as an example) and group the others in the line "Others ...". Then, for each external source of funds, the outstanding balance (in R$) at the end of the period (column 2), the respective percentage participation in the total amount of capital invested in the month (column 3), and the rate of remuneration of these capitals invested in the month (column 4). Also, to calculate the total value of the invested

capital, the amount related to the Net Equity of the month, as expressed in the penultimate row of Table 8, was inserted.

It should be noted that the monthly interest rates, in the case of loans and financing to third parties, were those contractually expressed when raising these funds. As for shareholder's remuneration, the rate of 2.94% per month was used because this was the "TMA" reported as the one sought by the company's owners. In the example of Table 8, the calculated CMPC/WACC was 1.8274% per month (sum of the last column) for the cited period. This means that the company's operating activities should provide enough profit to generate return on net assets (RSAL/RONA) greater than this cost of capital in order to generate wealth (positive EVA).

The results of the CMPC/WACC calculations for all the months of the semester revealed that there were small swings in rates during the six months covered (1.8274% in July, 1.8074% in August, 1.8430% in September, 1.8989% in October, 1.8025% in November and 1.8646% in December).

4.4.4 EVA Calculation

The data cited in the previous sections allowed us to determine the company's results in terms of EVA during the months of the target period. Thus, in order to present the scenario identified in this context, Table 9 was elaborated.

Table 9
EVA of the second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)

Items/periods	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
1) RSAL/RONA	0.0065%	3.0798%	0.2451%	0.9021%	0.0990%	-2.0841%
2) CMPC/WACC	1.8274%	1.8074%	1.8430%	1.8989%	1.8025%	1.8646%
3=1-2) DIFERENCE	-1.8209%	1.2723%	-1.5980%	-0.9968%	-1.7034%	-3.9488%
4) INVESTED CAPITAL (R$)	395,304	411,136	405,767	402,546	419,112	395,461
5) EVA OF PERIOD (R$)	-7,198	5,231	-6,484	-4,012	-7,139	-15,616

Note. Source: prepared by the authors.

As can be seen in Table 9, the EVA calculation was done as follows (with data referring to the month of July, as an example):

1) The return on net assets (RSAL/RONA) was 0.0065%.

2) The weighted average cost of capital (CMPC/WACC) reached 1.8274%.

3) The difference between RSAL and CMPC was negative (-1.8209%).

4) The total amount of capital invested in that month was R$ 395,304 (thousands of reais).

5) The economic value added (EVA) in the period was R$ -7,198 (thousands of reais), representing "destruction of investor wealth".

When analyzing all the periods covered, it was verified that the individual performance of the other months was as follows: in August R$ 5,231 (positive EVA = wealth creation); in September: R$ -6,484 (wealth destruction); in October R$ -4,012 (wealth destruction); in November R$ -7,139 (wealth destruction) and in December R$ -15,616 (wealth destruction). That is, in most months the result in terms of Economic Value Added (EVA) was negative, which implies to conclude that in those periods there was "wealth destruction". This occurred when the return obtained with the net assets used was lower than the weighted average cost of capital (RSAL < CMPC) in the month. However, only in August 2014, it was verified that the EVA was positive, which was motivated by an index of 3.0798% of RSAL, against 1.8074% of the CMPC/WACC. The difference between the two parameters was 1.2723%, which, multiplied by the capital invested in the month (R$ 411,136), generated an aggregate economic value (EVA) of R$ 5,231 (positive, because RSAL> CMPC).

Based on the poor results identified for the EVA in the entity in question, managers should study the applicability of measures to optimize this performance, such as reducing the

cost of raising funds from third parties; try to increase profit without investing more capital (by improving productivity or prioritizing the most profitable product lines); reduce capital invested in operational activities (with initiatives related to the demobilization of idle assets and/or reduction of inventories, for example); invest only in projects or segments with a return greater than the CMPC/WACC and sell assets whose return is lower than the CMPC/WACC.

5 CONCLUSION

The company management used EBITDA as the main performance measurement metric and in this study three other indicators were measured, as shown in Table 10.

Table 10
Comparison of indicators during the second half of 2014

Monetary values in thousands of reais and rounded (no values after the comma)

Indicators	jul/14	aug/14	sep/14	oct/14	nov/14	dec/14
EVA (R$)	-7,198	5,231	- 6,484	- 4,012	- 7,139	- 15,616
EBITDA (R$)	12,099	9,459	9,105	10,966	7,817	5,404
RSI/ROI (%)	0.006%	0.803%	0.452%	0.975%	0.058%	-0.947%
RSA/ROA (%)	0.003%	1.647%	0.129%	0.486%	0.053%	-1.080%

Note. Source: prepared by the authors.

The evolution presented in Table 10 shows that the month of August was the one with the best performance in all indicators, while the month of December can be classified as the most problematic. However, two aspects are worth highlighting in relation to the measured context. The first concerns the low return provided by the company's activities, both in terms of investments (RSI/ROI) and RSA/ROA. Especially in the months of July, September, November and December, the profitability of funds invested in the company was at levels, a priori, undesirable for shareholders.

The second point to highlight is that, while for EBITDA the company's performance is adequate for the entirety of the months (even with a downward trend in the first half), the EVA showed that in 5 out of 6 months the return on net assets (or invested capital) was lower than the weighted average cost of capital. With this, there was wealth destruction in those 5 months and only in August, the picture was positive (with wealth creation). The divergence in these two ways of analyzing the venture emphasizes the importance of choosing the appropriate indicator(s) to identify the company’s performance; otherwise it would jeopardize managers' decisions about the pertinence of maintaining existing policies or about the need to change them.

As seen previously, by focusing on EBITDA, the company's managers are led to believe that the situation would be better than it really is if the business's ability to generate enough profit to remunerate all sources of funds (by itself or others) through the EVA. As a result, it was suggested that managers should also monitor the capacity of this plant to add economic value, as well as to consider the feasibility of measures that can improve this result.

In view of the above, the authors consider that they have answered the research question, as well as having achieved the proposed objective. That is, as the study question asked about the existence of similarities or divergences in the evolution of the indicators, it was evident (Table 10) that there were discrepancies in the trajectory of the parameters measured in the months covered. Then, as the aim of the research was to measure the performance of the company surveyed through four accounting indicators, the authors concluded that the evolution of the productivity of the accounting assets had different performances (positive in some parameters and negative in others) and divergent trajectories (especially in the case of EBITDA and EVA). In addition, the evolution of these metrics for corporate performance’s assessment was commented on in the previous sections, and was concluded due to the inadequacy of the results obtained, given the low productivity of the assets presented by the company in the half year covered.

As limitations associated with the study, the following aspects should be highlighted:

a) Exclusive focus on financial indicators: even if non-financial indicators can include other aspects that affect the productivity of assets, priority was given exclusively to the assessment in this regard, by financial indicators. In this sense, it is worth noting that neither of these two categories of indicators can be considered immune to criticism or that they can be applied without restrictions in the assessment of the productivity of assets.
b) Restriction of the findings to the company surveyed: because it is a case study, the conclusions are limited to the context of the company in question. Thus, the possible application of the same procedures in another company will probably require adaptations.

Finally, it is suggested that future studies focus on subjects such as the possible need for adjustments in the accounting database used (to assure greater reliability in the comparison of these indicators) and/or to discuss different factors or approaches that allow to conclude on the adequacy or not to use these indices in a comparative way to assess the assets' productivity.

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