

Comparative Analysis of Key Economic Indicators and Their Change as a Consequence of the Implementation of an ERP System in an Enterprise for Production and Trade in Bread and Pasta

PhD candidate Yanko Georgiev
University of Economics - Varna, Varna, Bulgaria
yanko_georgiev@ue-varna.bg

Abstract

The main goal of the management of each company is to optimize its activities in a way that improves financial performance and leads to higher results. Modern companies also face the issue of the use of ERP systems and their efficiency. The implementation of such software is a serious investment that carries significant financial risk. Operating in an uncertain environment, with strong competition and variable consumer demand, the management of any company that decides to invest in the implementation of an ERP system must know what results can be expected from the implementation of the software and whether it is worth the investment and risk.

Keywords: Enterprise Resource Planning, ERP, implementation processes, software, Critical Success Factors, CSFs

JEL Code: A00

Introduction

Enterprise process management systems used in a business and the Enterprise Resource Planning systems (ERP) in particular have long been known in the economic literature. The benefits of their application have been highlighted by a number of studies and a wide range of authors. In practical circles, the use of ERP systems is also gaining popularity and the number of companies that have decided to optimize their activities with the help of software solutions is growing. As a result, the number of manufacturers of ERP systems is growing. In Bulgaria, the level of development of computer systems and technologies is not inferior to that in developed countries, and the number of companies willing to invest in modern software such as ERP systems is increasing. This raises the question of whether ERP systems are effective and what economic results can bring the implementation of a project to implement an ERP system?

The purpose of this study is to examine the changes in the main economic indicators of an enterprise for the production and trade of bread and pasta. The periods before and after the implementation of an ERP system will be covered. By analyzing the change in these key economic indicators, it will be possible to answer the question of how effective the use of ERP software is and the investment for the implementation is justified.

1. Theoretical foundations of financial analysis.

In the modern environment in which enterprises operate, the importance of financial analysis is growing. It makes it possible both to reveal trends and patterns in the past development of an enterprise and to take timely measures for its effective management.

The financial analysis allows you to determine the financial condition of an organization and to define the way it operates or has functioned in the past. The results of the analysis are usually used to make several strategic decisions by company management.

In various scientific sources, there are concepts such as financial-economic, financial-accounting, financial, corporate, accounting analysis and others. For example, some of them use the term financial and economic analysis, thus believing that along with financial activity, production activity should also be studied. Other authors believe that the analysis of the activity of the enterprise should be divided into financial and managerial. The first is based on the annual financial statements,

the so-called public accounts and its results are intended primarily for external persons, while the second is based on data from current accounting and is intended mainly for the management of the enterprise. The third authors argue that financial and accounting analysis are two essentially different types of analysis, with the first looking at only cash flows and the second looking at economic benefits (Todorov, 2005).

There are a number of names of the analysis, but for the present development, the concept of the financial analysis is accepted. Financial analysis can be presented from different points of view. This is because it can pursue different goals. For example, financial analysis can be used as a tool for selecting financial and/or capital budget investments. At the same time, it is a tool for selecting sources of financing for the company. It provides a rational assessment of the securities portfolio, as well as effective planning and forecasting of the future financial condition and results (Adamov, 2006).

Research in the field of financial analysis usually focuses on one or another area of its application. They focus on the financial results (Chukov, 1997), on the specific financial ratios (Nikolov, 1995), or the financial condition, as part of the overall economic analysis of the enterprise (Vakliev, 1992).

From the above, we could define financial analysis as a set of methods for studying the activity of the enterprise, aiming to determine the changes in key indicators of the enterprise. By examining these changes, we could also justify the effectiveness of ERP systems.

The analysis could be performed by different users of information, as well as be designed for different users. Therefore, the subjects of the analysis and the users of its information can be both the same and different. Depending on the needs of the individual subjects of financial analysis, they can be classified into the following main groups (Adamov, 2006):

- creditors (banks and other companies);
- portfolio investors (in company shares and bonds);
- company financial management;
- others.

In addition to these entities in the form of investors, creditors and corporate financial management, some authors identify other alternative groups of users of the information generated by the analysis. These groups include auditors, company restructuring specialists, specialized statistical services and agencies and trade unions (Adamov, 2006).

Financial management can be indicated as the main user of the data obtained from the financial analysis. The information obtained is used to assess the stability and efficiency of an enterprise. It is the analysis performed for company management that is characterized by the most complete content, as the analyst has all the available information necessary for analysis.

Financial management can analyze financial information once or periodically, and based on the results will be able to identify changes in ratios, trends and all other relationships related to the current state of the enterprise, as well as past or future changes.

The process of implementing an ERP system, being a large investment and characterized by high risk, must be justified by forecasts that justify the risks taken. The financial analysis of the enterprise before, during and after the implementation of the system is the main way to determine first the need for such a system, and then the effectiveness of the same.

The in-depth analysis could also reveal the weaknesses of the company and localize problems that should be solved to ensure the sustainable development of the enterprise.

Financial analysis is of particular importance for the proper functioning of each business entity, as it allows to reveal trends and patterns through which company management can make informed decisions to optimize the activities of the enterprise and increase its efficiency.

2. Financial analysis of an enterprise for production and trade in bread and pasta

The subject of the present study is an enterprise registered as a limited liability company, operating on the market since 1997. The subject of activity of the enterprise is production and trade in bread and pasta. Over the years, it has established itself in the market for the production and trade of pasta, having managed to build contractual relationships with the largest retail chains operating both nationally and internationally. In 2017, the surveyed company is one of the sector leaders in the ranking of bakery producers with a total number of companies of 573. For the same period, as over years it managed to increase its sales not only on the domestic market but also on the foreign one.

The trend of increasing turnover in the bakery sector and taking into consideration the increase of companies in this market segment requires the company's management to decide to optimize the organization of the company and increase company efficiency through the implementation of an ERP system.

The company started a procedure for the implementation of the ERP system in the second quarter of 2017. After the documentation of the project, setting the framework, goals and objectives of the investment, the system is implemented. This implementation begins in August of the same year, and for a real start of work with the new system is set the date 01.12.2017. For development, we believe that despite the real start of the system in the last month of 2017, its positive/negative impact was not significantly expressed during this reporting year. In our opinion, the efficiency of the implementation of the ERP system can be measured in 2018, as throughout the calendar period the activity of the enterprise is managed in this way.

The comparison of the data from the period before and after the implementation of the ERP system would show whether and to what extent the implementation of the system contributes to the increase of the company indicators. In the present study, data on the activities of the enterprise in the period 2014 - 2020 will be examined.

For the present study, changes in the indicators of profitability, efficiency and liquidity will be considered and evaluated. We focus on these three ratios as the basis for performing financial analysis and best reflecting the economic condition of the enterprise under study.

The first indicator on which our study will focus is the profitability of the enterprise. It is the basis of financial analysis. Profitability is a quantitative characteristic of the efficiency of revenues, expenses, assets, liabilities and equity. It establishes the effectiveness of the invested resources. Profitability ratios can determine whether a company can generate profit. It should be noted that profitability ratios are positive values when the company generates profit and respectively negative when generating losses.

The profitability ratio of sales revenue is calculated as the ratio between the financial result of the company after tax and the net amount of sales revenue. Expresses the return per unit of income realized by the enterprise in the formation of the financial result. The relative change in this indicator for the object of the present study is within different limits, but for 2018 there is a significant increase of 85%, which is the most significant one for the study period (see Table 1). This is the first year in which the ERP system has functioned and its positive impact on this indicator can be assumed. In the next two years, the profitability ratio of sales revenue recorded a slight fluctuation but remained high.

Another indicator that reflects the profitability of the enterprise is the rate of return on equity. It is calculated as the ratio between the financial result and the equity. It shows the return on equity of the company in the formation of financial results and here again, we see the largest growth in 2018 and slight changes in the next two reporting periods, while maintaining relatively high values of the indicator.

We observe a similar trend for the rate of return on liabilities and that on assets. The first reflects the ratio between the financial result and the liabilities of the enterprise, and the second, respectively the assets of the enterprise. The growth in the rate of return of liabilities reaches an extremely high of 176%, and that of assets up to 120%. However, for both coefficients, in the next two years, there is a significant decline, which returns them to the levels from before the implementation of the ERP system.

Table 1. Profitability ratio of significant indicators for the period 2012 - 2020

№	Indicators	Year								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Profitability ratio of										
1	Sales revenue									
	Value	0,019	0,022	0,035	0,052	0,050	0,053	0,098	0,093	0,097
	Absolute change	-	0,003	0,013	0,018	-0,002	0,003	0,045	-0,005	0,005
	Relative change (%)	-	17,838	59,633	50,287	-3,824	4,970	85,606	-5,408	5,070
2	Equity									
	Value	0,239	0,243	0,295	0,332	0,266	0,281	0,462	0,357	0,317
	Absolute change	-	0,004	0,052	0,037	-0,066	0,015	0,181	-0,104	-0,040
	Relative change (%)	-	1,462	21,326	12,487	-19,759	5,526	64,446	-22,595	-11,167
3	Liabilities									
	Value	0,051	0,066	0,098	0,152	0,156	0,167	0,462	0,255	0,142
	Absolute change	-	0,015	0,033	0,054	0,004	0,011	0,295	-0,207	-0,113
	Relative change (%)	-	28,376	49,543	55,148	2,694	6,718	176,859	-44,846	-44,287
4	Assets									
	Value	0,043	0,052	0,074	0,104	0,099	0,103	0,227	0,149	0,098
	Absolute change	-	0,010	0,021	0,031	-0,006	0,004	0,124	-0,078	-0,051
	Relative change (%)	-	22,482	40,727	41,712	-5,561	4,264	120,935	-34,465	-34,095

Looking at the data presented in Table 1, we see a significant increase in all indicators in the reporting year 2018. But while the rates of return on equity, assets and liabilities over the next two periods return to their previous values, the rate of return on sales remains close. Based on these data, we can conclude that even if external factors affected the results in 2018, the maintenance of high profitability of sales revenues in the absence of these external factors should be due to the implemented ERP system.

Another key element of financial analysis is the study of the efficiency of the enterprise and aims to determine its ability to generate sales revenue, with which it will be able to recover the costs incurred for the activity and to provide income. Table 2 presents the calculations of performance indicators for the period 2012 - 2020.

Table 2. Revenue and expenditure efficiency ratio for the period 2012 - 2020

№	Indicators	Year								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Efficiency ratio of										
1	Costs									
	Value	1,022	1,025	1,035	1,061	1,059	1,060	1,119	1,113	1,120
	Absolute change	-	0,003	0,010	0,026	-0,002	0,001	0,060	-0,006	0,007
	Relative change (%)	-	0,303	0,995	2,464	-0,179	0,113	5,614	-0,527	0,629
2	Income									
	Value	0,979	0,976	0,966	0,943	0,945	0,944	0,893	0,898	0,893
	Absolute change	-	-0,003	-0,010	-0,023	0,002	-0,001	-0,050	0,005	-0,006
	Relative change (%)	-	-0,296	-0,984	-2,412	0,191	-0,116	-5,320	0,526	-0,624

The cost-effectiveness ratio is calculated as the ratio of revenue to cost. This ratio represents the amount of revenue generated by a unit of expenditure in the surveyed enterprise. The values of

the coefficient above one show that the costs are less than the revenues. In this case, we observe values above one for the entire period under review, which means that the company successfully manages its costs. At the beginning of the study period, for every BGN 1 of expenses, the company generated BGN 1,022 in revenues. At the end of the period, this value reaches 1,120, which is the highest for the whole period. The growth of 8.75% between the two years is a definite indicator of the positive trend of the company's development. The most significant part of this increase is accumulated in the years 2018 - 2020, which coincides with the time of use of the ERP system. This gives us reason to say that the software can have a positive impact on the company's operations.

To operate successfully, in addition to its costs, the company must manage its revenues. The revenue efficiency ratio shows the ratio of expenses incurred to revenues received. This indicator indicates a unit of revenue, from which amount of expenditure is incurred. Values below 1 are positive, and the decrease we observe for part of the period indicates the receipt of higher revenues with fewer costs incurred.

Both efficiency coefficients remain relatively constant for the entire study period, the movement is mainly in a positive direction for the company, taking into account two significant changes first in 2015 and then in 2018. And in terms of efficiency ratios, the most significant increase is for the period in which work with the ERP system is started. Although in 2019 the cost efficiency decreases, in 2020 it increases again, reaching the highest level for the period under study.

From the data presented in Table 2, the tendency for the improvement in the level of efficiency of the surveyed enterprise is clearly outlined. In the period after the implementation of the ERP system, the efficiency ratio reaches its highest levels and this is a clear sign of the positive impact of the software on the company's activities.

Positive results for profitability and efficiency of the enterprise are key to its successful operation, but their importance is complemented by the ability of the enterprise to make its payments on time without taking unnecessary risks and depriving itself of its profitable assets. For this purpose, it is necessary to be liquid. The study of the total liquidity of the organization is presented in Table 3.

Table 3. Liquidity ratios of the company for the period 2012 – 2020

№	Indicators	Year								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Liquidity ratio										
1	General									
	Value	1,216	0,896	0,865	1,200	1,347	1,070	1,610	1,481	1,270
	Absolute change	-	-0,320	-0,031	0,335	0,147	-0,278	0,541	-0,129	-0,211
	Relative change (%)	-	-26,342	-3,427	38,696	12,258	-20,600	50,542	-8,018	-14,246
2	Fast									
	Value	0,628	0,526	0,630	0,890	1,176	0,836	1,073	1,223	1,127
	Absolute change	-	-0,103	0,104	0,261	0,286	-0,341	0,237	0,150	-0,096
	Relative change (%)	-	-16,319	19,787	41,391	32,139	-28,964	28,375	13,974	-7,836
3	Immediate									
	Value	0,137	0,059	0,082	0,137	0,209	0,059	0,053	0,079	0,214
	Absolute change	-	-0,078	0,023	0,055	0,071	-0,150	-0,006	0,026	0,135
	Relative change (%)	-	-56,955	39,796	67,153	51,820	-71,668	-9,983	48,120	171,701
4	Absolute									
	Value	0,137	0,059	0,082	0,137	0,209	0,059	0,053	0,079	0,214
	Absolute change	-	-0,078	0,023	0,055	0,071	-0,150	-0,006	0,026	0,135
	Relative change (%)	-	-56,955	39,796	67,153	51,820	-71,668	-9,983	48,120	171,701

Liquidity ratios (see Table 3) reflect the company's ability to cover its current liabilities with available current assets. The total liquidity ratio is calculated as the ratio of the company's current assets available to current liabilities. The generally accepted value of this indicator is 1, and the optimal value for an enterprise with production activity is in the range of 1.5 - 2.0. The presented data show that the indicator for the company is in a wide range and only in the reporting year 2018 - the year of the actual start of work with the ERP system, falls within the recommended range. In the following years, it decreased, but it did not eliminate the initial increase and the total liquidity remained higher than those for the period before the implementation of the ERP system.

If the role of tangible assets as an opportunity to repay short-term liabilities is eliminated, an indicator of quick liquidity will be formed. The recommended value of the indicator is about one. For the period of operation of the ERP system, namely in the interval 2018 - 2020, the quick liquidity has values close to or above one, which is a positive result. Improvements in the values of the quick liquidity ratio were observed throughout the study period, but during the time of using the ERP system, its values were approximately twice as high as in the year of the beginning of the study. The positive effect of the software implementation is visible from the presented data.

Immediate liquidity reflects the relationship between immediately liquid current assets and current liabilities. Demonstrates the company's ability to repay its short-term (current) liabilities with available highly liquid assets. The movements in this indicator are significant throughout the study period. Despite reaching the lowest level in 2018, in 2020 the immediate liquidity marked a significant increase and reached the highest value for the period. This result is again achieved after the implementation of the ERP system, and this indicates its positive effect.

To calculate the absolute liquidity ratio, cash and current liabilities are compared. This indicator reveals the ability of the enterprise in question to repay its short-term liabilities with the available cash. It is recommended that this ratio does not take into account values below 0.3. This means that the company must maintain cash covering about 30% of its current liabilities. In this regard, there are opportunities for improvement in working capital management, given the values presented. We see such an improvement again in 2020, as the coefficient is approaching the optimal value.

The data presented in Table 3 illustrate significant changes in the liquidity ratios for the surveyed enterprise. It should be noted that their values are not in the optimal range and there is room for improvement. We also observe a positive trend in the period after the implementation of the ERP system, as 2020 is the one with coefficients closest to the optimal values. These results are indicative of the positive impact of the ERP system on the activities of the enterprise and the possibility of forming a long-term, positive trend.

The studied data clearly illustrate the growth in the financial indicators for 2018. This is also the first full year using the implemented ERP system. However, to make a reasonable conclusion that the development of the enterprise is a result of the use of ERP software, an assessment must be made of the economic development in the country for the same period. The growth of the Bulgarian economy in 2018 amounts to 3.2% with an annual inflation rate of 2.3%. The presented information shows that for 2018, the economic environment is favourable and the company operates in conditions suggesting the improvement of its economic indicators. Therefore, we cannot attribute the achieved results entirely as a consequence of the use of the ERP system. It should be borne in mind, however, that ratios such as profitability and efficiency are influenced to a greater extent by the internal organization and decisions of the company management and not so much by the economic environment. Proper management of the processes taking place in the enterprise is a consequence of the use of the right tools. ERP systems are designed to provide these tools, and hence the data needed to make motivated and successful management decisions. After the main indicators, depending on the internal state and environment in the enterprise, note changes in a positive direction, the conclusion that ERP systems lead to improved financial results is justified.

As a result of the study we could draw the following conclusions:

First, the profitability ratio of the various indicators marked the most significant increase in the first reporting period of operation of the ERP system and despite subsequent declines remained

at levels higher than before the implementation of the system. This is indicative of the positive impact of the implementation of the ERP system.

Second, the efficiency of the enterprise increases in small steps, but in a positive direction. Only in two of the studied years, there is a decline, but the increase in cost efficiency of 9% in 2020 compared to 2012 is a sure indicator of the positive trend in the development of the enterprise. These positive results are a consequence of the implementation of the ERP system because with its implementation the rate of efficiency increases.

Third, the liquidity ratios of the company are not at optimal levels, and even have values outside the optimal for the entire period of the study. However, there is an improvement in the years after the implementation of the ERP system, reaching values close to the recommended limits. This improvement in liquidity ratios can be attributed to the positive effects of ERP software deployment.

Fourth, the values of all presented coefficients report accumulated growth in the period 2018 - 2020, which is the one with the use of the ERP system. This growth can justifiably be attributed to the positive effect of the implementation of the ERP system, proving the benefits of its use.

Conclusion

The implementation of ERP software is a project with a high value of an investment and carries high risks for the company that decided to implement it. As such, the company management needs information and data proving the need for the implementation of an ERP system and the positive results it should bring. Despite the theoretical foundations and research highlighting the positive impact of the use of ERP software on financial performance and results, practical data are needed to prove this effect.

The present study examines the financial performance of an enterprise for production and trade in bread and pasta, which has implemented an ERP system, and the study period includes years before the start of work with the system and after. Thus, the change in the presented data is a consequence of the influence of ERP software on the company's activities. The positive trend in the change of all considered coefficients is present and based on these data we can conclude that the ERP system has a positive contribution to the activity of the enterprise.

This report is a good starting point for deciding to invest in the implementation of an ERP system, carrying information about the effect of such a real project and taking into account the actual change. Deepening the research with the inclusion of more indicators can bring additional data on the effect of the implementation of ERP software and prove in a definite way the positive impact of the same.

References

1. Adamov, V., i kol. (2007) Investitsii. V. Tarnovo: ABAGAR.
2. Adamov, V., Holst, D., Zahariev, A. (2006) Finansov analiz. V. Tarnovo: ABAGAR.
3. Vakliev, G., i kol. (1992) Osnovi na stopanskiya analiz na predpriyatieto. IK Lyuren.
4. Godishen schetovoden balans na predpriyatieto za perioda 2012 – 2020 g.
5. Nenkov, V. (1998) Finansov analiz na firmata. V. Tarnovo: ABAGAR.
6. Nikolov, N. (1995) Finansov analiz. Princeps.
7. Otchet za prihodite i razhodite na predpriyatieto za perioda 2012 – 2020 g.
8. Prodazhbite na hlebni izdeliya narastvat s 6.6 %. // v-k Kapital, 26.10.2018. Available on: https://www.capital.bg/specialni_izdaniia/regal500plus/2018/10/26/3336245_prodajbite_na_hlebni_izdeliia_narastvat_s_66/. [Accessed 15/10/2021].
9. Todorov, G. (2005) Finansovo-schetovoden analiz na predpriyatieto. Varna: Steno.
10. Chukov, K. (1997) Analiz na finansovite rezultati i finansovoto sastoyanie na predpriyatieto. IK Lyuren.