

ERP IMPLEMENTATION IN A RESEARCH-DEVELOPMENT INSTITUTE IN ROMANIA - PERCEPTION CASE STUDY

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Iulia UNGUREANU

University Alexandru Ioan Cuza from Iași
Iași, Romania
iuliaungureanu80@gmail.com

Oana Cătălina ȚĂPURICĂ

National Research and Development Institute for Industrial Ecology - ECOIND, Synesis
Partners SRL
Bucharest, Romania
oana.tapurica@incdecoind.ro

Mariana Simona CĂLINESCU

National Research and Development Institute for Industrial Ecology- ECOIND
Bucharest, Romania
simona.calinescu@incdecoind.ro

Ioana Iulica MIHAI

National Research and Development Institute for Industrial Ecology- ECOIND
Bucharest, Romania
iulia.mihai@incdecoind.ro

Abstract: *This study aims to analyze the perception of the users of an Enterprise Resources Planning (ERP) system implemented in a research and development (R&D) institute in Romania regarding the achievement of the objectives proposed by this implementation but also the factors that contributed to the successful implementation of this ERP system. To study the perception, a questionnaire was sent for completion, to which 54 users, employees of the R&D institute, replied. The results obtained show that the users' perception is favorable to the achievement of the implementation objectives and the factors that have contributed the most to the success of the implementation are the support offered by the implementation team in the implementation of the ERP System Microsoft Dynamics NAV and the involvement of the management team in defining and following the objectives.*

Keywords: *ERP, organizational performance, accounting and finances, efficiency, business model.*

Introduction

In Romania, through the National Strategy for Research, Development and Innovation 2014-2020, the main objective was to develop the national research and development system. Thus, the main instrument for the implementation of the strategy was the National Plan for Research, Development, and Innovation for the period 2015-2020 (PNCDI III). The subprogram 1.2. Institutional performance was developed to increase the performance of research and development organizations. Within this subprogram, the national research and development institutes have set themselves objectives that will lead

to an increase in the performance of the research teams. This is also the case of the R&D institute that is the subject of this study and which has proposed the implementation of an ERP (Enterprise Resources Planning) system in order to obtain the increase of the productivity of the R&D personnel by simplifying the auxiliary processes and increasing the volume of time allocated exclusively to research and development activities.

ERP systems are modular systems that integrate all the databases in an organization. By implementing ERP systems, all the workflows of operations in the company are transposed so as to obtain a transparent and easy to analyze image of the activity. Most ERPs contain basic modules, which include data about customers, suppliers, employees (Davenport, 1998), accounting data, but the most complex ERP systems integrate data related to the production process, services, acquisitions, analysis and complex data modelling through Business Intelligence modules and others. All the analyses and reports obtained with the help of ERP systems use as decision tools for top management.

The benefits of integrating ERP systems are analyzed by the specialized literature and two types of results are revealed, one is an increase in performance, revenues, profitability, improved productivity, and the other is an increase in expenses, low productivity, etc. Therefore, through this study we aim to analyze through the perception of users of an ERP system implemented in a R&D institute in Romania, whether the objectives that led to the implementation of this system have been achieved and whether there are factors that have contributed to the successful implementation of the ERP system in the research organization.

Our paper is structured as follows: Section 2 summarizes the literature review. Section 3 describes the data and methodology employed, Section 4 reports the empirical findings, while Section 5 presents the concluding remarks.

Literature review

In the literature there are results that show that a successful ERP implementation in an organization can generate important benefits. The providers of ERP systems promise benefits from the Go-Live phases, but most of the time, the post-implementation phases are the ones that ensure the obtaining of the benefits. ERP implementation is a complex, long-lasting process, and can generate besides benefits, dissatisfaction among employees. From the point of view of complexity, implementing an ERP is a difficult process that involves employees from all business processes of the organization. These implementations can fail from the very first stages of implementation if organizations do not have adequate financial and human resources. The costs of implementing an ERP are very high and include infrastructure costs, licenses, consulting, training, system maintenance costs, subscription costs, costs for further development and personnel costs. Also, due to the fact that the implementation is a complex process, which especially in the testing phase but also in the Go-Live phase, which overlaps the initial flow to test the correctness and accuracy of the data, can make the staff's activity difficult, it is necessary to have a mindset open to change to be embraced by all the staff involved. The literature has identified 4 phases in the implementation of an ERP: planning, implementing, stabilizing and improving the ERP system and their success depends on some critical success factors (Shadi AboAbdoa, 2019). The long-term vision of the managers of the organizations that implement ERP must include the post-implementation process, the

development and improvement of the ERP system, in order to obtain benefits at the level of the organization (Esteves, 2009). In the implementation process, organizations meet with challenges and risks (Sumner, 2000). There is a risk of reconfiguring the business flows to match them in the ERP system but also the risk of hiring new personnel who can operate in the implemented system. These risks can be avoided if the business analysis prior to the implementation of the ERP system is a detailed one and suitable for the type of ERP system purchased. At this stage, it is essential that the expertise and knowledge of the external team are perfectly intertwined with those of the organization's implementation teams. Major risks in ERP implementation can also arise from the lack of management support, inefficient communication and insufficient training of teams. But if there is support of the top-management team in implementation, if the planning of the processes and the training of the teams are carefully and rigorously carried out, then these factors (success factors) can be decisive for obtaining the desired effects after the ERP implementation (Chung B, 2009). The human factor and financial resources are the most important resources when it comes to digital transformation that involves a long, laborious and expensive project for any organization. For this reason, only 30% of digital transformation projects really reach a successful implementation (BCG, 2021). The main reasons why companies decide to integrate ERP solutions as tools to optimize efficiency in their business flow are the simplification of processes to obtain superior productivity and the facilitation of fast and correct decisions of the top-management. For the correct analysis of the benefits, it is essential that they be evaluated in relation to the motivation of ERP implementation (Markus, 2000) but also in relation to the moment when the benefits are evaluated (Esteves, 2009).

Data and methodology used

To analyse the perception of the development of R&D institute staff in relation to the benefits obtained from the implementation of ERP but also in relation to the success factors of the implementation, we developed a questionnaire structured in three parts. Respondents were asked to rate the importance of the factors that determined the success of ERP implementation, but also the perception of the benefits of ERP implementation using a Likert scale, with 5 response options (1-very low, 2-low, 3-medium, 4-high, 5- very large). Out of the total of 162 employees of the R&D institute, only a third use the ERP system and all the 54 employees who use the ERP computer system completed the questionnaire. Therefore, all the respondents use the ERP system and have played various roles in the implementation of ERP. The responsiveness rate was 100%, as all the target employees were previously notified about the research, and they agreed to be part of the target group.

The R&D institute implemented the integrated ERP system, Microsoft Dynamics NAV, through an institutional development project financed by the Ministry of Research and Innovation. The motivation for the system implementation was mainly to increase the productivity of R&D staff by simplifying auxiliary processes and increasing the volume of time allocated exclusively to research-development activities. The ERP system, Microsoft Dynamics NAV, was implemented in the R&D institute with the financing support offered by Program 1 - Development of the national research-development system, Subprogram

1.2 - Institutional performance, Institutional development projects - Projects to finance excellence in RDI, and the implementation period lasted over two years (2019-2020).

There was also a post-basic implementation period. In 2021, the R&D institute initiated the implementation of an additional functionality, RD Laboratory Activity. This development was intended to relieve R&D staff of certain administrative tasks that would save time and increase their productivity. Therefore, during the testing of user perception (May 2022), the ERP system implemented in the R&D institute was in the consolidation phase (first three years of implementation) after the SAP classification (Nolan and Norton Institute, 2000), when it is expected that the benefits targeted by the motivation of ERP implementation in the institute start being visible. The implementation of this ERP system aimed at simplifying and de-bureaucratising the administrative and research flows existing at the level of the R&D institute. The implemented ERP system is like an integrated resource management system, having both the role of simplifying administrative processes and streamlining flows at the level of research departments, contributing to improving the institutional performance of the R&D institute, increasing the amount of time allocated to research and innovation activities, as well as the performance of research teams.

The questionnaire distributed to the employees of the R&D institute was structured in three parts as shown in Table 1:

Table 1. The structure of the questionnaire used for carrying out the empirical research

No.	Section	Number of items	Types of items	Objective
1.	Section 1 – Level of contribution regarding the implementation of the ERP system	3	Multiple choice questions	Assessing the employees' activity in the R&D institute and the role played in the implementation of the ERP system
2.	Section 2 – Assessing the employees' perception about the system implementation	8	Multiple choice questions	Assessing the employees' perception of the benefits of implementing the ERP system
3.	Section 3 – Assessing the employees' perception of the factors that determined the success of the implementation	5	Multiple choice questions	Assessing whether the success factors of the implementation correspond to the ones identified in the consecrated literature

The main characteristics of the users describing their profile are presented in Table 2.

Table 2. Profile issues of the target group

Role in the ERP implementation		(%)
I designed the functionalities requirements/ modules	4%	
I tested the functionalities/modules	74%	
I did both	22%	
Structure/ respondent position		(%)
R&D staff	52%	
Staff with auxiliary functions	48%	
Modules defined or tested by the respondent		(%)
Assets	3,70%	
Project Management	22,22%	
Accounting	16,67%	
Stocks	5,56%	

Sales	20,37%
Salaries	7,41%
Staff administration	3,70%
Payroll	1,85%
Staf Timesheet	16,67%
Document administration	20,37%
Debt tracking	9,26%
Registry	9,26%
CRM	22,22%
Laboratory activities	57,41%
Acquisitions	38,89%

Considering the previous studies, we anticipate that there are benefits of ERP implementation in the process flow of the R&D institute, so we decided upon the following hypotheses that essentially highlight whether in the respondents' perception, ERP implementation has led to an increase in the productivity of R&D staff:

Hypothesis 1: Using the ERP system Microsoft Dynamics NAV does not make the activity difficult.

Hypothesis 2: With the help of the ERP Microsoft Dynamics NAV, the automation of the activity was successful.

Hypothesis 3: The ERP will provide you with all the tools necessary to carry out the activity.

Hypothesis 4: The performance of the ERP is good.

Hypothesis 5: By implementing the ERP, it was obtained the simplification and efficiency of the activity flows.

Hypothesis 6: By implementing the ERP, it was possible to increase the volume of time allocated to research and innovation activities and increase the performance of research teams.

Hypothesis 7: The implementation of ERP system has reduced the time in which I perform the current service tasks.

Hypothesis 8: The implementation of the ERP system has reduced errors in the activity I am running.

Also, considering the previous studies, we anticipate that there are factors that influenced the successful implementation of the ERP system in the R&D institute, so we decided upon the following hypotheses to highlight whether or not, in the perception of respondents, the implementation of the ERP system in the R&D institute had the result of the same success factors circulated in the literature:

Hypothesis 1: The support provided by the management team contributed to the successful implementation of the Microsoft Dynamics NAV ERP system within the R&D institute.

Hypothesis 2: The support provided by the implementation team contributed to the successful implementation of the Microsoft Dynamics NAV ERP system within the R&D institute.

Hypothesis 3: The efficient assignment of tasks by the project manager contributed to the successful implementation of the Microsoft Dynamics NAV ERP system within the R&D institute.

Hypothesis 4: The involvement of the management team in defining and pursuing the objectives contributed to the successful implementation of the Microsoft

Dynamics NAV ERP system within the R&D institute.

Hypothesis 5: The efficient training of the teams contributed to the successful implementation of the Microsoft Dynamics NAV ERP system within the R&D institute.

Results

In the first part of the questionnaire, the respondents provided information about their activity in the R&D institute and the role played in the implementation of the ERP system. The results obtained indicate a higher completion rate for people who had the role of testing the modules and functionalities implemented (74%) than those who had both roles (22%) or those who defined only the ERP requirements (4%) (Table 2). In the second part of the questionnaire, respondents provided information on their perception of the benefits of implementing ERP. The assumptions made may or may not indicate an increase in the productivity of R&D personnel. Although productivity in the R&D institute is on an upward trend, the determinants of its growth cannot be quantified by econometric models. Therefore, testing the perception of staff who have implemented the ERP system can be a good indicator of these results.

Since most modules and functionalities, especially those that serve the activity of R&D staff were developed on the flows of the R&D institute on the ERP platform and were not taken as standard functionalities, the first statutory hypothesis was meant to determine whether ERP integrated workflow has hampered staff activity. Most of the answers (41%) agreed with the statutory hypothesis by ticking in the questionnaire the 5-very high answer option, and 15% of the respondents ticked the 4-high answer option. Therefore, at the level of the R&D institute, employees perceive the implementation of the ERP system as a system that does not hinder the activity.

By implementing the ERP system, automatization was the goal to achieve, especially for those activities which were auxiliary to the R&D field and were carried out by the R&D staff. In the perception of the respondents to the questionnaire, this benefit was obtained, the majority being in great agreement with the hypothesis formulated (50%). The implementation of the ERP system within the R&D institute aimed at de-bureaucratisation the activities so that it would provide the necessary support to all the flows carried out. The results of the study show that most respondents agree with the hypothesis (44% - ticked 5-very high; 19% - ticked 4-high). The analysis of the answers for the perception related to the performance of the implemented system shows that most respondents agree very much with this hypothesis (44% - 5 very high, 22% - 4 high). In the respondents' perception, the implementation of the ERP type information system in the R&D institute produced the simplification and efficiency of the activity flows (43% - 5 very high; 26% - 4 high). Therefore, this aspect is an important indicator that leads to the conclusion that the implementation of ERP can generate an increase in productivity for employees.

Through the implementation of ERP, the management of the R&D institute aimed at relieving the administrative activities of the R&D staff in order to increase the time allocated to the R&D activities. 43% of the respondents strongly agree with the achievement of this objective and 15% ticked 4-high. Therefore, most respondents perceive

the implementation of ERP as a tool that indirectly resulted in an increase in the performance of research teams, and therefore an increase in productivity.

Another indicator that suggests an increase in productivity would be a reduction in the time in which employees perform their duties. Most respondents perceive this goal as achieved following the implementation of ERP, most being in very high agreement with the statutory assumption (44% - 5 very high; 15% - 4 high). Also, the employees' perception of the reduction of errors in the activity carried out is a good one, 48% of the respondents ticking 5-very high, and 19% of the respondents ticked 4-average. The weighted average scores for this part of the study in which we wanted to test the perception of users of the ERP system implemented in the R&D institute show a general perception of average to good (3-medium to 4-high) of respondents in relation to all statutory assumptions (Table 3). For hypotheses 2 and 4 that reflect the performance of the implemented system, the weighted average score is 4, so respondents have a good perception of these issues.

Table 3- Respondents' perception- ERP implementation has led to an increase in the productivity of R&D staff

Hypothesis	Respondents' perception					Weighted average score
	1- very low	2-low	3-medium	4-high	5-very high	
H1	7	1	16	8	22	3.7
H2	3	5	10	9	27	4
H3	2	7	11	10	24	3.9
H4	3	1	14	12	24	4
H5	2	7	8	14	23	3.9
H6	3	10	10	8	23	3.7
H7	2	8	12	8	24	3.8
H8	2	10	6	10	26	3.8

Therefore, correlating the fact that the implementation of ERP is in the phase of improvement / consolidation both with the records from the financial reports of the R&D institute and with the result of this study we can consider that the implementation of ERP helps by increasing the productivity of R&D staff. In the third part of the questionnaire, the respondents provided information on their perception of the factors that determined the success of the ERP implementation in the R&D institute. Studies show that the support provided by the management team in implementation projects is a determining factor for the success or failure of the project. In the perception of most respondents (46% -5 very high; 30% -4 high), the management team of the R&D institute provided support in implementation.

In the respondents' perception, a slightly higher score is given for the support provided by the implementation team, as a determining factor of the success of the implementation project (48% -5 very high; 30% -4 high). The efficient assignment of tasks by the project manager in ERP implementations is another factor that contributes to the success of the implementations. Respondents' perception confirms that this factor was also a determinant in the ERP implementation project in the R&D institute (44% of respondents ticked 5-very high; 31% of respondents ticked 4-high). The involvement of the management team in defining and pursuing objectives is another determining factor for the

success of ERP implementation projects. According to the respondents, this was a success factor in the ERP implementation project of the R&D institute (48% of the respondents ticked 5-very high; 26% of the respondents ticked 4-high).

Another determining factor for the success of ERP implementation projects is the efficient training of the teams. And in the R&D institute that is the subject of the case study, the respondents give a high score for this factor (46% - 5 very high; 28% - 4 high). Therefore, the statutory hypothesis is confirmed. Therefore, from the analysis we can deduce the conclusion that in the perception of the respondents, the successful implementation of the ERP project in the R&D institute is largely due to the success factors revealed and the literature. In this case study, the highest weighted average score was given for the support provided by the implementation team in implementing the Microsoft Dynamics NAV ERP system in the R&D institute and for the involvement of the management team in defining and pursuing objectives (Table 4).

Table 4- Respondents' perception- the factors that determined the success of the ERP implementation in the R&D institute

Hypothesis	Respondents' perception					Weighted average score	Hypothesis -rank
	1- very low	2-low	3-medium	4-high	5-very high		
H1	3	2	8	16	25	4.07	2
H2	3	3	6	16	26	4.09	1
H3	3	1	9	17	24	4.07	2
H4	3	1	10	14	26	4.09	1
H5	3	5	6	15	25	4	3

Conclusions

The results obtained by analysing the users' perception in relation to the benefits and the performance obtained is in agreement with the results obtained for the determinants of the implementation success.

Although the implementation is in the improvement / consolidation phase, the users' perception indicates a good performance in the sense of increasing the productivity of the R&D staff in the institute. The users' perception correlates with the results of specialized studies. The cause of this correlation may be the fact that the users of the ERP system from the R&D institute are people with digital skills well above the national average, having scientific researcher titles and higher education degrees.

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