

# Critical Success Factors and Enterprise Resource Planning Implementation in Central Macedonian Agricultural Processing Companies

Asimina Kouriati<sup>1</sup>, Christina Moulogianni<sup>1</sup>, Thomas Bournaris<sup>1</sup> and Eleni Dimitriadou<sup>1</sup>

<sup>1</sup> Department of Agricultural Economics, Aristotle University of Thessaloniki, University Campus, 54124 Thessaloniki, Greece

## Abstract

Enterprise resource planning (ERP) system helps many companies to integrate all the business functions using a common database and shared information. The parameters that have an important impact on the success of that system (ERP) are known as Critical Success Factors (CSFs). Understanding Critical Success Factors (CSFs) and how they affect Enterprise Resource Planning (ERP) implementation leads to the provision of useful enterprise guidance. The investigation of the relationship between CSFs and ERP implementation in companies evinces deep interest in literature but it is believed that such an investigation has never taken place in Greek agricultural processing companies by now. Facts that are the reason for this paper to make an effort to investigate this research object by using Correlation Analysis.

## Keywords

Enterprise Resource Planning, Critical Success Factors, Agricultural Processing Companies, Central Macedonia

## 1. Introduction

The framework regarding the investigation of the relationships between critical factors and the successful implementation of ERP systems in companies [1 – 5], evinces deep interest. Studies concerning Greek agriculture are related to farm management and farm decision making [6 - 8]. ERP and critical success factors' investigation in the sector of agriculture has never been implemented in Greece, apart from some literature aspects which concern a general study of the Information Systems (IS) adoption and implementation in the agricultural processing and food sector [9, 10].

The above facts led present study's authors to make a corresponding analysis in Central Macedonian (Greek) agricultural processing companies. In order for the fulfillment of this literature gap, it was decided that this study should be based on paper of [11], who defined 37 ERP critical factors through a content analysis implementation. Therefore, in the case of this study, Critical Success Factors (CSFs) are taken into account individually, as features of the implementation and the system in order for their relationship with ERP success, to be studied. Based on this, a management version of this Information System (IS) is presented, aiming for its success in Central Macedonian (Greece) agricultural processing companies. So as for relevant data to be collected, a special questionnaire was used. After the data collection present study's authors used the Correlation Analysis method in order to identify the relationships between ERP implementation success and each one of the critical factors' importance [1, 2, 12].

---

Proceedings of HAICTA 2022, September 22–25, 2022, Athens, Greece

EMAIL: kouriata@agro.auth.gr (A. 1); kristin@agro.auth.gr (A. 2); tbournar@agro.auth.gr (A. 3); edimitri@agro.auth.gr (A. 4)

ORCID: 0000-0002-4306-8553 (A. 1); 0000-0002-1364-4214 (A. 2); 0000-0001-9540-7265 (A. 3); 0000-0002-7363-0703 (A. 4)



© 2022 Copyright for this paper by its authors.

Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

CEUR Workshop Proceedings (CEUR-WS.org)

## 2. Research Methodology

In order for the fulfillment of the present study's aim, a research was conducted on Central Macedonian (Greece) agricultural processing companies, with the use of an electronic questionnaire which is related to the critical factors and ERP success. The questionnaire was formatted on Likert scale [13, 14] questions in order to be pointed out the respondents' preferences for the importance degree of critical factors (1=Not Important to 5=Very Important) and ERP success degree (1=Not at all to 5=Very much). Once the questionnaire was ready, it was sent to Central Macedonian agricultural processing companies' corporate email addresses. This research, specifically, was directed to all companies' members who are involved in the implementation of ERP system [15], i.e. top managers, general managers as well as other employees. Present survey was lasted four months (October 2019-February 2020). After the data collection, Correlation Analysis was used in order for the relationships between implementation success and critical factors to be identified.

Correlation Analysis evaluates the degree of association of two variables and determines the direction of the relationship that exists between them [16]. Due to the fact that the importance of factors and the degree of the ERP system's success are expressed as hierarchical (ordinal) variables, the correlation coefficient of Spearman is used [16]. Spearman correlation coefficient results from two variables (X, Y), whose observations' ranking is achieved in ascending or descending order. Based on that, correlation coefficient is calculated through the equation [16]:

$$r=1 - \frac{6 \sum_{i=1}^m di^2}{m^3-m} \quad (1)$$

Where:

**di** express the difference between **rx<sub>i</sub>** - **ry<sub>i</sub>**, **rx<sub>i</sub>**: the degree of value **x<sub>i</sub>**, **ry<sub>i</sub>**: the degree of value **y<sub>i</sub>** and **m**: the number of sample's observations. The coefficient values are in the range of -1 and +1 and the higher their absolute value is, the stronger the correlation becomes [16]. Negative coefficient values indicate that when variable x increases, y decreases, and vice versa, while zero value indicates a lack of correlation. Through the above properties, the direction of the relationships between two or more variables (positive or negative) is specified. The following equation was used to identify whether the Spearman correlation coefficient ( $\rho$ ) is statistically equal to zero -or not- or, even, to statistically confirm the relationships between two variables [16]:

$$t = r \sqrt{\frac{m-2}{1-r^2}} \quad (2)$$

If the value t corresponds to probability less than the significance level ( $p < 0.05$  or  $p < 0.01$ ), then the null hypothesis ( $\rho = 0$  for correlation lack) is rejected [16].

## 3. Results and Discussion

A total of 227 members of Central Macedonian companies, which operate in the agricultural processing field (olive, milk, fruit, vegetables, meat, nuts, wheat, cereals, bee products, tea as well as coffee) [17, p. 6] participated in the present survey. The ERP systems used by the majority of the participated companies provide various capabilities such as financial monitoring, accounting, warehouse, sales and purchasing management [18-21]. After the collection, data were properly processed and entered the statistical package of SPSS in order for the implementation of Correlation Analysis [1, 2, 12]. Present study's research hypotheses arose from [11]'s theoretical framework regarding the identification of 37 ERP Critical Success Factors.

Taking into account the importance values of the factors [11], these research hypotheses can be set as:

***H<sub>1-37</sub>: Critical factor's importance is significantly related to the degree of ERP system's implementation success.***

The hypotheses are considered as alternatives, while the null hypothesis, which is defined for each case, is set as:

***H<sub>01</sub>: Critical factor's importance is not significantly related to the degree of ERP system's implementation success.***

From Correlation Analysis implementation, it emerged that 24 out of 37 critical factors are significantly related to the successful ERP implementation (Table 1).

**Table 1**  
Correlation analysis results (1)

Correlations		1. Top management support	2. Communication	3. Business plan	4. BPR	5. Change management	6. Organizational culture	
Spearman's rho	ERP Success Degree	Correlation Coef.	.241**	.181**	.148*	.207**	.222**	.189**
		Sig. (2-tailed)	0	0.006	0.026	0.002	0.001	0.004
		N	227	227	227	227	227	227
Correlations		7. Implementation strategy / Goals achievement timeframe	8. Well defined Budget	9. Communication plan	10. External pressure	11. Controlled ROI	12. Project management	
Spearman's rho	ERP Success Degree	Correlation Coef.	.210**	.262**	.143*	.255**	.187**	.179**
		Sig. (2-tailed)	0.001	0	0.031	0	0.005	0.007
		N	227	227	227	227	227	227

Correlations								
Spearman's rho	ERP Success Degree	Correlation Coef.	.223**	.176**	.210**	.153*	.158*	.173**
		Sig. (2-tailed)	0.001	0.008	0.001	0.021	0.017	0.009
		N	227	227	227	227	227	227
		13. Performance Monitoring, Evaluation & Feedback	14. Recognition of qualifications, reward & motivation	15. Users & stakeholders' involvement	16. Users' characteristics, skills & capabilities	17. Software testing, customization & troubleshooting	18. Accuracy, Data Integrity	

Correlations								
Spearman's rho	ERP Success Degree	Correlation Coef.	.250**	.142*	.184**	.311**	.144*	.156*
		Sig. (2-tailed)	0	0.033	0.005	0	0.03	0.018
		N	227	227	227	227	227	227
		19. ERP package selection	20. Post-implementation audit	21. System support/Maintenance & further training	22. Implemented modules	23. Use of consultants	24. ERP vendor selection	

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Correlation Coefficient values are not close to the unit (1), which is something that proves that there is no large degree correlation. Nevertheless, the values of line Sig. are less than 0.05, which leads to the acceptance of the research hypotheses, concerning the 24 factors of Table 1, and concludes that **the emphasis that is placed on these factors has an impact on the ERP implementation success**. Moreover, all factors that are mentioned in the Table 1 show a positive (due to the sign) correlation

with the successful implementation of the system. 13 out of 37 factors did not meet the specifications mentioned above, as it can be seen in the following results (Table 2).

**Table 2**  
Correlation analysis results (2)

		Correlations													
		25. Realistic expectations	26. National culture	27. Knowledge management	28. Company-Wide Support	29. Capable and balanced project team	30. Project champion and adequate role	31. Empowered decision-makers	32. Training	33. IT Infrastructure	34. System Quality	35. Minimum customization	36. Processes alignment	37. Service Quality	
Spearman's rho ERP Success Degree	Correlation Coefficient	0,1	0,1	0,08	0,056	0,07	0,07	0,07	0,08	0,1	0,1	0,1	0,1	0,1	
	Sig. (2-tailed)	0,1	0,08	0,1	0,4	0,2	0,2	0,2	0,1	0,06	0,09	0,08	0,08	0,052	
	N	227	227	227	227	227	227	227	227	227	227	227	227	227	

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

To be more precise, the values of Sig. line are above 0.05. This fact leads to the rejection of the hypotheses, which concern the 13 factors, and to the acceptance of null hypothesis (H01) respectively. Thus, it is concluded that the emphasis that is laid on these factors has no impact on the ERP implementation success.

### 3. Conclusions

The framework regarding the investigation of the relationships between critical factors and successful implementation of ERP systems in companies evinces deep interest. Therefore, in the present study, a corresponding analysis in agricultural processing industries which are located in Central Macedonia's prefecture, was selected to be implemented because it is believed that such an investigation has never taken place in Greece again. In order for this investigation to be carried out, 37 research hypotheses were created by taking into account the critical factors as individual features of the implementation and the system and they are tested through the use of Correlation Analysis.

Through the answers given by the Correlation Analysis method, it was determined whether the importance that is shown to critical factors is related to the degree of ERP success. Based on the above fact, useful guidelines are created in order for agricultural processing companies' managers to understand which CSFs can be taken into account so as for the successful implementation of ERP system to be feasible. To be precise, Correlation Analysis results (Tables 1 and 2) showed that the importance of 24 CSFs is positively related to the degree of ERP system's successful implementation. That indicates that these factors are considered as the most critical in ERP implementation of Central Macedonian agricultural processing companies. For that reason, a holistic focus could be suggested on the characteristics of these 24 factors because a partial one can limit their positive effect to ERP success [22].

Unfortunately, in the case of this study, there was an inevitable limitation. That one concerns the values of correlation coefficients, which are not close to the unit and, thus, a small degree correlation is indicated [16]. Furthermore, a corresponding research approach is proposed to be implemented in other Greek prefectures as well, in order for more answers regarding the Critical Factors and ERP systems' implementation in agricultural processing industries, to be received.

#### 4. References

- [1] Mengistie, A., Heaton, P., and Rainforth, M. (2013). Analysis of the Critical Success Factors for ERP Systems Implementation in U.S. Federal Offices. *Innovation and Future of Enterprise Information Systems*.
- [2] Shatat, A. (2015). Critical Success Factors in Enterprise Resource Planning (ERP) System Implementation: An Exploratory Study in Oman. *The Electronic Journal of Information Systems Evaluation*.
- [3] Farrokhanian, R., Soleimani, F., Gholipour-Kanani, Y. and Ziabari, S. (2014). A Structural Equation Model for Identifying Critical Success Factors of Implementing ERP in Iranian, Kalleh Food Product Company. *Proceedings of the 2014 International Conference on Industrial Engineering and Operations Management*. Bali, Indonesia, January 7 – 9, 2014.
- [4] Afaneh, S., AlHadid, I. and AlMalahmeh, H. (2015). Relationship between organization factors, technological factors and Enterprise Resource Planning system implementation. *International Journal of Managing Information Technology (IJMIT)*.
- [5] Bansal, V., and Agarwal, A. (2015). Enterprise resource planning: identifying relationships among critical success factors. *Business Process Management Journal*, 21, 1337-1352.
- [6] Bournaris T., Papathanasiou J., Moulogianni C., Manos B. A fuzzy multicriteria mathematical programming model for planning agricultural regions (2009) *New Medit*, 8 (4), pp. 22 – 27.
- [7] Chatzinikolaou P., Bournaris T., Kiomourtzi F., Moulogianni C., Manos B. Classification and ranking rural areas in Greece based on technical, economic and social indicators of the agricultural holdings. (2015) *International Journal of Business Innovation and Research*, 9 (4), pp. 455 - 469. DOI: 10.1504/IJBIR.2015.070178
- [8] Kouriati A., Dimitriadou E., Bournaris T. Farm accounting for farm decision making: A case study in Greece. (2021) *International Journal of Sustainable Agricultural Management and Informatics*, 7 (2), pp. 77 – 89. DOI: 10.1504/IJSAMI.2021.116065
- [9] Zioupou, S., Andreopoulou, Z., Manos, B., and Kiomourtzi, F. (2014). Business information systems (BIS) adoption in agri-food sector and the “transaction climate” determinant. *International Journal of Business Information Systems*.
- [10] Mitsos, B., Kontogeorgos, A. and Beligiannis, G. N. (2019). Information systems and software used by food businesses in Western Greece. *International Journal of Business Continuity and Risk Management*, 9, 153-170.
- [11] Kouriati, A., Bournaris, T., Manos, B. and Nastis, A. S. (2020). Critical Success Factors on the Implementation of ERP Systems: Building a Theoretical Framework. *International Journal of Advanced Computer Science and Applications (IJACSA)*, 11, 23-40.
- [12] Lakshmanan, S., Edmund, S. and Kinslin, D. (2018). An Empirical Analysis on Critical Success Factors for Enterprise Resource Planning (ERP) Implementation in Automobile Auxiliary Industries. *International Journal of Engineering & Technology*.
- [13] Sangster, A., Leech, S., and Grabski, S. (2009). ERP Implementations and their impact upon management accountants. *Journal of Information Systems and Technology Management*.
- [14] Reitsma, E. and Hilletoft, P. (2018). Critical success factors for ERP system implementation: a user perspective. *European Business Review*, 285-310.
- [15] Duangekanong, S. (2014). Factors Influencing the Success of an ERP System: A Study in the Context of an Agricultural Enterprise in Thailand. *Silpakorn U Science & Tech J*.
- [16] Iliopoulou, P. (2015) (in Greek). Correlation analysis - Regression. Spatial self-correlation - Spatial Regression [Book Chapter]. In Iliopoulou, P. (2015). *Geographical Analysis*. Athens: Association of Greek Academic Libraries, Athens.

- [17] Kouriati, A.; Moulogianni, C.; Kountios, G.; Bournaris, T.; Dimitriadou, E.; Papadavid, G. Evaluation of Critical Success Factors for Enterprise Resource Planning Implementation Using Quantitative Methods in Agricultural Processing Companies. *Sustainability* 2022, 14, 6606. <https://doi.org/10.3390/su14116606>
- [18] Atlantis ERP (2016). Organization of System Operation. [http://eservices.unisoft.gr/downloads/manuals/atlantis/pdf/atl\\_3v4.pdf](http://eservices.unisoft.gr/downloads/manuals/atlantis/pdf/atl_3v4.pdf). Date Accessed: 30/03/2020.
- [19] Singular Logic (2020). Singular Logic: Enterprise Applications. <https://portal.singularlogic.eu/>. Date Accessed: 29/03/2020.
- [20] Softone (2020). <http://www.seve.gr/wp-content/uploads/2017/11/Soft1-ERP-GR>. Date Accessed: 30/03/2020.
- [21] Unisoft (2020). Unisoft a softone company. [https://www.unisoft.gr/?gclid=Cj0KCQjwsYb0BRCOARIsAHbLPhFIWd74AyOdQcZbwAcwNsVTMPRsZXE05\\_1QWL1NbCkiAFEnP-SmKkUaAqW6EALw\\_wcB](https://www.unisoft.gr/?gclid=Cj0KCQjwsYb0BRCOARIsAHbLPhFIWd74AyOdQcZbwAcwNsVTMPRsZXE05_1QWL1NbCkiAFEnP-SmKkUaAqW6EALw_wcB). Date Accessed: 30/03/2020.
- [22] Chatzoglou, P., Chatzoudes, D., Fragidis, L., and Symeonidis, S. (2016). Critical success factors for ERP implementation in SMEs. *Proceedings of the Federated Conference on Computer Science and Information Systems*, 1243–1252.