

## **Introducing an Open-Source Software for the Enterprise Resource Planning in the Business Management Degree**

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*An Enterprise Resource Planning (ERP) is a program that integrates all the departments and functions of the entire organization in a single IT system [1]. Nowadays, it is possible to differentiate between two types of ERP systems: proprietary systems and open-source systems.*

*In order to profit from the advantages of open-source systems and overcome the drawbacks of free software, lecturers of the subject Introduction to Firms Information Systems at Universitat Jaume introduced Odoo software in the practical sessions of the course.*

*Using active methodologies, lecturers involve students in the design and implementation of an Odoo ERP for the management of a real business. In order to know the previous background, engagement, motivation, and overall satisfaction with this educational innovation, we carried out an online survey of students.*

*The results of this survey will be presented and suggest future avenues for carrying out actions that contribute to the knowledge of the management of these ERP management systems. In addition, the main implications for business management education will be presented.*

*Keywords: ERP, open-source software, higher education, information systems, active learning, students' assessment*

## INTRODUCTION

IT systems have been demonstrated as a key factor in managing organizations. This study focuses on Enterprise Resource Planning (ERP), a tool that integrates all the departments and functions of the entire organization in a single IT system. It is a coherent method for the effective planning and control of all the resources necessary for the preparation, sending, and accounting of the orders of its clients. It has been studied as essential for implementing new organizational business models, improving the supply chain, and even enabling more sustainable business strategies linked to the circular economy [2].

Having acknowledged the importance of introducing Enterprise Resource Planning (ERP) for higher education through active learning methodologies, an innovation was introduced in the subject Introduction to Firms Information Systems. This subject is taught in the degrees related to economics and business at the Universitat Jaume I, based on the practical teaching of using an open-source ERP, Odoo. This work conducts an empirical study based on the quantitative analysis supported by the student's anonymous assessment through an online survey.

The results obtained would help both lecturers and academics to improve the learning process of an ERP in higher education by providing useful information on the student's background, motivation, general satisfaction, and main interests in learning the practical contents of a specific subject, linked to Information Management Systems. Specifically, this study has the following structure. Firstly, the concept of ERP is introduced, highlighting the main benefits of open-source ERP for organizations. Secondly, we explained the methodology used and the most important traits of the study. Thirdly, the results obtained are presented and analyzed. Finally, the conclusions of this study are discussed, standing out the most relevant contributions.

## ENTERPRISE RESOURCE PLANNING AND ADVANTAGES OF OPEN-SOURCE ERP FOR BUSINESS MANAGEMENT

ERP is considered a software strategic tool that facilitates the integration of a firm's processes, allowing the sharing of information among departments by using a single database [1]. Properly implemented ERP brings several advantages to businesses, including reduced inventory levels, improved data analysis and decision-making processes, improved customer service quality, and increased margins [3].

Traditionally, ERPs were information systems to support large companies [4,5]. However, ERP manufacturers are currently looking to expand their solutions also to small and medium enterprises (SMEs). As mentioned previously, two types of ERP are on the market: proprietary ERP or license payment ERP, and open-source ERP. According to the literature (e.g.,[6]), open-source ERP is changing how organizations acquire and use these business software applications. Among the main advantages of open-source ERP are the following [7,6]:

- Its download and trial without costs.
- It uses standards, so this kind of open ERP tends to communicate well with other applications.
- It allows sharing, modifying, and studying the source code.
- It promotes collaboration between users, which means a quick and diverse development of the solution and better detection of security holes.

However, despite the above, there are also some disadvantages associated with open-source ERP that should be taken into account by part of the firms' management [8]:

- This type of solution does not have a company behind it that provides full-service support, so it is advisable for the company interested in its implementations to have some technical knowledge.
- If there is no supportive community of users behind the development of the program, it can disappear.
- Its usability and attractiveness are not as good as that of proprietary ERP.

There are many open-source ERP packages in the market today; however, it seems that the Odoo solution is one of the most widely implemented and best received by companies [9]. The benefits of this open-

source ERP incorporated into the theoretical part of the subject Introduction to Business Information Systems will be discussed in the following sections.

## **ERP IN HIGHER EDUCATION**

### **Introduction to the Subject**

Introduction to Business Information Systems is a subject taught in the first year of the Degrees in Business Administration, Finance and Accounting, and Economics, and also, in the first year of the Double Degree in Business Administration and Law, at Universitat Jaume I.

It is an introductory and compulsory subject whose main objective is to provide the students with the basic principles and concepts related to information and communication technologies, specifically, information systems. Therefore, this subject intends to increase students' knowledge of the use and application of information systems, especially ERPs, in strategic decision-making, relationships with the main interest groups, and operational efficiency. Moreover, the subject tries to raise awareness of the importance of training in information systems for professional success and to give a practical and professional vision of the study of information systems, educating with a focus on sustainability and action for transformation.

So that students can absorb the theoretical knowledge and fundamentals about information systems, as well as be able to use them, the subject is divided into three main blocks, where the practical part has an important weight:

- Theoretical sessions. The theoretical sessions are divided into two parts: (1) master classes, from the beginning of the course to half course, where the main concepts, knowledge, and ideas related to information systems are taught, combined with readings, study cases, and problems that students need to think about and debate; and (2) problem sessions, from half course until the end, where students will design, create and manage a database form an ERP system and its applications for the management of organizational information systems. This second part of the theoretical block is where the Odoo software is introduced and used by the students.
- Laboratory sessions. In those sessions, students should solve problems and business cases through the Microsoft Excel program.
- Tutorial sessions. These sessions are intended to reinforce the learning taught in the second part of the theoretical sessions regarding the creation and management of a database.

### **Teaching Odoo Software**

The three types of sessions presented in the previous section provide the students with a basis to know and use information systems. As mentioned, Odoo software is presented and taught in the problem classes of the theoretical sessions.

- Odoo is an open-source integrated ERP system produced by the Belgian company Odoo S.A.
- It covers the needs of different areas of the firm, and everything in the tool works in an integrated way.
- It has multiple applications and those developed by third parties, providing it with several possibilities.

The Odoo software has several advantages, as, for example [10]: its orientation towards objectives, its ease of use, the inclusion of more than 1,000 modules developed by Odoo partners, and availability for installation to suit a wide variety of functionalities, the additional incorporation of the main extensions of the ERP, the existence of an extensive international network of technology partners and collaborators in the continuous development of new modules, the adoption of this tool in organizations of relevance in the market or its translation into 30 languages, among others.

To introduce and teach Odoo to the students, lecturers of the subject Introduction to Firms Information Systems use active methodologies, especially those based on Role Playing and study cases, to involve students in the simulation of the design, creation, and management of a database implemented through the

Odoo ERP system, to manage the specific requirements of a real business. Students should work in groups of 4-6 people, assuming the role of junior consultants or different roles in an organization. They should develop and implement a database through Odoo to manage all the information and processes that the organization's object of the project will require. Moreover, they should present and defend the prototype in the last session of the practical sessions and deliver a report justifying its design, the steps made and their aim, and difficulties encountered, among other aspects.

To know the previous background, engagement, motivation, and overall satisfaction with the methodology and the use of Odoo, we conduct an online survey of students. The methodological aspects and the results are presented in the following sections.

### Methodological Aspects

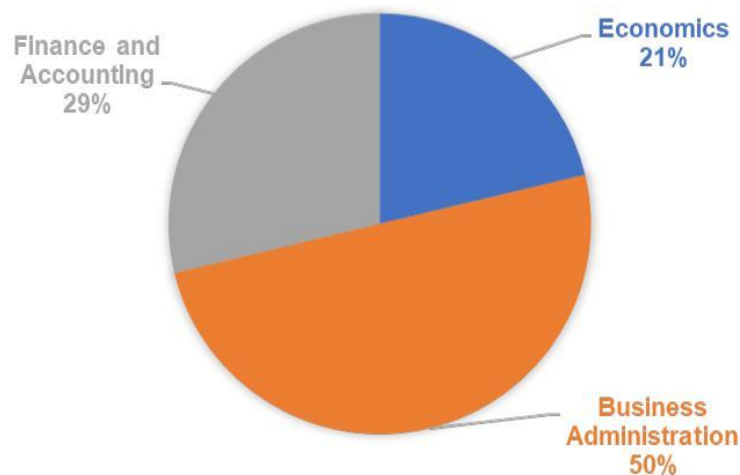
We conducted an online questionnaire to examine students' perceptions regarding their attitudes and difficulties found towards information management learning and the ability of the lecturers to provide knowledge and help.

Specifically, this study addressed the following research questions through a non-standardized questionnaire: 1. General descriptive characteristics of the sample and of the students' mood in using information systems. 2. Issues that the literature considers crucial in determining the level of acceptance and use of information systems by users: (a) expectations of students' effort and training made to learn how to use the software (e.g., [11]), and (b) evaluation of the usefulness and satisfaction with the course [12]. 3. An open question to find out which modules or aspects of the Odoo software they would like to explore in the future.

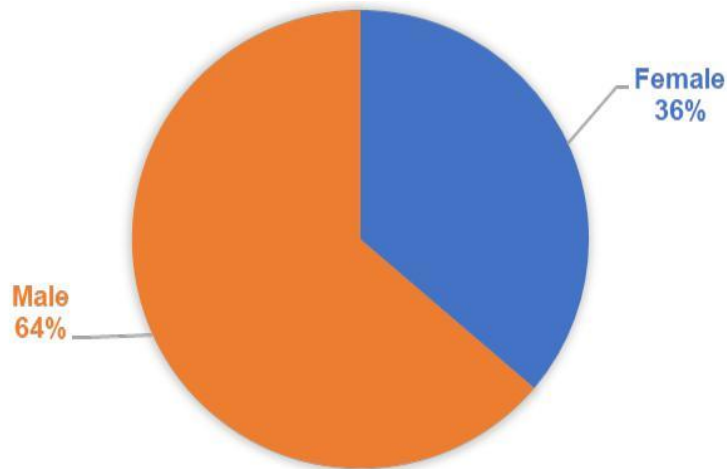
For the questions listed in the previous point 2 to assess student opinion, 7-point Likert-type scales have been used, where 1= strongly disagree and 7= strongly agree. The population for the study was selected non-probabilistic and consisted of 80 students enrolled in one of the three university degrees in which the subject is taught. Data was collected online., and the questionnaire was available for the students via a Moodle platform link.

Figures 1-3 show the descriptive statistics of the interviewed students in terms of the degree they belong to (Figure 1), their genre (Figure 2), and their previous background using information systems (Figure 3).

**FIGURE 1  
STUDENTS' DEGREE**



**FIGURE 2**  
**STUDENTS' GENRE**



**FIGURE 3**  
**STUDENT'S PREVIOUS EXPERIENCE USING INFORMATION SYSTEMS**



As 'Introduction to information management systems' is a subject in the first course of these three degrees related to business and management, it seems reasonable that students indicate no previous experience using information technology (Figure 3).

## **RESULTS**

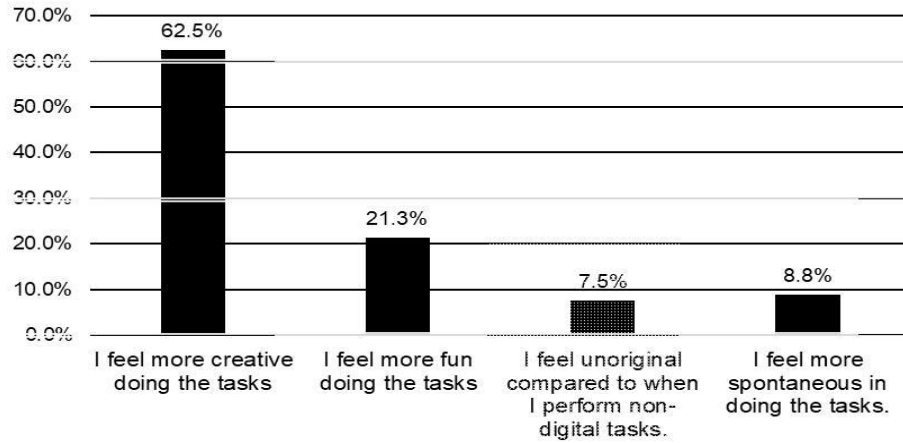
This section presents the results of the empirical study carried out, and it is divided into four main subsections according to the research questions outlined above.

### **Students' Perception of Information Management Systems Usage**

The first subsection illustrates the survey results on students' moods using information technology in doing their tasks over traditional non-digital activities. According to the survey results, 62.5% and 21.3%

of the respondents answered that they feel more creative and fun doing the tasks using information systems (see Figure 4). In addition, 8,8% of the respondents indicate they feel more spontaneous doing the tasks. In contrast, only 7,5% of the students show they feel unoriginal compared to they perform their tasks using non-digital methods (Figure 4).

**FIGURE 4**  
**STUDENTS' MOOD IN USING INFORMATION SYSTEMS**

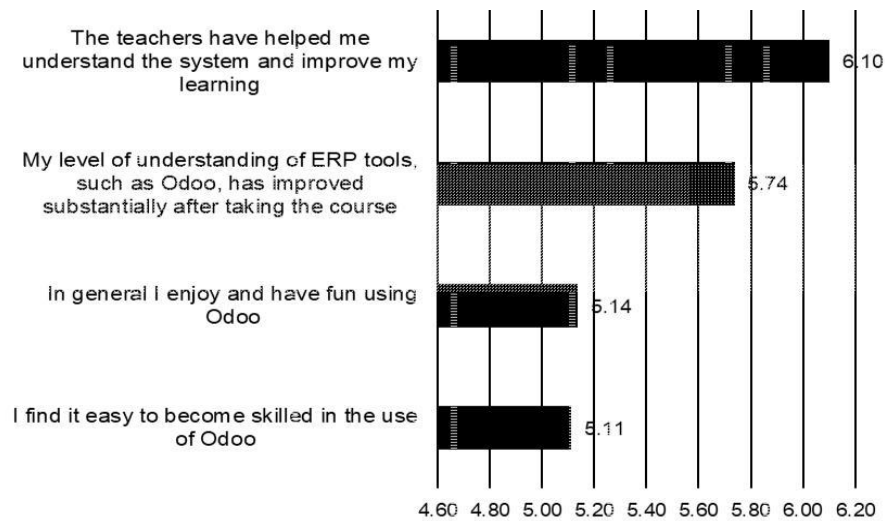


**Students' Effort Expectation and Training**

In this part, we intended to inquire if students: a) found it easier to follow and understand the subject; b) enjoy and have fun using Odoo; and c) the importance of teachers' support and performance.

According to the results of the survey, the students, on average, consider it easy to become skilled in the use of Odoo (value 5.11 on a Likert scale with 7 points of semantic differential) and that their level of understanding of ERP tools has increased after the subject (value 5.74) (Figure 5). In this vein, the students appreciate the lecturers' effort in teaching information technology (6.10) and enjoy classes using Odoo (5.14).

**FIGURE 5**  
**EFFORT EXPECTATION AND TRAINING**

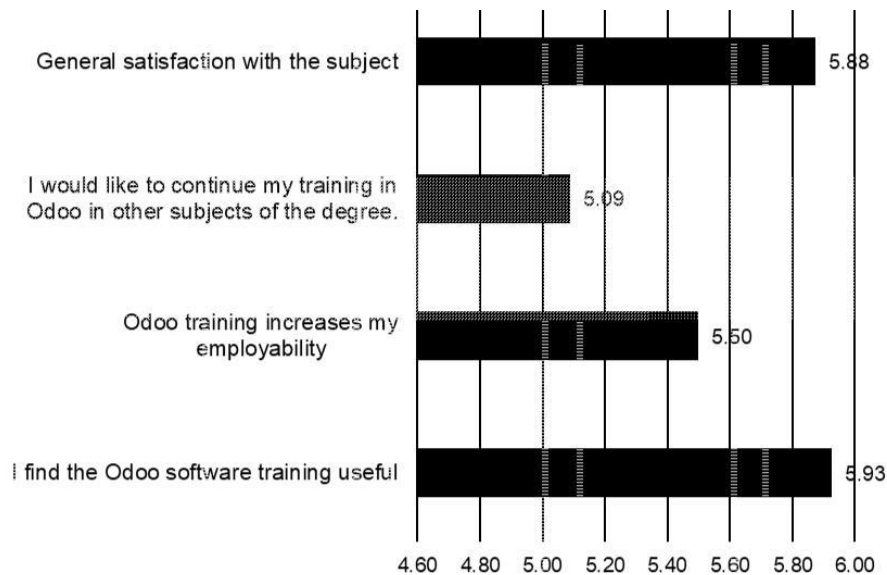


### Students' Usefulness and General Satisfaction

The third block of our study reports the student's general perception of the usefulness of Odoo software training and for increasing their professional opportunities in the labor market. This part also contains information about students' desire to continue their training in Odoo and their general satisfaction with the subject.

As reported in Figure 6, the students, on average, find the Odoo software useful, in general (value 5.93 on a Likert scale with 7 points of semantic differential) and for increasing their employability level (value 5.5). Students also point out that they prefer continuing their training using Odoo (value 5.1), showing a good general level of satisfaction with the subject (value 5.88).

**FIGURE 6**  
**USEFULNESS AND GENERAL SATISFACTION**

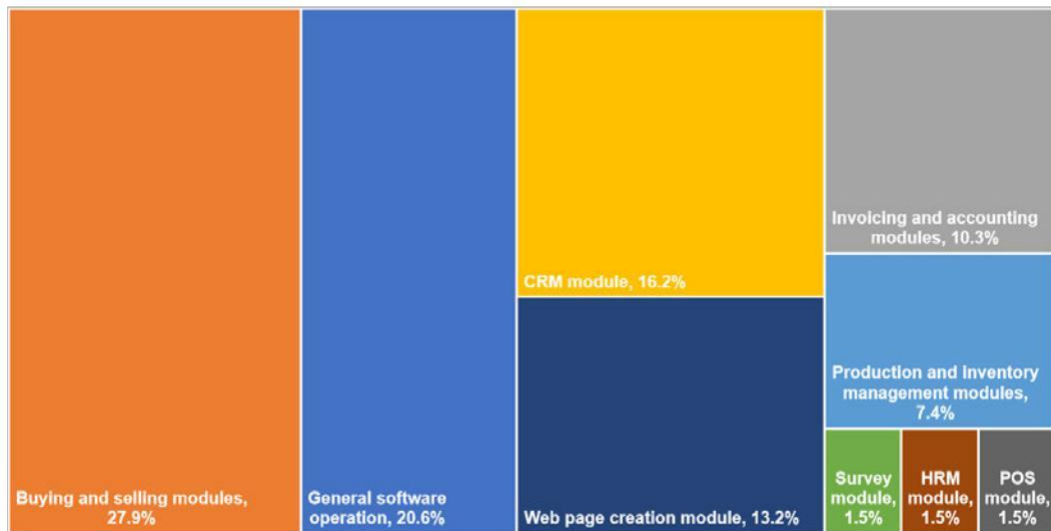


### ERP's Modules and Applications to Guide Future Learning

Finally, the survey includes an open question for students to point out contents about the ERP usage to learn or deepen in the future.

As pointed out in Figure 7, 27.9% of students are focused on transactional modules related to purchases and sales, 20.6% point out their interest in general software operations, 16.2% in Customer Relationship Management modules, 13.2% in e-commerce and website modules, whereas 10.3% and 7.4%, respectively, want to deepen their expertise in accounting and inventory management applications. Surveys, Human Resource Management, and POS were also pointed out by 1.5% of students as future learning points.

**FIGURE 7**  
**ERP'S MODULES AND APPLICATIONS OF THE ERP THAT STUDENTS WOULD LIKE TO EXPLORE MORE IN-DEPTH IN THE FUTURE**



## CONCLUSIONS

Information management systems have an important impact on a firm's competitiveness and sustainability, enabling them to control costs, increase efficiency and productivity, and enhance the adoption of strategies [2]. Therefore, universities must translate the importance of using these information systems to generate knowledge and business intelligence.

ERPs are information systems that facilitate the integration of information and knowledge management within an organization. Their importance for the strategic management of companies has led to the rise of numerous solutions on the market. Among all these possibilities, the so-called open-source ERPs stand out for their versatility, lower costs, and capacity to adapt to the organization's knowledge needs.

The high demand for profiles that combine a solid knowledge base in business management with technical skills in the management of ERP software is increasing worldwide [13]. Therefore, it is imperative that educational institutions introduce the use and learning of this type of software tools in their degrees linked to business management to promote graduates who meet the above demand in an increasingly digital society.

This work gathers the students' impressions of incorporating an open-source ERP (Odoo) in the subject of Introduction to Firms Information Systems at the Universitat Jaume I. To know the opinion and satisfaction of the students with the use of an ERP in the subject, a survey was distributed to a sample of 80 students. The results illustrate that using these information systems is useful for students and awakens feelings of greater creativity in them. This result confirms that young students currently attending university education have long been accustomed to interacting through different digital devices and applications [13].

Moreover, the empirical results show good results on how students perceive that the incorporation and use of this software in university degrees increases their level of employability. Finally, the high levels of satisfaction both with the subject and with the support and assistance provided by the lecturers are also noteworthy. Satisfaction was also found to be the crucial determinant success factor when assessing the impacts of using ERP on education [12].

This research highlights the importance of certain active methodologies that stimulate students' learning through the assumption of roles or the development of business cases similar to those they will be able to carry out as future graduates. A second contribution is related to the high satisfaction indicated by the students regarding the usefulness of using real software for the management of business information



systems. Thus, the practical implications of our study are that universities and business schools should continue to promote subjects that combine theoretical knowledge in business management with solid training in technical skills in the use of software. This practical training should be applicable to both operational levels of the company (e.g., CRM) and at a more strategic level (e.g., BI). With regard to the limitations of this study, the small sample size and the fact that the study only collected the opinions of one academic year should be highlighted.

Even though the present research provides valuable insights into the understanding of education management information system success from a student's perspective, there are some future research avenues to explore.

## ACKNOWLEDGEMENTS

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