

A comparative analysis of the ERP tools, Odoo and Openbravo, for business management.

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Received: July 27, 2020.

Approved: November 11, 2020.

Abstract— The comparative analysis of the two (2) enterprise resource planning (ERP) systems, Odoo and Openbravo, was a research work that began with the characterization of the ERP tools, the description of the general characteristics, the functionalities (hardware and software) and the advantages and disadvantages of each ERP system. The criteria for each aspect evaluated were selected under the ERP System Selection Methodology (MSSE) [1], establishing the weights or ratings for each of the functional, technical, vendor, service and economic aspects of each ERP under study, allowing an individual evaluation and comparison of the two (2) systems with the ultimate goal of selecting the highest scoring tool and defining the degree of coupling with the company in the mining sector in Norte de Santander, Cúcuta Colombia. Finally, the conclusions of the research were presented to the research community, as well as to the bibliographic references studied.

Keywords: Business planning, ERP systems, selection methodologies.

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La revisión por pares es responsabilidad de la Universidad de Santander.

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Forma de citar: C. Y. Gómez-Llenez, N. R. Diaz-Leal y C. R. Angarita-Sanguino, "A comparative analysis of the ERP tools, Odoo and Openbravo, for business management", Aibi revista de investigación, administración e ingeniería, vol. 8, no. 3, pp. 145-153, 2020.

I. INTRODUCTION

The growth of markets eliminates borders and trade barriers between companies, for this reason companies need to expand their portfolio of services and products, or become specialized in any of them. For this reason, companies require the support of technology to manage more efficiently their processes, control inputs, inventories and production lines. The Enterprise Resource Planning Systems (ERP) help to identify the current and future situation of businesses, allowing through modular structures the unification of the areas involved in the processes, characterized by having a centralized and standardized database allowing for interaction with other applications.

As affirmed [2], the improvement of technological infrastructure is important for cost reduction and innovation in the production process for the delivery of a high quality and environmentally friendly product, being these the steps to stay in the market and continue in the competition.

It is necessary that organizations not only base themselves on the acquisition of computer equipment, but also identify and evaluate their processes and the way they are executed; in this way, investment is made in training and new forms of management that are collateral to the process of acquiring new technologies at the business level [3].

In the Santanderes, there is evidence of a low level of use and appropriation of TICs, for this reason [4] it refers to the implementation of information systems for management decision-making (ERP) as a way of measuring the level of access to information by companies in the Colombian productive sector.

In the revision of [3] it was identified within each process of the value chain, the technologies that can be found in the companies, managing to focus on the importance of the same in the innovative processes of the organization, and in this description the ERP as tools of administration of resources of the secondary chain are evidenced.

[5] establish the need that the region of Norte de Santander has specifically the small and medium enterprises (SMEs) in the access to the ERP, for these organizations is very reduced the access to these management and decision support systems because of their expensive implementation; since it requires of investment in technological specialized infrastructure and licenses for the operation. The above is the motivating factor of this research, which allowed the analysis of two of the most complete open source ERPs and verifying their functionalities, to finally deliver conclusions that provide support to companies in the mining sector and seeking to reduce costs, since organizations would only focus on having the technology and stop worrying about licenses.

HENCE, ERP systems reached their peak of maturity in the 1990s when SAP [6] came to market as a resource with an integrative approach based on the functions of a business. An ERP integrates and automates business processes associated with the operational and productive aspects of a company, and is considered a very important asset for decision-making [7].

ERP systems help micro-, small- and medium-sized enterprises (MSMEs) in the mining sector to broaden their reach to very remote locations, offer new products and services, reform jobs and workflows and perhaps profoundly change the way they conduct their businesses, allowing through modular structures to unify the areas involved in the mission processes and through a centralized database optimize business information for decision making.

Commercial guidelines require companies to be increasingly competitive, for this reason; companies need to have optimized, defined, established and integrated each of their internal processes and external business relationships, in order to achieve improvements in manufacturing, quality, customer service and cost reduction. Situation

that leads to a comparative analysis of two applications for ERP type business management such as Odoo and Openbravo of the open source community, which are selected for their ease of access and for having open source modules that allow testing and changes. This analysis of business resources specifically aims to support MSMEs in the mining sector in their mission processes, bearing in mind that these organizations do not have sufficient financial resources to acquire a commercial tool, and at a technological level the carbon sector is not in the best conditions; as explained in the section "SME crisis and challenge towards innovation" of the study made by [8], where it is established that the TIC management of the Coal SMEs in Norte de Santander tends to the lack of information systems that support the decision making, the implementation of redundant systems among the different entities and even within the same entity, generating loss of opportunities in the coal sector because of not having timely information, slow growth of IT versus changing needs of the sector and lack of governance policies, low level of information security.

Based on this background, the objective of this research was focused on making a comparative analysis of Odoo and Openbravo that allows the MSMEs of the coal mining sector IN Norte de Santander in Cúcuta Colombia to adopt the best solution that improves productivity and generates profitability, competitiveness and sustainability.

In [9] it became evident that the business segment of the mining and energy sector in Norte de Santander is insufficiently managed in areas focused on the development of IT systems; areas that are linked by contracts and external consulting services. The use of IT tools is limited and they operate in isolation and there are no integrated information systems to help the organisation improve its processes and manage its resources. In Norte de Santander the mining sector has a problem of low allocation of resources for the application and maintenance of ICT architecture, because 17% of companies have defined technology policies and strategic IT plans which lead them to prioritise their needs in terms of changes in the company to adapt to the technological environment.

They also [9] highlight that the entities that best represent the actors in the coal chain in Norte de Santander are ASOCARBÓN and APROCANOR.

The aforementioned entities have the potential to "lead the supply chain, align their objectives with a high technological component and increase R&D within companies so that SMEs can obtain greater added value in the commercialization of their products and generate an impact on the development of the Norte de Santander region", stated [xxxxx] in their study, involving academia through the University-Business Committee (CUEE).

II. METHODOLOGY

The research was conducted through the descriptive level; since it initially described the supply chain of the coal sector in Norte de Santander and the systems that enable the missionary processes. The general characteristics of the Odoo and Openbravo systems, according to [10] the descriptive research proposes to characterize the components of a reality. For the analysis and comparison of the two tools the user manuals, installation and configuration of each ERP system are taken and downloaded directly from the official website of each developer house. In the ERP tool selection stage, the MSSE methodology was used to evaluate the following aspects functional, technical, service provider and economic factors to compare Odoo and Openbravo systems and select the one that best meets the requirements. Following the theory given in [11]; documentary research employs logical and mental procedures that allow for analysis, synthesis, deduction and induction. Finally, taking into account the degree of abstraction of the research, was defined as an applied type.

III. THE SUPPLY CHAIN OF THE COAL SECTOR IN NORTE DE SANTANDER AND THE SYSTEMS THAT ENABLE THE BUSINESS PROCESSES

The Coal Sector mission processes of Norte de Santander are those related to the main development of the business activities of each MSMEs in the sector. One way to understand the mission processes of this sector is "through the understanding of logistics systems or supply chain (SCM) bearing in mind that these are usually divided into inbound and outbound logistics systems, and internal and external logistics, within which there are significant associated elements such as information and communication technologies (ICT), tools, models and quantitative and qualitative methodologies"[12].

According to the premise of [13]. In Norte de Santander, the reality of coal logistics is alarming, since the companies in the coal sector have a deficient infrastructure, which does not allow them to expand and gain profitable access to the connection routes between production centres, stockpiles and shipping ports. Taking into account the above, the author concludes that; it is necessary to apply business logistics management and supply chain systems that allow the implementation of efficient planning and operation models in this sector and to manage to conserve profits with the reduction of prices, or to increase profits in case prices stabilize, showing that the responsibility that not only falls on the State but also on the private sector that represents the great majority of agents and actors in the coal supply chain.

To respond to these challenges in the business environment, supply chains can carry out strategies suggested by [14]; these include outsourcing low-risk operations, choosing a small number of suppliers to work with, concentration of ownership to create large companies and obtain economies of scale, mass customization of products, control and ownership in retailers and marketers to have direct contact with customers, environmental management and risk management.

In the analysis made to eight (8) coal companies in Norte de Santander by [15], which is based on a descriptive study of the different aspects of competitiveness of the coal sector in Norte de Santander and characterization of the same supported by personal interviews; shows that, in issues of innovation, companies have mostly a medium level of innovation, and others with a low degree, because there is not enough investment for this topic, preventing the modernization of processes, and therefore, the efficiency and effectiveness of these. In this respect, there is a willingness in the companies to apply strategies for technology transfer and process innovation.

The Norte de Santander coalmining chain is implicitly related to the main activities that make up the Colombian coalmining chain. According to the approaches of the Unidad de Planeación Minero Energética, the stages of the coalmining chain in Colombia are outlined as follows: Exploration, exploitation, profit, transformation, transport and commercialization [13].

The existing distribution infrastructure in Norte de Santander's coal sector is not sufficient to achieve coal competitiveness and affects medium miners and traders to a large extent due to high freight rates and associated land transport, and because much of the ore passes through Venezuela's logistical corridors that entail political and economic risks. Knowing the problem [13] in his study, he concludes that "the application of business logistics and supply chain management systems is required in order to implement efficient planning and operation models in the coal sector in order to conserve profits by reducing prices, or increase profits if prices stabilize, which represents a responsibility that not only falls on the State but also on the private sector, which represents the great majority of agents and stakeholders in the coal supply chain".

IV. CHARACTERIZATION OF ODOO AND OPENBRAVO

Before starting the characterization of Odoo and Openbravo, it is necessary to take into account some considerations about enterprise resource planning (ERP) systems. Among the considerations, [16] it defines ERP as a tool to help integrate key business operations, improving coordination between entities, streamlining work and processes, and improving customer service and productivity.

[17], [18] and [19] respectively define enterprise resource planning (ERP) as business process management software that allows an organization to use an integrated application system to manage the business and automate many back office functions, as a system to integrate organizational processes, improve them and adapt its technology, as a system used in organizations, regardless of their size, even though in the past it was only implemented in large organizations, reaching today to find open source ERP systems.

ERPs are generally known as enterprise resource planning systems with benefits for corporations, as these tools are somewhat costly and complex to implement [20]. Licensed ERPs are unaffordable for small businesses because of their cost and risk, making open source ERP systems the solution for small organizations [21]. Also in [20], after making a comparative and evaluative analysis of several open source ERPs, the premise is established that each open source ERP is different from the others, which indicates that each one has its benefits and can be adapted to the needs of the organization.

[17] shows Odoo ERP as one of the most powerful open source platforms for business applications.

According to [19], "OpenERP is one of the prominent systems", its framework, the open source technology used in OpenERP makes it unique and efficient. Compared to other ERPs it meets expectations above the competitors. The Odoo/OpenERP 8.0 version has made ERPs have a CMS, an e-commerce system and added business intelligence to the new system, increasing the complexity of use for the final user.

Odoo is an integrated open source, license-free business management system that is capable of meeting the needs of large, medium and small business areas. Odoo uses the client-server paradigm. The client executes a JavaScript application in the browser, connected to the server using the JSON-RPC protocol over HTTP(S). Currently clients can connect to the server using XML-RPC or JSON-RPC [22].

Openbravo is a software solution developed in open source, geared towards enterprise resource planning and intended for MSMEs. The use of open source in its creation implies its free distribution and development, i.e. a constant improvement of the source code eliminating errors and adapting the product according to the business needs of the company. Based on a client/web server architecture programmed in Java, its execution is done on Apache and Tomcat integrating support for databases such as PostgreSQL and Oracle [7].

As cited [20], "Openbravo is an ERP is a web-based open source tool that seeks to improve overall business performance, based on a single, integrated data model that covers all application areas of an enterprise management system, including business intelligence (BI) tools and point-of-sale (POS) terminals".

- Description of Odoo

This section emphasizes aspects of Odoo such as general characteristics, functionalities, technical characteristics and advantages.

General characteristics of Odoo

Odoo is open source, with many modules developed by the company itself and others created by its partners. The client interface in Odoo is on the web.

Odoo is multiplatform; it can be installed in several operating systems and has different ways of access [23].

Odoo facilitates the connection to other open source tools such as OpenOffice for reports, Jasper Reports (iReport) for the creation of reports with Java, Eclipse or Gedit for Python developments among others [24].

Localization in Odoo is done by downloading the specific package for the country in which you want to implement and there is also a multi-currency option in Odoo.

Odoo Functionalities

According to [24], Odoo is equipped with the default modules of the free version, such as the Purchasing Management, Warehouse Management, Production Management and Commercial Management modules. [25] also highlights other specific functionalities of each module.

Technical characteristics of Odoo

The technical characteristics of the Odoo ERP [24] hardware, software and architecture are specified below.

Odoo Hardware Features: Supports databases: PostgreSQL 8.1.4 or higher. Users of the ERP system access through a web interface. Odoo works with operating systems: Microsoft Windows XP, Vista or higher, Linux, Ubuntu, Debian, OpenSuse, Red Hat, Fedora, CentOS and Mac OS X.

Odoo Software Features: Windows family operating system equal to or later than Windows XP, any current Linux or MacOS X distribution.

Odoo architecture: client/server structure; the server manages the business logic and communicates with the database independently of the client that displays the information to users and allows them to communicate with the server [26].

Advantages of Odoo

Odoo being a free software, released under GPL license, has several advantages: zero cost of licenses, wide variety of extensive documentation on the network, flexibility in implementation, easy customization of the application and integration with own modules, wide possibility of future developments, fast and efficient correction of clean code bugs and frequent updates available free of charge [25].

- Description of Openbravo

Openbravo is an open source ERP enterprise management application for small and medium sized businesses [27]. The following are aspects of Openbravo such as its general features, functionalities, technical features and benefits.

General features of Openbravo

OpenBravo is Opensource, with a web user interface that follows a model-view-controller approach, supports any operating system including Windows, Linux and Mac, allows you to include everything you need to properly locate the tool to any country and has the option of implementing multiple currencies.

Openbravo also has the possibility of integrating the system with office automation tools, and other formats such as PDF and HTML can also be used for generating reports and exporting data.

Developers and the community have invested a great deal of time and effort into Openbravo's documentation of almost all processes and modules, providing a great deal of help in the event of errors or problems [28].

Openbravo Features

Quoted in [28] Openbravo has the following modules: a) Master Data Management, b) Procurement Management, c) Warehouse Management, d) Sales Management and CRM, e) Production Management, Financial Management and Accounting, f) Business Intelligence and Project Management.

According to [29] Project Management, is a functionality that is geared towards companies whose activities are based on the delivery of projects and services, Openbravo allows the management of budgets, phases, tasks, expenses and purchases related to each individual project.

Technical features of Openbravo

The technical characteristics of Openbravo ERP hardware, software and architecture are specified below.

Openbravo hardware features: supports databases, MySQL 5.0 / MySQL, Apache Derby, Oracle 10g version 2, PostgreSQL 8.1.4 and HSQLDB 1.8.0. Openbravo users access through a web interface and work with operating systems: Microsoft Windows 2000, XP, Vista, Linux, Ubuntu, Debian, OpenSuse, Red Hat, Fedora, CentOS, Mac OS X.

Openbravo software features: Apache Tomcat is required as the servlet container, but others can be used instead. Apache-Ant to automate a number of tasks such as building the system from the PostgreSQL (8.3) or Oracle SE (10g-11g) source code and database.

Openbravo architecture: it is an application with client/web server architecture written in Java [30].

Advantages of Openbravo

According to [27], Openbravo has many advantages over other ERP systems, such as: extensive functional coverage, easy to adapt, flexible implementation, and a subscription model that allows costs to be optimized and adapted according to use, avoiding an expensive upfront investment. Its interface is 100% web-based: no software has to be installed on the workstations [30].

V. COMPARISON OF THE ERPS STUDIED: ODOO AND OPENBRAVO

Considering that the comparison of the Odoo and Openbravo ERP systems leads to the selection of an ERP that meets the need of a MSME, the adoption of phase 1 of the ERP System Selection Methodology (MSSE) is specifically contemplated in the activity of compiling a list of criteria to be taken into account in the selection [1].

Aspects to be taken into account in the selection of an ERP

The aspects to evaluate according to the MSSE methodology are six (6), taking into account the MSMEs case study five (5) aspects are taken, Functional Aspects, Technical Aspects, Provider Aspects, Service Aspects and Economic Aspects.

Adopting the MSSE [1] methodology, the selection criteria for functional, technical, provider, service and economic aspects and their corresponding weightings by group of aspects are established.

The group of functional aspects has a weighting of thirty (W1=30) and the selected criteria are shown in Table 1.

Table 1: Selection criteria functional aspects.

SELECTION CRITERIA	WEIGHTING
Modules of the ERP system	16
User friendliness	14
Adaptability and flexibility	12
Interaction with other systems	8
Multilanguage option	5
Multicurrency option	3
Multi-storage option	12
Ease of carrying out own developments	9
User reporting tool	10
Location	11
Total	100%

Source: properly done for the research.

For the selection of technical aspects, the MSSE presents fifteen (15) criteria to evaluate, in this study ten (10) criteria are taken, as shown in Table 2. This group is given a weighting of twenty-five (W1=25).

Table 2: Selection criteria technical aspects.

SELECTION CRITERIA	WEIGHTING
Adaptability to the structure of the company	13
Database	13
User documentation	10
Technical documentation	10
Language and programming tools	7
Security	11
Back-up	12
Remote installation	4
Multiplatform	10
Hardware	10
Total	100%

Source: properly done for the research.

The group of supplier aspects has a weighting of ten (W1=10) and the selected criteria are shown in Table 3.

Table 3: Selection criteria supplier aspects

SELECTION CRITERIA	WEIGHTING
Características del proveedor	25
Otras implantaciones similares	10
Evolución del ERP	35
Confianza	30
Total	100%

Source: properly done for the research.

With respect to the characteristics of the service, the criteria listed in Table 4 are considered. The weighting for this group of aspects is ten (W1=10).

Table 4: Selection criteria service aspects

SELECTION CRITERIA	WEIGHTING
Scope of implementation	15

Implementation Methodology	10
User training	10
Product Warranty	10
License	22
Support	18
Updates	15
Total	100%

Source: properly done for the research.

The group of economic aspects has a weighting of twenty-five (w1=25), and the selection criteria for this group are shown in Table 5.

Table 5: Selection criteria technical aspects

SELECTION CRITERIA	WEIGHTING
ERP costs	28
Hardware costs	30
Implementation costs	25
Additional costs	17
Total	100%

Source: properly done for the research.

Analysis of Aspects of the Odoo and Openbravo ERP Systems

After establishing the criteria and assigning a weighting to them, we proceeded with the assignment of scores in order to analyze each selection criterion established, the MSSE methodology [1] proposes scores ranging from 1 to 4 where 1 = Bad, 2 = Regular, 3 = Good and 4 = Very Good, which allowed us to provide a table for the assessment of each ERP system in each of the criteria for selecting aspects. Then multiply the value given by the weighting of the criterion. Add the value obtained from all the criteria of the same group and multiply by the weighting of the group and divide by 100. This will obtain the weighting of the group in general. Repeat this operation for the 5 groups under evaluation and for all ERPs, as shown below.

Analysis of functional aspects of Odoo and Openbravo

Tables 6 and 7 are presented below with the assessment of each criterion corresponding to the analysis of functional aspects of the ERPs.

Table 6: Analysis of Odoo functional aspects

Criteria	WEIGHTING	Odoo Score (X1)	Y*X1
	(Y)		
Modules of the ERP system	16	4	64
User friendliness	14	4	56
Adaptability and flexibility	12	3	36
Integration with other systems	8	3	24
Multilanguage option	5	3	15
Multicurrency option	3	3	9
Multi-storage option	12	4	48
Ease of carrying out	9	2	18

own developments			
User reporting tool	10	3	30
Location	11	3	33
Functional aspects results	W1 = 30	Total= $(\sum(Y*X1)*W1)/100$	99,9

Source: properly done for the research.

Table 7: Analysis of Openbravo functional aspects

Criteria	WEIGHTING	Odoo Score (X1)	Y*X1
	(Y)		
Modules of the ERP system.	16	2	32
User friendliness.	14	2	28
Adaptability and flexibility.	12	3	36
Integration with other systems.	8	3	24
Multilanguage option	5	3	15
Multicurrency option	3	3	9
Multi-storage option	12	4	48
Ease of carrying out own developments.	9	2	18
User reporting tool	10	3	30
Location	11	3	33
Functional aspects results	W1 = 30	Total= $(\sum(Y*X1)*W1)/100$	81,9

Source: properly done for the research.

The findings of the analysis of the functional aspects showed that Odoo has a superior qualification with respect to OpenBravo given that it offers companies around two thousand (2000) modules that can be gradually implemented as they are required while OpenBravo has modules available at the time of installation, these being the storage, purchase and sales management module that does not allow the company to configure or make use of the modules it needs to implement.

Regarding the criteria of user-friendly; Odoo stands out due to its intuitive interface as it does not require a great deal of knowledge about the application, on the other hand, OpenBravo is a complex application to use and it is not easy to interpret what needs to be done, nor is it intuitive.

Analysis of technical aspects of Odoo and Openbravo

The following tables 8 and 9 show the assessment of each criterion corresponding to the analysis of technical aspects of the ERPs.

Table 8: Analysis of technical aspects Odoo

Criteria	WEIGHTING	Odoo Score (X1)	Y*X1
	(Y)		
Adaptability to the structure of the company.	13	3	39
Database	13	2	26
User documentation.	10	3	30
Technical documentation	10	3	30
Language and programming tools.	7	2	14
Security	11	3	33
Back-up	12	3	36
Remote installation	4	3	12
Multiplatform	10	4	40
Hardware	10	3	30
Technical Aspects Results	W2 = 25	Total = $(\sum(Y*X1)*W2)/100$	72,5

Source: properly done for the research.

Table 9: Openbravo Technical Analysis

Criteria	WEIGHTING	OpenBravo Score (X1)	Y*X1
	(Y)		
Adaptability to the structure of the company.	13	2	26
Database	13	4	52
User documentation.	10	3	30
Technical documentation	10	3	30
Language and programming tools.	7	2	14
Security	11	3	33
Back-up	12	3	36
Remote installation.	4	3	12
Multiplatform	10	4	40
Hardware	10	3	30
Technical Aspects Results	W2 = 25	Total = $(\sum(Y*X1)*W2)/100$	75,75

Source: properly done for the research.

The technical analysis results showed OpenBravo with a higher score than Odoo, due to the adaptability criteria in the company.

As far as the database criterion is concerned, OpenBravo in comparison with Odoo provides the option of choosing between different types of databases such as MySQL, Apache Derby version, Oracle 10g, PostgreSQL, thereby achieving an advantage when implementing an ERP in an organization.

Analysis of Odoo and Openbravo ERP supplier aspects

Below are tables 10 and 11 with the assessment of each criterion corresponding to the analysis of functional aspects of the ERPs.

Table 10: Analysis of supplier aspects in Odoo

Criteria	WEIGHTING	Odoo Score	Y*X1
	(Y)	(X1)	
Characteristics of the supplier.	25	3	75
Other similar implementations	10	1	10
Evolution of the ERP.	35	3	105
Reliability	30	3	90
Supplier Aspects Results	W3 = 10	Total=($\sum(Y * X1) * W3$)/100	28

Source: properly done for the research.

Table 11: Analysis of supplier aspects in OpenBravo

Criteria	WEIGHTING	Open Bravo Score	Y*X1
	(Y)	(X1)	
Characteristics of the vendor.	25	3	75
Other similar implementations.	10	1	10
Evolution of the ERP.	35	2	70
Reliability.	30	2	60
Supplier Aspects Results	W3=10	Total= $\sum(Y * X1) * W3$ /100	21,5

Source: properly done for the research.

The result of the analysis of the supplier's aspects showed Odoo with a higher rating with respect to OpenBravo with a score of 28 and it is concluded that it is due to the fact that regarding the evolution criterion of the Odoo ERP, it offers its customers improvements in the different modules, while OpenBravo in its free version only updates with respect to the free modules it offers, if other modules or options are required to be implemented it is necessary to resort to the commercial versions of the software.

With respect to the criteria of reliability of the supplier, Odoo generates more confidence to the companies that decide to implement this ERP since it has a network of partners that are at the disposal of clearing the doubts and inconveniences that are presented to the user, while OpenBravo does not assure the support to the clients that make use of the free version of the software, generating with this little confidence at the moment of implementing the ERP.

Analysis of Odoo and Openbravo ERP service aspects

The following tables 12 and 13 show the assessment of each criterion corresponding to the analysis of service aspects of the ERPs.

Table 12: Analysis of Odoo service aspects

Criteria	WEIGHTING	Odoo Score	Y*X1
	(Y)	(X1)	
Scope of implementation.	15	3	45
Methodology of implementation.	10	3	30
User training.	10	3	30
Product Warranty	10	3	30
License	22	3	66
Support	18	3	54
Updates	15	3	45
Service Aspects Results	W4 = 10	Total= $(\sum(Y * X1) * W4)$ /100	30

Source: properly done for the research.

Table 13: Analysis of OpenBravo service aspects

Criteria	WEIGHTING	OpenBravo Score	Y*X1
	(Y)	(X1)	
Scope of implementation.	15	2	30
Methodology of implementation.	10	3	30
User training.	10	3	30
Product Warranty	10	2	20
License	22	3	66
Support	18	2	36
Updates	15	3	45
Service Aspects Results	W4 = 10	Total= $(\sum(Y * X1) * W4)$ /100	25,7

Source: properly done for the research.

The result of the analysis of the service aspects is that Odoo offers a more practical installation. It offers the possibility of coupling the system in a simpler way to the business model under the implementation approach through modules, thereby ensuring that the process and the adaptation of the company to the new system is not tedious.

Odoo offers the guarantee of the product and the correct functioning, in addition to offering the possibility of training the users of the system in the whole process of implementation of the ERP. It is important to mention that this causes an investment, while OpenBravo in its free version does not provide this service and it is necessary to resort to consultations in different blogs and video tutorials.

Analysis of the economic aspects ERP Odoo and Openbravo

Below are tables 14 and 15 with the valuation of each criterion corresponding to the analysis of economic aspects of the ERPs.

In terms of user training, Odoo offers the user training service included in the ERP implementation, and OpenBravo in its free version does not offer the user training service.

In terms of support, Odoo has the advantage of offering support to the company through the network of Partners worldwide, while OpenBravo in its free version does not offer this service.

Table 14: Analysis of Odoo economic aspects

Criteria	WEIGHTING	Odoo Score	Y*X1
	(Y)	(X1)	
Cost of ERP.	28	3	84
Cost of hardware.	30	3	90
Cost of implementation.	25	3	75
Additional costs.	17	3	51
Economic Aspects Results	W5 = 25	Total=($\sum(Y*X1)$)*W5)/100	75

Source: properly done for the research.

Table 15: Analysis of OpenBravo economic aspects

Criteria	WEIGHTING	OpenBravo	Y*X1
	(Y)	Score (X1)	
Cost of ERP	28	3	84
Cost of hardware	30	3	90
Cost of implementation	25	3	75
Additional costs	17	3	51
Economic Aspects Results	W5 = 25	Total=($\sum(Y*X1)$)*W5)/100	75

Source: properly done for the research.

According to the results both Odoo and OpenBravo behave equally in terms of costs, since both ERP's are free and the costs generated are derived from the investment in the hardware, the cost of implementation, the support and licenses that can be generated in the case of using compatible tools for report generation.

Selected ERP

The final score obtained by Odoo is 306.9 and Openbravo's is 279.15; taking into account the ratings given in each aspect, which allows the decision to be made as to which of the two ERP's analyzed is the best solution to be implemented in the company. The Odoo ERP system achieved the highest score and stands out for the following aspects:

Odoo is an ERP system used by many users and companies worldwide to manage businesses of any size, this means it is a reliable and current application, being the most used in the market as far as open source ERP systems are concerned.

As for ease of use and manageability, it is a simple and intuitive application. In a short time, it is possible to manage and learn its functionalities without the need of resorting to the help of professionals or experts in the subject.

Odoo allows you to customize the application or create a new functionality since it has access to the source code and can be modified.

If for any reason the company needs maintenance services, customization, support, etc. This is not a problem for Odoo, as there are companies and professionals who provide these services.

VI. CONCLUSIONS

The analysis of defined evaluation parameters showed as a result that Odoo is the optimal option for implementation thanks to its several beneficial characteristics such as, functionality with a score of 99.9, supplier aspects with a total of 28, service aspects with a total of 31.5, technical aspects with a total of 72.5 and economic aspects with a total of 75.

The Odoo application by default is ideal for companies that use standard raw materials for the products they generate, such as bakeries, automobile assembly companies, motorcycles, cell phones, computer equipment, among others; On the other hand, it is not completely compatible with the proposed business model for companies operating in the coal mining sector, since Odoo does not allow a production order for a specific product to vary in the consumption of the raw material needed to generate that product.

Having an integrated database is an important benefit for today's companies, as an integrated database provides flexibility in the information needed for the day to day operations in each of the processes carried out within the organization. In addition to this the information is grouped and stored in a single place, for greater control and security of the company's data.

Odoo works with the integration of each of the departments that participate in each of the processes, this increases productivity by managing the company's procedures more easily and quickly, helps with the optimization of costs, day-to-day tasks are performed with greater speed and flexibility, operation times are reduced and the information handled in each area is clear and concise

VII. REFERENCIAS

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