

Business Intelligence Analytics Tools

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Abstract. Information is one of the most important assets for organizations. In the current scenario of a stagnant economy and fierce competition, it is imperative for organizations to be proactive, and for this to be possible, it is necessary to have timely access to the necessary information, so that it supports the decision-making process, thus allowing anticipate business strategies to react in a timely manner. It is in this context that Business Intelligence (BI) and its tools arise. Through BI it is possible to have access to an integrated set of solutions that allow data analysis in order to capture the information and knowledge necessary to leverage the business. BI allows organizations to use tools to analyze, plan, predict, solve problems, understand, innovate and learn in order to increase organizational knowledge, allowing effective actions that help to establish and achieve concrete business objectives in order to increase its efficiency and competitiveness. There is a wide variety of BI tools available on the market, which facilitate the use of the right data and visualization in ways that allow you to understand what it means. It is pertinent that organizations know how to select the appropriate tools for their needs. In this sense, a comparative analysis will be carried out between the different BI tools. The characteristics, specifications, and attributes of each one of them will be detailed to know key aspects of the tools that help the different organizations, regardless of the service they offer, to achieve their processes in an effective and efficient way. This comparison will allow companies to have a new perspective when using BI tools and generating business strategies.

Keywords: Business intelligence · BI tools · Analytics tools · Competitive advantage

Technological progress and the great growth of data have been brought to the organizations to seek the way to use this information to excel before others, improve the flow of your company, have more customers, prevent sales or consumption, find market levels, and adjust your business strategy.

The organizations must have the relevance that they hold the data that are generated daily, so they must count on a correct management of information. This must be efficient so that they can be competitive, on the basis of which it is necessary to adopt BI tools for the analysis of this information and thus facilitate the understanding of their businesses for companies [1].

BI is the process through which users obtain accurate and consistent data from the storage of organizational data (internal and external). The data obtained from different

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commercial contexts allow users to identify, analyze and detect trends, anomalies and make predictions.

In the competitive and dynamic environment where companies operate, it is necessary to use the data available in order to ensure the success of the organization. In general, organizations use BI systems to obtain useful information from the data obtained, in order to improve the decision-making process. An organization with BI solutions is capable of creating a high-quality data infrastructure, with greater usability and integration [2].

Within companies, decision-making is an action of great importance, since it marks their path and behavior in order to achieve the established objectives. For this reason, the use of BI plays a fundamental role, since it is possible to foresee the future, going from reactive to proactive, minimizing uncertainty, transforming information into knowledge and generating useful solutions to a given problem [3].

Business success is based on making decisions at the right time, however, it can be a bit complicated due to the large volumes of data that exist, so it is necessary to couple BI tools that allow you to include graphs and make reports with the needed information [4].

1 Business Intelligence

Business Intelligence is an abstract concept, in which techniques and tools that allow the organization and analysis of information that support decision-making are involved. The concept describes the capabilities of organizations to access data and explore information, analyze and develop perceptions and understandings about their businesses, which allows them to increase and make the necessary decision more guided by information [5, 6].

BI systems and tools play a key role in the strategic planning process of organizations. These systems allow the compilation, store, access and analysis of organizational data to support and facilitate decision making [6, 7].

BI can improve competitiveness, provide information necessary for the productive development of a company or organization, thus allowing better decision-making [8].

Another important point to refer to is about business modeling, this allows achieving certain objectives. Business modeling describes the relationships between the capture and representation of information within the enterprise. A model allows events to be specified, that is, to describe the behavior of each element or dependent on others based on conceptual criteria; measures and explains the influence of other elements; specify the results that analysts describe, in order to predict or modify. Therefore, it is intended to define what to measure and how it will be done, so it's possible analyze what happens, document, test and develop theories for the operation of the business [9].

BI allows organizations to reduce costs; the increase in income; improve the use of investment in ERP systems; and also improve internal communication [6]. The decrease in costs directly benefits an organization as it allows to eliminate delays in reports, allowing other activities to be carried out that conclude in a continuous improvement of the business, at the same time the decrease in costs based on BI allows to use opportunities that were previously wasted in the value chain, which produces new profits for the business [11].

BI facilitates the productivity of a company, since it allows the focus on information and its results, through the generation of reports or simply helps them make decisions.

Among the most popular benefits are best practices, decision-making support, process organization, since by including BI tools, a specific strategic, tactical and functional framework is provided for the analysis of business needs.

The benefits of BI are divided into cost savings; income increase; improve the use of the investment in ERP systems and finally improve internal communication [5,6]. The reduction of costs directly benefits an organization since it allows to eliminate delays in the reports, allowing other activities that conclude in a continuous improvement of the business, at the same time the reduction of costs based on BI allows to employ previously untapped opportunities in the value chain, producing new profits for the business [11].

Each of the benefits of adopting Business Intelligence is the total profit of the business, improve performance, improve analytical strategies, and satisfy the customer.

Despite having multiple benefits that Business Intelligence offers, it also has its drawbacks. Among them are making an investment where the economy must be considered and the training and time that the company has must also be taken into account [12].

2 Materials and Methods

This study uses a hybrid, descriptive and exploratory methodology, where the properties or characteristics of the Business Intelligence tools will be specified, subject to a comparative analysis [13].

The items used in this analysis are: tool name; developer; description; functions; features (license, GUI, plugins, compatible S.O, updates); advantages; and disadvantages.

Once the individual analysis of each tool has been carried out, a global assessment will be made in which what the tool enables will be considered: ETL Processes (ETL), OLAP Processes (OLAP), Report Generation (RG), Dashboard (DB), Support Technical (TS), Additional Components (AC), Tool Dependency (TD), Graphical Interface (GUI), Export Data (EXD), and whether or not it is licensed (LIC)) [14].

If a tool complies with the process or characteristic, it will receive a rating of 1, and if it does not comply, it will receive a rating of 0. In the end, all these values will be averaged and transformed in such a way that the final rating will be 5 points, with the ranges being 0 to 1.99 with a low score, from 2 to 3.49 with a medium score, and from 3.50 to 5 with a high score.

3 Analysis of BI Tools

Business Intelligence supports organizations to make appropriate and fast decisions that contribute to better performance and therefore makes them more competitive in the market. These types of tools are designed in an interactive and user-friendly way using graphics to make the information more accessible to the end user, which in this case is usually middle management or administrative [15].

Next we will go on to analyze the 19 selected BI tools: Open: OLAP DVP; Mondrian; Jedox OLAP; InstantOLAP; phpMyOLAP; RapidAnalytics; InetSoft; JasperReports; Eclipse BIRT; SpagoBI; Microsoft Dynamics NAV; Oracle BI; IBM Cognos Analytics;

SAP Business Objects; QlikSense; Power BI; Tableau; Microstrategy; and Domo BI (see Fig. 1).

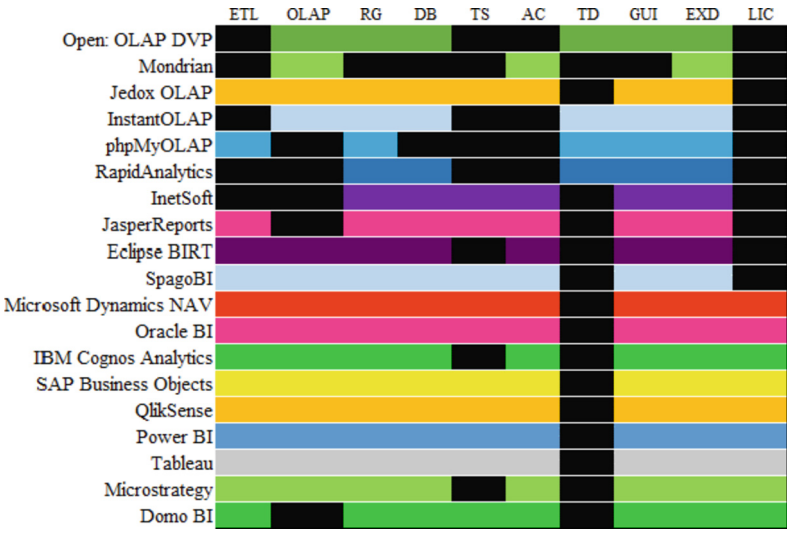

Fig. 1. Business intelligence tools scores (■ = 0, other colors = 1).

Open OLAP Data Visualization Plugin It is a complementary plugin created as an interface for Pentaho BI Server and Mondrian, it allows generating reports, creating dashboards, and viewing or querying data from an OLAP cube or relational databases through its interface graph. It has a GNU General Public License and maintenance service, it is compatible with all operating systems, it supports the Mondrian server, XMLA data, Microsoft SQL Server Analysis Services DB [16]. By receiving constant updates, it can be easily adapted to Mondrian and Pentaho, in addition to having an intuitive interface. It has commercial support and services that allow it to be implemented successfully. Its installation is tedious and the XMLA data source works exclusively for data belonging to the Mondrian tool.

Mondrian is a server to create and manage OLAP servers online, it supports XML files, allows you to manage OLAP servers and perform multidimensional queries. Its owner is Pentaho Corporation and it has an EPL (Eclipse Public License) type license, it does not contain a graphical interface, however, it is multiplatform.

Its complementary tools are JPivot, Saiku, Pentaho Analyzer, Pivot, EasyBi and it has updates made by the Pentaho community. It has four layers to display information, Presentation Layer is the top layer that determines the information displayed by the user and Queries are performed. Dimensional Layer which is the layer that executes the multidimensional queries towards the DB or OLAP cubes. Star Layer entrusts the program cache. Storage Layer adds data to the various dimensions of a relational database [17]. It enables the management of frontend tools, providing support for resolving incidents such as JIRA, the release times of Mondrian and Pentaho versions coincide. As it does

not have a graphical interface, its use is intuitive, requiring programming knowledge. You also need complementary tools to be able to interpret data by the end user.

Jedox OLAP is a tool to manage and create OLAP servers and dashboards, produce Scorecards, queries to the OLAP DB, it does not have a graphical interface, however it provides an Excel plugin which is related to the Jedox OLAP DB synchronizing with each other. It has an LGPL type license and its owner is Jedox AG, it is compatible with the operating systems IOS Mobile, Android, Linux, Windows, and is in constant development [18]. It allows you to modify data in real time thanks to the integration with Microsoft Excel. It does not have technical support, and it is necessary to have a Microsoft Excel license.

Instant OLAP allows to query ROLAP and MOLAP databases, manage dimensions using Drillthrough and Drilldown expressions in real time. It also generates reports, dashboards, scorecards, manages OLAP databases, and allows information to be consulted from a web browser and exported in XML/A format to Microsoft Excel. It has a graphical interface and is multiplatform. It was developed by Thomas Behrends Softwareentwicklung und Organisationsberatung, and has regular updates [19]. It can be used from any platform, make queries in real time, and view reports from the web, it supports XML/A. It does not have technical support and there is not much information about this tool.

phpMyOLAP is an OLAP application for the use of MySQL, it has a simple graphical interface that allows you to process information from OLAP cubes in an analytical way for the generation of reports, it also allows you to manage data warehouse and import data. It is only compatible with Windows, it was developed by AlterVista and it has updates [20]. It is a simple reporting tool, however it is only used to generate unofficial reports.

RapidAnalytics allows to generate reports based on data processed and transformed by DataMining and RapidMiner for ad-hoc end users. It also generates Dashboards and has a graphical interface. It was developed by RapidMiner and has the AGPLv3 license, it is compatible with Windows, Linux and Mac [21]. Dashboards can be fully edited and its graphical interface is easy to use. It depends on the RapidMiner tool.

InetSoft allows to manage and create Dashboards and Scorecards. It also allows generating reports and querying relational databases and OLAP cubes in real time, it has a graphical interface. Its owner is InetSoft Technology Corp which has technical support [22]. It allows the use of suites that facilitate the use of the application and present the data in different ways in the Dashboards. It is only intended for the creation and management of Dashboards and Scorecards. On top of that, their reports are simple.

JasperReports is a tool to generate Dashboards, Scorecards and sophisticated reports capable of being exported in various formats and can be included in web applications, it also allows ETL processes. It has a graphical interface, its owner is TIBCO Software, Inc., which has a maintenance service and periodic updates, it is compatible with Windows, MacOS and Linux, it has an LGPL, Eclipse and AGPL license. Its plugins are Jasper products such as: Jaspersoft ETL, Ja-perReports Server, JasperReports Studio, JasperReports Library, and iReport Designer. You can export large volumes of output formats. It is necessary to have all the components installed.

Eclipse BIRT is a software project that allows you to access a wide variety of data warehouses, it also allows you to create data visualizations, reports, Dashboards and Scorecards. It contains a graphics engine that can be integrated with other applications, the designs that are generated in this tool are in XML format. It is in constant development by The Eclipse Foundation in collaboration with IBM, which is in charge of continuous development and updates, its license is EPL type. It has several add-ons and plugins and is multi-platform [22]. Capable of covering all types of Business Intelligence solutions, its integration is easy with other tools. It is necessary to have solid knowledge in programming.

SpagoBI is a BI suite capable of covering Business Intelligence project analysis areas. It allows creating Dashboards, Scoreboards, analysis models based on KPIs, and integrating ETL tools, Talend Open Studio Products and Datamining, as well as performing multidimensional database analysis, generating reports and exporting them in various formats. It was developed by Engineering Ingegnería Informatica S.p.A and has an Open Source license. Mozilla Public License v. 2.0 with constant maintenance and updates, its plugins are Meta, SpagoBI SDK, SpagoBI Studio, SpagoBI Server, SpagoBI and SpagoBI Applications [24]. BI solution that is required can be carried out. Allows to modify the views of the OLAP cubes. You need to know the tool to be able to use it.

Microsoft Dynamics Nav, is a solution (ERP) developed by Microsoft that adapts to small and medium-sized companies, developed by Microsoft which allows to create automated and integrated financial processes, manage data, processes, applications and systems connected to each other and be able to perform predictive analysis [24]. This BI tool allows users to access the system from anywhere and on any device. The integration of Microsoft Dynamics 365 Finance allows you to create a more productive and collaborative work environment. One of the downsides is that it is currently catching up with other CRMs on certain features which does not allow adjustments to the server code.

Oracle BI is one of the most complete tools on the market because it has real-time interactive panels which help take key actions and provide predictive responses by displaying statistical graphs [26]. This sophisticated tool offers us cloud-based services and data visualization, making individual interactive reports, allowing us to have integration with Office with ease of migration and updating of components. Oracle BI does not have a free version and does not offer a free trial.

IBM Cognos Analytics is an advanced business analytics solution that provides insights, data governance, and reporting. Which allows you to create data visualizations, infographics, dashboards, control panels and reports in a matter of minutes, and has compatibility with Cloud, SaaS, Web, Mac, windows, Linux, Android, iPhone [27]. One of the advantages of this tool is the fact that it allows users to have direct, productive and controlled access to data. Managed reports are created by professional report authors for other users or consumers. The only drawback is that a license is required to use all the tools.

SAP Business Objects provides comprehensive Business Intelligence functionality that enables users to make critical and effective decisions based on robust data and analysis [27]. This tool offers a very broad and complete solution for business management, it is designed taking into account the needs of small and medium-sized companies to

facilitate their performance. One of the disadvantages of its use is the high cost of implementation for the first time due to the need for an adequate infrastructure and also the training of use is very expensive.

QlikSense is an advanced data visualization application, ideal for the analytical needs of groups, departments or an entire organization, allowing the management of high volumes of data and collaboration on any device, creating reports and dynamic tables [32]. It is a scalable product since it is compatible with a large number of data sources, it is capable of modeling data and performing complex calculations. One of the advantages of using this tool is that it allows to connect with multiple data sources to obtain an analysis in a complete visual way to communicate and collaborate more effectively with the work team. In addition, it is multiplatform, that is, it adapts automatically with a desktop and mobile version. One of its disadvantages is predictive analytics, as it is only possible through API connections with third-party software.

Power BI is a business intelligence solution in the cloud, which allows the use of different data sources, in order to process, analyze and present a report, allows access from any device to be shared by different users of the same company or organization; in such a way that all staff, administrative, financial, marketing, etc. can have business information in real time [30].

One of the advantages of the tool is the fact that it offers impressive interactive and customizable reports in any internal or external application, as well as fully secured data. It has an intuitive interface that is easy to use and its appearance is striking, which is why its user experience score is very high. It also has a large community of partner users and distributors that provide new functionalities and valuable informative content for new users. Unfortunately, the Power BI Free service is limited and you need to purchase a license, in addition, the business versions have a high price, but compared to other paid tools, this one is more affordable.

Tableau is a complete Business Intelligence solution, leader in the market and that allows decision makers to have all the necessary information in real time. Tableau allows the generation of advanced analyzes in record time, generating interactive visualizations and impressive demonstrations without the need for complex development with a very flexible configuration, since it can run under a server, locally on the user's computer or in the cloud, making it an easy-to-manipulate tool [31]. It offers the possibility of integration with cloud services in a simple way, it helps us to detect data correlations in a short time. In addition, it detects trends and erroneous behavior in the information. It has a community that contributes informative content and its manufacturer provides training available on the web. Its biggest disadvantage is that it is focused only on reporting tasks, without ETL and data transformation capabilities.

Microstrategy is a world leader in enterprise mobility and analytics software. A pioneer in the business intelligence and analytics space, MicroStrategy delivers innovative software that empowers people to make better decisions, available on Cloud, SaaS, Web, Mac (desktop), Windows (desktop), Linux (desk-top), Windows (local), Linux (local), Android (mobile) [32]. One of the advantages is that it has a high degree of personalization and real-time data analytics. Microstrategy has an SDK for data mining and predictive analytics. Its disadvantage is the need for highly trained human personnel to develop reports.

Domo BI is a subscription cloud platform that provides a business management solution that users can access from anywhere to perform analysis and generate reports from anywhere. It is compatible with all operating systems such as Windows, Mac and iOS. Domo offers a powerful and reliable cloud-based business intelligence (BI) system with the ability to display real-time data in a single dashboard [32]. This tool provides visibility and analysis through dashboards with data from various areas and performance metrics in real time, it has powerful data connection capabilities, which facilitates the integration of systems inside and outside the organization. Its disadvantage is that a license is needed to use all the tools.

4 Analysis and Results

Although both licensed and unlicensed BI tools were reviewed, only the free JedoxOLAP tool was able to obtain as good a rating as the ratings for the licensed tools. While only the Mondrian tool obtained a low evaluation since it only allows to manage and generate OLAP server online.

SpagoBI and Jedox OLAP were the ones that obtained the highest score compared to the other BI tools analyzed, obtaining a score of 4.94/5, followed by JasperReports and Eclipse BIRT, which obtained a score of 4.32/5 since they did not have OLAP processes, technical support or dependencies respectively. Open OLAP, InstantOLAP and Qlik Sense received 3.70/5, none of these three allowed to carry out ETL processes. phpMyOLAP, RapidAnalytics and InetSotf obtained a rating of 3.09/5 while Mondrian was the one with the lowest rating of 1.85/6 as it only allows OLAP processes and data export (see Fig. 2).

Among the BI tools analyzed, it is notable that among the licensing options they tend to be more complete to generate reports and make decisions within a company, in which QlickSense stands out. Power BI, Tableau, SAP Business Objects. However, these high scores should not be a straitjacket, since the choice of the best tool for a business depends on its needs and requirements based on functionality, architecture and cost.

Mondrain was the only solution with a low score. With a medium 3 tools (phpMyOLAP, RapidAnalytics, and InetSoft), and all the rest had a high score (see Fig. 3).

To choose a tool it is necessary to know what characteristics the users of our organization have, these users may have profiles of information producers or information consumers" and a formal or informal selection process can be followed [8].

The informal process is one of the least recommended for choosing a BI tool since it can trigger unexpected results, resorting to forced changes after a few years, which would be reflected as a loss of both economic and time resources. These types of informal selection processes generally win the company that best sells its BI solution to the contracting company.

The formal process provides a greater probability of choosing the right tool for the type of business of the contracting company, and the selection of this must follow a formal process and be treated as a project, in addition, a selection committee must be created with few members made up of stakeholders from the different departments of the organization for the choice of the BI tool.

Once the committee is selected, it must determine the scenarios and users of use, since different types of users require different types of reports. Once the requirements

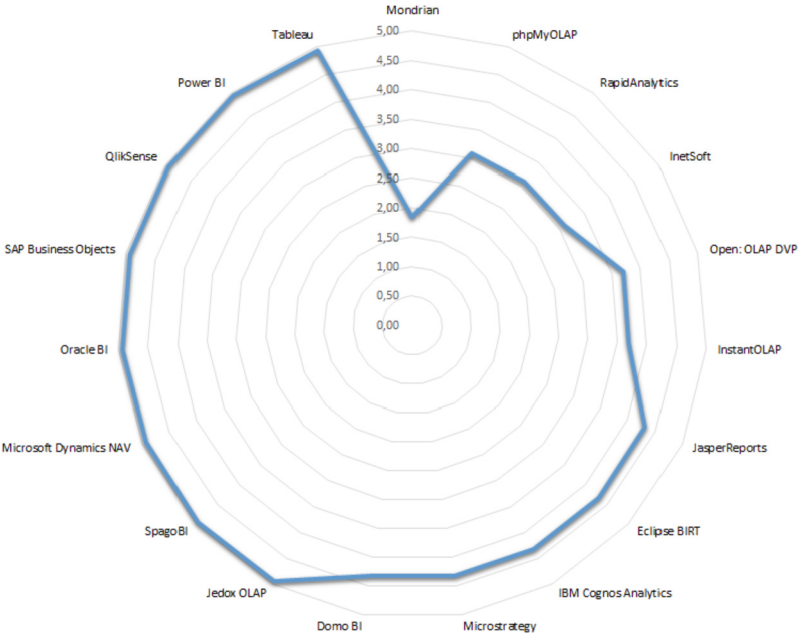

Fig. 2. Business intelligence tools scores.

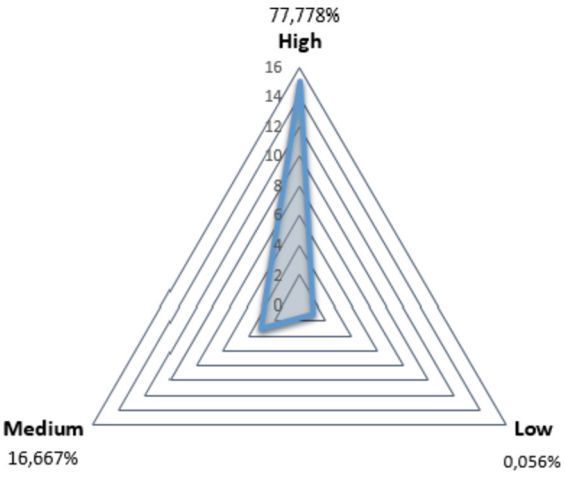

Fig. 3. Business intelligence tools scores ([0.00–1.99] low, [2.00–3.49] medium, [3.50–5.00] high).

have been defined, the different solutions provided by the different BI tools must be analyzed to achieve each requirement, and the selection committee must understand these differences and choose the one that comes closest to solving the requested requirements. Based on the requirements and solutions provided by each tool, the selection committee must also choose the one that best fits the organization in the short and long term.

5 Conclusions

In the competitive field in which companies find themselves, it is necessary for them to be able to get the most out of their data, and to stand out from the rest; due that, the incorporation of Business Intelligence in companies is of great importance. Although it means an investment on the part of the owners of the company, they will have more benefits in the end than disadvantages.

There are many Business Intelligence tools, in this case it is up to the company to make the correct selection of them, it is possible that the majority will go for unlicensed tools, but other companies will want to use and have more options so they choose licensed tools.

In this comparative study, all the theoretical content was first analyzed, to give a final approach to the tools that were going to be mentioned, some of these can be useful for large companies, while others are perfectly suited to small or medium-sized SMEs.

References

1. Yonatan, M.: Business Intelligence: herramientas para la toma de decisiones en procesos de negocio," Perú (2018)
2. Dodson, G., Arnott, D.: The use of business intelligence systems in Australia. In: ACIS 2008 Proceedings, vol. 74 (2008)
3. Alberto, R.: Impacto de la Business Intelligence en el Proceso de Toma de Decisiones. UPIICSA, México (2008)
4. MAYKROSYS: Inteligencia de Negocios. MAKROSYS (2016). http://www.makrosys.com/index.php/servicios-corporativos/bi-y-reporteria
5. Guarda, T., Santos, M., Pinto, F., Augusto, M., Silva, C.: Business intelligence as a competitive advantage for SMEs. Int. J. Trade Econ. Financ. **4**(4), 187–190 (2013)
6. Guarda, T., Leon, M.A., Barrionuevo, M.F.O., Pesantes, M., Pomboza, E., Alvarez, J.: Business intelligence pervasive systems: BIPS model. In: 12th Iberian Conference on Information Systems and Technologies (CISTI) (2017)
7. Aaker, D.A., Kumar, V., Day, G.S., Leone, R.: Marketing Research, 10th edn., Wiley.com (2009)
8. Cano, J.L.: Business Intelligence. Banesto, Madrid (2015)
9. A. Rozenfarb, "Toma de Decisiones y Business Intelligence," Centro de Altos Estudios en Tecnología Informática - CAETI, Buenos Aires
10. Navarrete Carrasco, R.C.: Análisis de impacto del Business Intelligence: Expectativas y Realidades. Monterrey (2002)
11. Cipolla, A.I.: Business Intelligence. Que es y Beneficios? Open Webinars. https://openwebinars.net/blog/que-es-business-intelligence-y-cuales-son-sus-beneficios/

12. Guevara Alban, G.P., Verdesoto Arguello, A.E., Castro Molina, N.E.: Metodologías de investigación educativa (descriptivas, experimentales, participativas, y de investigación-acción). RECIMUNDO, pp. 163–173 (2020)
13. Vera García, A.C.: Análisis de herramientas BI en el mercado actual (2015)
14. Calzada Cantú, L.M., Abreu, J.L.: El impacto de las herramientas de inteligencia de negocios en la toma de decisiones de los ejecutivos. Int. J. Good Consci. **2**(4), 16–52 (2009)
15. Pentaho: HITACHI INSPIRE THE NEXT. https://forums.pentaho.com/threads/93595-OpenI-available-as-a-Pentaho-Plug-in-for-OLAP-Reporting/
16. Pentaho: Pentaho a Hitachi Group Compabby. https://mondrian.pentaho.com/documentation/installation.php
17. JEDOX: Jedox Knowledge Base. https://knowledgebase.jedox.com/jedox/how-jedox-works.htm
18. InstantOLAP: InstantOLAP. https://www.instantolap.com/
19. Apmuthu: Github. https://github.com/apmuthu/phpMyOLAP
20. RapidMiner: RapidMiner Community. https://community.rapidminer.com/discussion/53577/where-can-i-download-rapidanalytics
21. InetSoft: InetSoft Open Standars Innovation. https://www.inetsoft.com/solutions/dashboards/
22. ECLIPSE: Birt Home. ECLIPSE (2022). https://eclipse.github.io/birt-website/
23. SPAGOBI: Sopago BI. https://www.spagobi.org/
24. Microsoft: Dynamics NAV. Microsoft. https://dynamics.microsoft.com/es-es/nav-overview/. Accessed 5 Enero 2001
25. Oracle: Oracle Business Intelligence. https://www.oracle.com/es/business-analytics/business-intelligence/technologies/bi.html. Accessed 1 May 2022
26. IBM: IBM Cognos Analytics con Watson. https://www.ibm.com/products/cognos-analytics. Accessed 6 Enero 2022
27. SAP: ¿Qué es SAP BusinessObjects Business Intelligence? SAP. https://www.sap.com/latinamerica/products/bi-platform.html. Accessed 1 June 2022
28. Qlik: Qlik Sense® | Analítica en la nube moderna. https://www.qlik.com/es-es/products/qlik-sense. Accessed 1 June 2022
29. Microsoft: Power BI. https://powerbi.microsoft.com/es-es/what-is-power-bi/. Accessed 6 Enero 2022
30. tableau: Tableau Software. https://www.tableau.com/. Accessed 7 Enero 2022
31. MicroStrategy: Descubra MicroStrategy. Micro Strategy. https://www.microstrategy.com/es. Accessed 7 Jan 2022
32. Domo: Domo BI moderno para todos. Domo. https://www.domo.com/. Accessed 7 Jan 2022
33. Jaco, M.: Que es Business Intelligence Reporting - Una vision general completa Los in-formes de. 25 Julio 2020. https://zipreporting.com/es/business-intelli-gence-reporting.html
34. Jacovkis, D.: El software libre: producción colectiva de conocimiento. IDP. Revista de Internet, Derecho y Política **8**, 4-–13 (2009)
35. Microsoft: Servicio Power BI para usuarios empresariales. 29 Septiembre 2021. https://docs.microsoft.com/es-es/power-bi/consumer/end-user-export#consider-ations-and-troubleshooting. Accessed 19 Jan 2022