

Association for Information Systems

## AIS Electronic Library (AISeL)

---

CAPSI 2020 Proceedings

Portugal (CAPSI)

---

10-2020

### OSSPal Assessment of Self-Service BI and Analytics Software

António Oliveira

Jorge Bernardino

Follow this and additional works at: <https://aisel.aisnet.org/capsi2020>

---

This material is brought to you by the Portugal (CAPSI) at AIS Electronic Library (AISeL). It has been accepted for inclusion in CAPSI 2020 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# OSSPal Assessment of Self-Service BI and Analytics Software

Antonio Oliveira, Polytechnic Institute of Coimbra, Coimbra Institute of Engineering – ISEC, Portugal,  
a21280654@alunos.isec.pt

Jorge Bernardino, Polytechnic Institute of Coimbra, Coimbra Institute of Engineering – ISEC, Applied  
Research Institute of Polytechnic of Coimbra – i2A, Portugal, jorge@isec.pt

## Abstract

Business Intelligence (BI) and Data Analytics are among the top Data Science topics nowadays. They are available as Self-Service solutions of valuable utility when business professionals need to perform data visualization and/or analytics. In addition to that, a great opportunity for companies to start exploring their data with minimal or no assistance from IT technicians. In other words, a shortcut to business opportunities. In this paper, through the OSSPal methodology, we assess the free versions of three popular Self-Service BI and Analytics tools: Power BI, QlikView, and Tableau Public. In conclusion, we could see that Power BI offers more features at no cost, being so highly recommended for Small and Medium-Sized Enterprises (SMEs). On the other hand, QlikView and Tableau Public were considered almost as powerful as Power BI and might also naturally be a more suitable choice according to the requirements of a company.

**Keywords:** Self-Service Business Intelligence and Analytics; Power BI Free; QlikView; Tableau Public; OSSPal.

## 1. INTRODUCTION

In the past, when modern companies had not yet so large volumes of data to process and analyse, it was still manageable to make use only of the classic Business Intelligence and Analytics tools to support the decision-making process efficiently. These solutions were efficient but required typically close cooperation with IT specialists to be operated.

Nowadays the amount of data is growing more and more and must be handled in ever shorter times by companies, which may naturally overload their IT personal. From this context emerged then the Self-Service BI and Analytics solutions, allowing business professionals themselves to work, evaluate and visualize data.

All of that through intuitive user interfaces, drag-and-drop menus and low-code environments, to allow user-friendly access to all relevant data and most common analytics capabilities with little or no assistance from Data Science experts. We are interested in open source software that is freely distributed without any fees related to use. Although the use of the open source software does not have to involve license costs, the cost of use of any software should be always expressed by sum of all cost related to software implementation, configuration, maintenance and support. Besides the zero licenses cost, open source software has the following qualities: reliability, customizability, freedom of choice, support and scalability (Bernardino, 2011). Furthermore, freeing up consequently the IT department for more strategic activities (Insider, 2017).

Ideally, training for business professionals would be still recommended but mostly to help them understand what data is available and how to query information to make data-driven decisions to solve business problems (Techo, 2016).

Self-Service Analytics is a form of Business Intelligence (BI) in which line-of-business professionals are enabled and encouraged to perform queries and generate reports on their own, with minimal IT support. It is often characterized by simple-to-use BI tools with basic analytic capabilities and an underlying data model that has been simplified or scaled down for ease of understanding and straightforward data access (Gartner, 2020).

Self-service BI and Analytics bring many gains for companies, as it enables Small and Medium-Sized Enterprises (SMEs) to start making data-driven decisions, without acquisition costs (Bernardino & Neves, 2016). Considering that, we have decided to search for the top trend free and open source analytics tools and evaluate them according to the OSSPal methodology. This, to help SMEs find and adopt the best solution according to their needs. Using OSSPal, quantitative and qualitative measures are combined for evaluating open-source software in several categories, resulting in a quantitative value that allows the comparison between the tools (Wasserman et al., 2017).

By using that methodology, three popular BI and Analytics tools are evaluated: Power BI Free, QlikView, and Tableau Public. These tools will be scored considering the features we considered as fundamental in Self-Service solutions.

The rest of this paper is structured as follows. Section 2 describes the BI and Analytics tools under evaluation. Section 3 explains the OSSPal methodology. Section 4 presents the evaluation through the methodology. Finally, Section 5 presents the conclusions and some future work.

## **2. BI AND ANALYTICS TOOLS**

First, to decide on the Self-Service tools for evaluation, we did an extensive search for the most adopted and best assessed free and open-source tools on websites which ranks Self-Service BI and Analytics Tools. Surprisingly, despite the significant number of tools available on the market, we could observe that the most relevant tools currently are free but not open-source.

To confirm that, we checked the tool rankings provided by renowned Research Companies such as Gartner and Predictive Analytics Today, which base their reviews not only on customers opinions but also on an unbiased methodology (Pat Research, 2019a). From Gartner, we considered its yearly renowned software ranking called Magic Quadrant (Howson, Richardson, Sallam, & Kronz, 2019), which ranks solutions based on a set of critical functionalities and trends on solutions for BI/Analytics tools.

With all this information, we could build our Top 3 of Self-service solutions. As a result, we had then the free versions of Power BI, QlikView, and Tableau for evaluation. It is also worth highlighting that we regarded the functionalities utilized by Gartner on (Howson et al., 2019) and the ones indicated by Predictive Analytics

Today on (Pat Research, 2019b), to build our set of essential features to evaluate the tools addressed in this paper.

In the following sections, we describe the main characteristics of each Self-Service BI and Analytics tool. Besides that, some major advantages and limitations of each tool are outlined.

## 2.1. Power BI Free

Power BI is a free desktop proprietary Microsoft platform released in 2011 (Wikipedia, 2019). It works in conjunction with a cloud application that makes possible to publish reports throughout the business. Power BI can only be installed on Windows OS and is updated every month. It is intended for small to midsize organizations.

It has the same rich visualizations and filters as the paid version, including a natural language question and answering functionality. Additionally, it saves, uploads and publishes reports to the web with a limit of 10 GB per user. Its other two types of license, Pro and Premium, which are paid, allow report collaboration, direct query, more advanced analytics features, and the use of the Power BI Report Server (Folio3, 2019).

**Advantages:** Inexpensive upgrade; Large custom visualizations range; Easy integration Excel; Quick learning curve for basic use.

**Limitations:** Bulky user interface; Online reports must be public to the whole Internet.

Figure 1 shows the Power BI Free user interface.

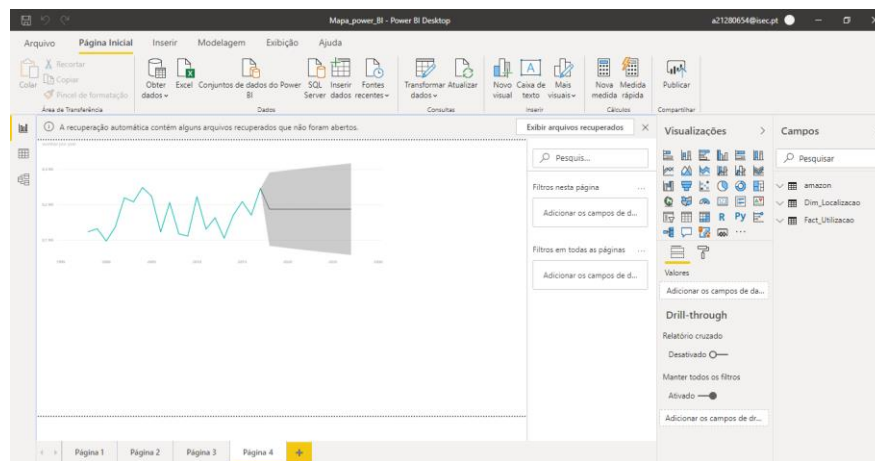


Figure 1: Power BI Free user interface.

Power BI Free has available a huge number of learning resources available on the web, an active community, and over 70 numerous integrations and data sources (Microsoft, 2020).

## 2.2. QlikView

QlikView is a robust proprietary desktop platform for business discovery which offers a powerful free version in terms of features. It was first released in 2012 (Qlik, 2020a) with frequent updates since then. It can be installed only on Windows OS (Qlik, 2020b), being suitable to companies of all sizes.

Its free version has no limitations in terms of time or functionality compared with its paid edition. However, the files/documents created by a free-license user cannot be opened on another computer or shared with a user who has a paid license.

**Advantages:** Fast user experience for being a memory-resident application; Fast implementation.

**Limitations:** It does not allow "write back " to the database; Reloading can take a significant amount of time as it loads most data into the system RAM; The user interface is not intuitive and looks unfriendly.

Figure 2 illustrates the QlikView user interface.

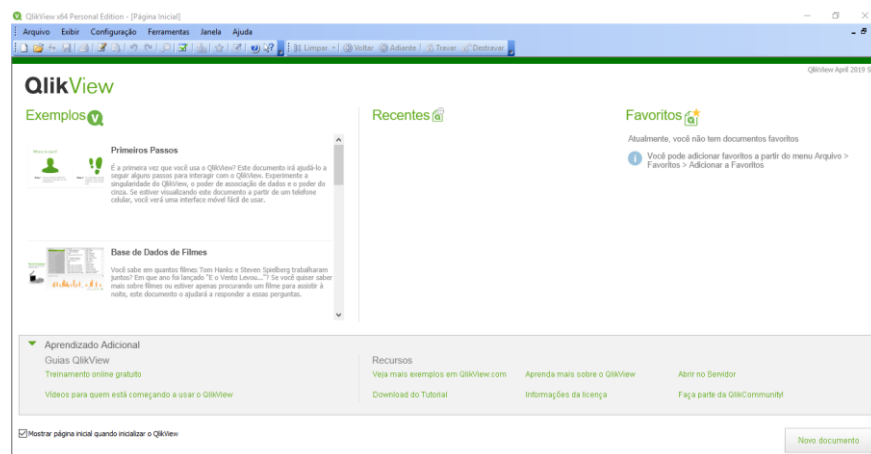


Figure 2: QlikView user interface.

Its in-memory engine recognizes patterns in data that we are not normally able to do it by using SQL alone (Kumar, 2019).

## 2.3. Tableau Public

Tableau is one of the most famous “self-service” visualization and analytics tools on the market. Its desktop version was first released in 2004 (Tableau, 2004) and was designed for companies of all sizes. It is not open-source but it has a commercially free platform, which is updated frequently.

It runs on Windows or Mac OS to be used in conjunction with the web free version. Many of the same powerful visualization capabilities its paid desktop and server versions features are available at no cost. Data Analyses is possible from sources such as Excel sheets for geographical visualizations, Gantt charts, tree maps, and other templates.

However, it is possible only to connect to Excel sheets, text file formats, statistical files, Google sheets, and web data connectors, which must be uploaded to the cloud. The free version has a limitation of 15.000.000 data rows per workbook (Tableau, 2016).

**Advantages:** Quick responsiveness; Extensive training resources available for free; Very intuitive user interface; Dashboards can be viewed on multiple devices;

**Limitations:** To keep workbooks private, a paid subscription is required; Complex visualizations require time and cost-intensive training.

Figure 3 represents the Tableau Public Desktop user interface.

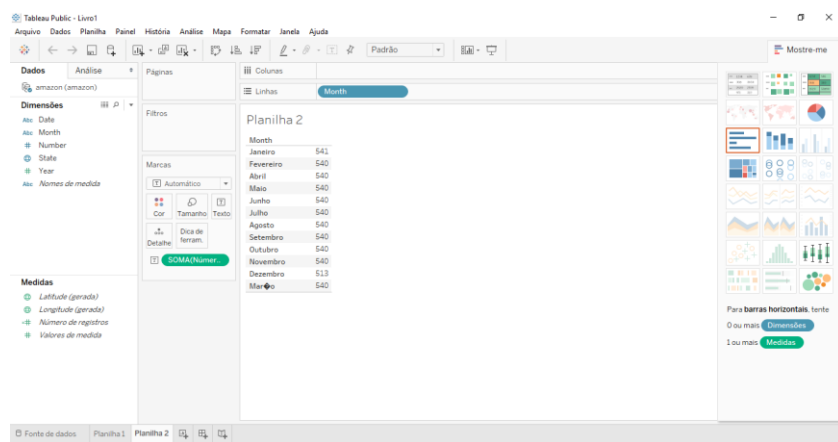


Figure 3: Tableau Public Desktop user interface.

Tableau Public is a very sophisticated and advanced system. It surpasses other tools mostly in data visualization. It provides an all-inclusive and user-friendly data visualization experience (Tableau, 2020).

### 3. OSSPAL METHODOLOGY

OSSPal methodology is an evolution of OpenBRR methodology (Marinheiro & Bernardino, 2015). The OSSPal methodology uses metrics to identify software quality level in seven categories (Wasserman et al., 2017):

- **Functionality:** How well will the software meet the average user's requirements?
- **Operational Software Characteristics:** How secure is the software? How well does the software perform? How well does the software scale to a large environment? How good is the UI? How easy to use is the software for end-users? How easy is the software to install, configure, deploy and maintain?
- **Support and Services:** How well is the software component supported? Is there commercial and/or community support? Are there people and organizations that can provide training and consulting services?

- **Documentation:** Is there adequate tutorials and reference documentation for the software?
- **Software Technology Attributes:** How well is the software architected? How modular, portable, flexible, extensible, open, and easy to integrate is it? Are the design, the code, and the tests of high quality? How complete and error-free are they?
- **Community and Adoption:** How well is the component adopted by community, market, and industry? How active and lively is the community for the software?
- **Development Process:** What is the level of the professionalism of the development process and the project organization as a whole?

The evaluation process is divided into four phases:

1. Construction of a capabilities list we consider to be essential in a determined software type for analyses and measurement.
2. Weight attribution for categories and measures by assigning a percentage for each category according to its importance, which should total 100%.
3. Data gathering for each measure of each category to calculate its weight from 1 to 5 (1 - Unacceptable, 2 - Poor, 3 - Acceptable, 4 - Very Good, 5 - Excellent);
4. Finally, OSSPal final score calculation based on 2).

As the category 'Functionality' is composed of the features mentioned in 1), it must be calculated separately, as follows:

- Score each feature from 1 to 3 (less important to very important);
- Use weighted average to scale the scores given in a range from 1 to 5.

The functionality category will have the following scale:

- Under 65%, Score = 1 (Unacceptable);
- 65% - 80%, Score = 2 (Poor);
- 80% - 90%, Score = 3 (Acceptable);
- 90% - 96%, Score = 4 (Good);
- Over 96%, Score = 5 (Excellent).

#### 4. EVALUATION PROCESS

First, we determined a weight for each category of this methodology in order of importance (see Table 1).

CATEGORY	WEIGHT
Functionality	30%
Operational Software Characteristics	15%
Documentation	15%
Community and Adoption	15%
Software Technology Attributes	10%
Support and Service	10%
Development Process	5%

Table 1: Assigned weights to the categories

The software’s functionalities set is the most relevant aspect, as it reveals the software utility. For this reason, the category “Functionality” received the highest weight, 30%. The next three categories had the second most relevant weight, 15%.

“Operational Software Characteristics” involves aspects such as security, performance, usability, and implementation. It had attributed this weight because without the referred aspects no software can be useful regardless of the functionalities it may offer. Moreover, we have “Documentation”, once they are essential for software implementation and troubleshooting. “Community and Adoption” is at the same weight level because it is where users can obtain support, especially in case of free software. Furthermore, it allows us to measure the tool’s acceptance in its market.

Following this, with 10% of weight, is “Software Technology Attributes”, as it considers how error-free the tool is, which is indeed important. However, it also includes aspects that normally self-service and BI and Analytics end-users are not interested in, e.g. code and test quality. “Support and Service” has a similar weight because end-users of free tools are generally aware that they cannot require commercial support, training or consulting services, unless they pay for it.

“Development Process” had the lowest weight, 5%, as it concerns the quality level of the software’s project organization, professionalism and development fashion. These are generally irrelevant aspects for the Self-service BI and Analytics software’s target users since they have normally little IT technical knowledge and will not likely consider this category when deciding on a software.

Next, we have Table 2, where weights were assigned to each functionality category according to its relevance (1 - slightly important, 2 - important and 3 - very important).



FUNCTIONALITIES / CRITERIA	WEIGHT
Access control and security	3
Ad-hoc reporting	3
Ad-hoc query	3
Cloud Services	2
Data visualization variety	3
Data Integration	3
Dashboard Designer	3
Interactive Visualization	3
Mobile capabilities	2
Natural Language Query	1
OLAP	3
Predictive Analytics	3
Real-time Analytics	3
Real-time Collaboration	3
Report Customization and Scheduling	3

Table 2: Weights for each functionality category.

Now, after collecting data, we calculate a score for all measures of each category in a range between 1 to 5 (see Table 3).

CATEGORY	SCORE		
	POWER BI FREE	QLIKVIEW	TABLEAU PUBLIC
Functionality	3.83	3.32	2.78
Operational Software Characteristics	4	3	3
Software Technology Attributes	5	5	5
Documentation	5	5	5
Community and Adoption	5	5	5
Support and Service	4	3	4
Development Process	5	5	5

Table 3: OSSPal score by category.

As we can see in Table 3, Power BI Free obtained the highest score, in a range from 0 to 5, for the “Functionality” category. That is justified by the fact it lacks only “Real-time Collaboration” among all the referred functionalities in Table 2. Besides that, its score is not even higher because it had attributed low punctuation in 3 categories as follows: “Access Control and Security”, once published workbooks must be public to the internet, “Cloud Services”, as its cloud application just allow dashboard/report visualization and small editions, and “Mobile Capabilities” because the mobile app just allows dashboard/report visualizations.

QlikView for the Functionality criteria obtained the second-best score, as it lacks “Cloud Services”, “Natural Language Query”, “Real-time Analytics”, and “Real-time Collaboration”. In addition to that, low punctuation was given to “Mobile Capabilities” because we just found an outdated iOS application available for installation.

Tableau Public occupies the third position in the functionalities category for not offering “Natural Language Query”, “Real-time Analytics”, “Real-time Collaboration”, and “Report Customization and Scheduling” capabilities. Moreover, it had a low score for the “Cloud Services” capability, once its cloud application allows data visualization, but with no dashboard editing possibilities, differently from Power BI Free, which allows some basic editing for visualizations.

Concerning the remaining categories, the three evaluated tools had very similar scores, once they are already mature software solutions on the market. However, it is important to mention that in “Operational Software Characteristics” Power BI Free stood out for having a more intuitive user interface compared to the other two solutions. As for “Support and Service” for the three tools, the end-users can count on support from an active community and extensive online official training resources, such as user guides and videos. Despite this, QlikView had a penalization, since its official training videos are paid.

After scoring Functionalities in Table 2 and Categories in Table 3, we have calculated a final score for every tool. By multiplying each score from Table 3 by the category weights from Table 1, we have obtained the scores in Table 4.

	SCORE		
	POWER BI FREE	QLIKVIEW	TABLEAU PUBLIC
<b>Total</b>	4.40	4.00	3.93

Table 4: OSSPal final score.

Overall, as we can see in Table 4, Power BI Free has the best final score of 4.4 (out of 5) through the application of the OSSPal methodology. QlikView has the next best score of 4.00, and Tableau Public the lowest score of 3.93.

## 5. CONCLUSIONS AND FUTURE WORK

In this paper, we evaluated three of the most popular Self-Service BI and Analytics tools in their free versions. To perform this evaluation, we tested the tools. Besides, we considered our experience, official documentation, and third-party websites which publish reviews and rankings about the tools, so that we could also choose some tests to perform based on the pros and cons those webpages published about each tool.

Through OSSPal, we could classify Power BI as “Good”, due to its best final score. This explains the high acceptance the solution has on the market. Its costless version offers almost everything we considered to be

essential for a software, restricting only a feature related to collaboration and refresh for Real-time Analytics just every 30 minutes. Furthermore, it stands out in features such as Ad-hoc Reporting and Predictive Analytics due to its higher easy-of-use compared to the other tools, being the only one to feature Natural Language Query at no cost. It relies more on drag-and-drop and intuitive features.

With the second-best score is QlikView, which was also classified as “Good”. It is also a powerful and solid BI and Analytics tool. However, it obtained a lower score mostly because it offers a few less free features than Power BI. Moreover, its interface is not as intuitive as Power BI’s interface, which is highly relevant for a Self-service solution. QlikView seems to be more a traditional, technical tool for users with already some experience with BI, data analytics, and reporting and has the very strong point of offering in its free version all functionalities of its paid license, locking just workbook’s sharing capabilities.

Tableau Public had the lowest final punctuation and was then categorized as “Acceptable”. However, with almost the same score as QlikView. It was more penalized than the previous tool because it offers fewer functionalities from Table 2 for free. Also, as it is not as intuitive as Power BI, new users may have to learn some Data Science before starting to benefit from it. However, it is the quickest in responsiveness with overall higher quality for visualizations. Furthermore, it also stands out from the other two tools for its extensive community and free training resources.

We would like to emphasize that our assessment study considered only the free functionalities of the evaluated tools. Thus, if we had considered paid capabilities, the score results would naturally be different, once the “Functionality” category has a 30% weight.

As future work, we intend to perform a comparative analysis of other relevant Self-Service BI and Analytics solutions to make available a wider set of them for choice by the SMEs according to their requirements.

## REFERENCES

- Bernardino, J. (2011). Open Source Business Intelligence Platforms for Engineering Education. In Proceedings of the 1st World Engineering Education Flash Week, WEE 2011, pp. 27–30.
- Bernardino, J. & Neves P. C. (2016). Decision-Making with Big Data Using Open Source Business Intelligence Systems. Human Development and Interaction in the Age of Ubiquitous Technology, IGI Global, pp. 120-147.
- Folio3. (2019). Difference Between Power BI Pro vs. Power BI Free vs. Power BI Premium. Retrieved January 23, 2020, from <https://dynamics.folio3.com/blog/difference-between-power-bi-pro-vs-free-vs-premium/>
- Gartner. (2020). Self-service Analytics. Retrieved January 11, 2020, from <https://www.gartner.com/en/information-technology/glossary/self-service-analytics>
- Howson, A. C., Richardson, J., Sallam, R., & Kronz, A. (2019). Magic Quadrant for Analytics and Business Intelligence Platforms. Retrieved February 19, 2020, from <https://www.gartner.com/doc/reprints?id=1-68720FP&ct=190213&st=sb>
- Insider, B. D. (2017). Was ist Self-Service BI (Business Intelligence)? Retrieved March 18, 2020, from <https://www.bigdata-insider.de/was-ist-self-service-bi-business-intelligence-a-659722/>
- Kumar, A. (2019). Comparison of Tableau Vs QlikView | QlikView Tableau Differences. Retrieved January 22, 2020, from <https://www.knowledgehut.com/blog/business-intelligence-and-visualization/tableau-vs-qlikview>
- Marinheiro, A., & Bernardino, J. (2015). Experimental Evaluation of Open Source Business Intelligence Suites using OpenBRR, IEEE Latin America Transactions 13 (3), 810-817.
- Microsoft. (2020). Data sources in Power BI Desktop - Power BI | Microsoft Docs. Retrieved January 22, 2020, from <https://docs.microsoft.com/en-us/power-bi/desktop-data-sources>
- Pat Research. (2019a). About Pat Research - Pat Research: B2B Reviews, Buying Guides & Best Practices. Retrieved

- December 14, 2019, from <https://www.predictiveanalyticstoday.com/about/>
- Pat Research. (2019b). How to Select the Best Self Service Analytics Software for Your Business - Compare Reviews, Features, Pricing in 2019 - Pat Research: B2B Reviews, Buying Guides & Best Practices. Retrieved November 25, 2019, from <https://www.predictiveanalyticstoday.com/self-service-analytics-software/>
- Qlik. (2020a). Released QlikView versions including build number. Retrieved February 13, 2020, from <https://support.qlik.com/articles/000003216>
- Qlik. (2020b). System Requirements for QlikView – QlikView. Retrieved April 5, 2020, from [https://help.qlik.com/en-US/qlikview/April2019/Content/QV\\_HelpSites/System-requirements.htm](https://help.qlik.com/en-US/qlikview/April2019/Content/QV_HelpSites/System-requirements.htm)
- Tableau. (2004). 1.0 | Tableau Software. Retrieved March 18, 2020, from <https://www.tableau.com/fast-pace-innovation/1.0>
- Tableau. (2016). Tableau Public Frequently Asked Questions |Tableau Community Forums. Retrieved January 5, 2020, from <https://community.tableau.com/docs/DOC-9135#subhead20>
- Tableau. (2020). What is data visualization? A definition, examples, and resources. Retrieved January 22, 2020, from <https://www.tableau.com/learn/articles/data-visualization>
- Techtarget. (2016). What is self-service business intelligence (BI)? - Definition from WhatIs.com. Retrieved January 10, 2020, from <https://searchbusinessanalytics.techtarget.com/definition/self-service-business-intelligence-BI>
- Wasserman, A. I., Guo, X., Mcmillian, B., Qian, K., Wei, M.-Y., & Xu, Q. (2017). *OSSpal: Finding and Evaluating Open Source Software*. [https://doi.org/10.1007/978-3-319-57735-7\\_18](https://doi.org/10.1007/978-3-319-57735-7_18)
- Wikipedia. (2019). Power BI – Wikipédia, a enciclopédia livre. Retrieved February 13, 2020, from [https://pt.wikipedia.org/wiki/Power\\_BI](https://pt.wikipedia.org/wiki/Power_BI)