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Selecting a BPM platform: beyond traditional evaluation criteria

Selección de una plataforma BPM: más allá de los criterios de evaluación tradicionales

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Abstract:

Business Process Management (BPM) improves efficiency, adaptability, and competitiveness by aligning processes with technology, supporting agility, reducing costs and errors, and enhancing customer satisfaction. With abundant data and integration tools, using a BPM system (BPMs) has become essential. Objective: This study proposes a methodology for selecting a BPMs that score well on traditional criteria and in criteria for global presence and community. Procedure: we used the Multi Criteria Decision Analysis method, for selecting the criteria and assigning value to each one. Next, we consulted in two sources the BPMs platforms to compare and apply the criteria. Results: Using the criteria usability, coverage, expert opinion, community and trend, Camunda was the selected BPM platform. Conclusions: Camunda is the BPM platform that best fits our evaluation criteria (it is free, open source, is widely used in many countries, and has the largest community around it). We arrived at this conclusion after comparing 107 BPM platforms. This study offers a differentiated perspective to help practitioners and academics choose BPM tools beyond traditional evaluation criteria.

Keywords: BPM, BPMs, BPM platform, software platform comparison.

Resumen:

La Gestión de Procesos de Negocios (BPM) mejora la eficiencia, la adaptabilidad y la competitividad al alinear los procesos con la tecnología, favorecer la agilidad, reducir los costos y los errores y mejorar la satisfacción del cliente. Con la abundancia de datos y herramientas de integración, el uso de un sistema de gestión de procesos de negocio (BPMs) se ha vuelto esencial. Objetivo: Este estudio propone una metodología para seleccionar BPMs que cuenten con una buena puntuación en los criterios tradicionales y en los criterios de presencia global y comunidad involucrada. Procedimiento: utilizamos el método de análisis de decisión multicriterio para seleccionar los criterios y asignar un valor a cada uno de ellos. Acto seguido, consultamos dos fuentes sobre sistemas BPM para compararlas y aplicar los criterios establecidos. Resultados: Utilizando los criterios de comparación de usabilidad, cobertura, opinión de expertos, comunidad y tendencia, Camunda fue la plataforma BPM seleccionada. Conclusiones: Camunda es el sistema BPMS que mejor se ajusta a nuestros criterios de evaluación (es gratuita, de código abierto, se utiliza ampliamente en muchos países y cuenta con la mayor comunidad a su alrededor). Llegamos a esta conclusión después de comparar 107 sistemas BPM. Este estudio ofrece una perspectiva diferenciada para ayudar a los profesionales y académicos a elegir sistemas BPM más allá de los criterios de evaluación tradicionales.

Palabras clave: BPM, BPMs, plataforma BPM, sistema BPM, comparación de plataformas de software.

INTRODUCTION

Business Process Management (BPM) has established itself as a key discipline for organizational improvement by focusing its efforts on business processes. Its implementation relies on BPM platforms that cover the full process lifecycle; however, the diversity of available solutions makes an objective selection difficult. Traditionally, these selection processes have been approached from a perspective focused almost exclusively on the technical performance of the platform, evaluating functionalities in an isolated and disconnected manner. This approach is limited, since it ignores key factors such as perceived usability, validation by experts, the strength of the community, and the real dynamics of adoption. Faced with this fragmented view, the coexistence of heterogeneous criteria such as these calls for an approach that allows such criteria to be structured, normalized, and weighted coherently.

For this reason, this study adopts a Multi-Criteria Decision Analysis (MCDA) approach, which provides a formal and transparent framework for the comprehensive evaluation of complex alternatives.

The study is limited to the comparative analysis of open-access BPM platforms, taking into account considerations of cost, technological independence, and reproducibility. Since these platforms implement consolidated standards of the BPM domain and share essential functional capabilities, their evaluation under an MCDA scheme allows real performance to be compared without biases associated with licensing schemes.

From a research perspective, this work constitutes the first stage of a broader investigation into the evolution of software based on business processes. Although the study was conducted with data up to June 2023 and its publication was delayed by administrative and funding processes, its relevance remains current given the growth of BPM and the sustained adoption of digital transformation initiatives.

The relevance of the study is reinforced by the absence of widely accepted systematic methodologies for the selection of BPM platforms. In this sense, the MCDA approach allows the problem to be addressed in a structured, reproducible, and justifiable manner, aligning the needs of the BPM field with a rigorous evaluation process.

This article is structured as follows: Section 2 presents the theoretical foundations of BPM platforms; Section 3 describes the methodology and the evaluation criteria; Section 4 presents the results obtained; Section 5 analyzes the threats to validity; Section 6 reviews related work; and Section 7 presents the conclusions.

BACKGROUND

This work compares various free and open BPMS that support the BPM lifecycle. BPM is a set of principles and techniques for the continuous improvement of business processes; that is, “a set of events, activities, and related decisions involving various actors and resources, and which, together, lead to a valuable outcome for an organization or its customers.” [1]. BPM facilitates the integration of new technological advances to reduce time to market, control costs, time, and quality, and consequently increase the efficiency of an organization’s business processes [2], [3], [4], [5], [6], [7], [8], [9]. The BPM lifecycle includes the discovery, design, analysis, execution, monitoring, and optimization of business processes. This strategy requires the coordination of people, information systems, data, and events to support the operation of a given business. The use of BPM enables the coordination of information systems by linking business process activities, decisions, or events with the software that supports its execution, as well as facilitating IT alignment with the business [10].

METHODOLOGY

To carry out this study, we followed the Multicriteria Decision Analysis (MCDA) method proposed by Pacheco Cárdenas[11] for selecting criteria that can be used in the evaluation of software products. Cárdenas’s proposal seeks for evaluators to be able to make methodological and transparent decisions. We adapted this method to our specific scope, following these steps: (a) list of all possible criteria, (b) definition of the evaluation for each of them, (c) assignment of a numerical score to each criterion, and (d) weighting of the criteria.

List of Criteria

The traditional criteria used to compare software tools include functionality, usability, performance and efficiency, reliability, maintainability and extensibility, portability and compatibility, cost and licensing, community, and vendor [12], [13], [14]. However, in this study, a key consideration when selecting a BPM platform is to ensure that it has the greatest possible impact on the academic community and industry. Therefore, to the above criteria, we add expert opinion, community, and trend, measures with which we seek to ensure that the selected BPMS has the widest possible reach. It is worth mentioning that the community refers to developers and the trend toward the popularity of a term search on Google (using Google Trends).

To assign the numerical score to each criterion, we followed the methodology of Bryson et al.[15], which consists of

structured quantitative scoring based on qualitative assessment rubrics through collaborative consensus processes among researchers[15].

At this point, we wish to highlight that the researchers agreed that the most important aspect of this study is the choice of the BPM platform with the greatest global presence, both in academia and in industry. However, we agreed to assign the same weighting.

Table 1 presents the normalized criteria.

Table 1: Normalization correspondence of the criteria

Criteria		Normalization	
		Range or Rule	**Value**
Usability	Technical support	Yes	5
		No	1
	Documentation	Available	5
		Not available	1
	Own forum	Yes	5
		No	1
Coverage	Available Operating Systems	4	5
		2–3	3
		1	1
		No information	1
	Languages	1 to 4	Number of Languages
		≥ 5	5
		Not specified	1
	Countries	1 to 4	Number of Countries
		≥ 5	5
		Not specified	1
	Success stories	1 to 4	Number of Stories
		≥ 5	5
		None	1
Expert Opinion	Forrester	Evidence evaluation	$\{1,2,3,4,5\}$
	Gartner		
Community	LinkedIn	Type min. – max. (benefit)	$\{1,2,3,4,5\}$
	Stack Overflow		
Trend	Google Trends		

Source: own elaboration

In this table, the ratings range from 1 to 5, which will allow us to obtain a decision matrix:

$$\boldsymbol{X} = [x_{ij}] \in \boldsymbol{R}^{mxn}$$

To compare m BPM platforms with n criteria. We obtained the ratings as follows: with (i) rules, with (ii) evidence evaluation, and with (iii) benefit-type correspondence (min = 1, max = 5). We applied the rules in usability and coverage, and each of them is seen in the Table 1. Some rules were “Available 5, Not Available 1”, “number of countries ≥ 5 5”, “There is no 1”.

We use the evidence evaluation to normalize the expert opinion as follows:

$$x_{ij} = f_j(evidencia) \in \{1,2,3,4,5\}$$

Finally, we applied the benefit-type correspondence to community and trend.

In the evaluation matrix, the score per criterion (Score) for each platform will be:

$$S(a_i) = \sum_{j-1}^{n} w_j x_{ij}$$

With w_j (equal weighting) with a value of 1 and x_{ij} normalized by rubric on the same scale.

For cases in which we found no information, we applied a penalty by assigning the minimum value of the scale $(x_{ij} = 1)$ to preserve comparability and avoid bias.

We then followed these stages to apply the selected criteria: (i) search for information sources on BPM platforms, (ii) selection of open and free BPM platforms that provide a BPM engine, (iii) application of criteria to the platforms and, finally, (iv) application of the MCDA criteria to compare the BPM platforms. Below, we describe each step of the process to facilitate its review and subsequent application.

Sources and selection of BPM platforms

Our main sources were the BPMN tools matrix by Hesse (BPMN tools matrix)[16], which lists 75 BPM tools, and the Gartner report on BPM platform reviews and ratings (Gartner report on BPM Platforms reviews and ratings)[17], which lists 65 BPM platforms. Both sources were consulted on June 8, 2023.

From Hesse's matrix, we took all the data as of the consultation date. For the Gartner report, we first selected the platforms that had at least five user ratings on Gartner's list. We then compared this selection with Hesse's list and obtained a list of 65 BPM platforms published online by Vega-Márquez[18].

We then selected the free and open source platforms. Fig. 1 summarizes the selection process applied to the BPM platforms. After applying these preliminary filters, we obtained the 10 BPM platforms presented in Tabla 2. The data for the platforms, both in the BPMN tools matrix and in Gartner, were taken in June 2023.

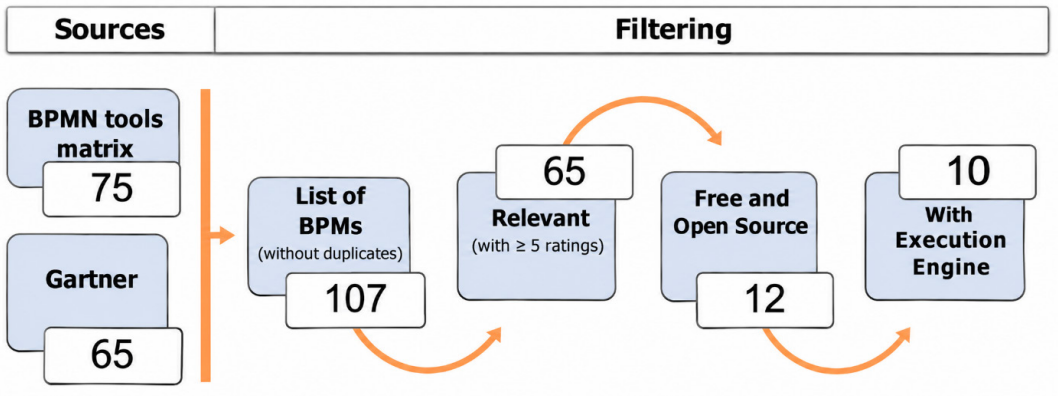

Fig. 1 Platform selection process for the comparison.
Source: own elaboration

Table 2: BPM platforms to be compared

Id	Name	URL
1	Activiti Modeler	https://www.activiti.org/
2	Bonitasoft	https://www.bonitasoft.com/
3	Camunda	https://camunda.com/
4	Flowable	https://www.flowable.com/
5	Imixs-Workflow	https://www.imixs.org/
6	jBPM	https://www.jbpm.org/
7	Modelio	https://www.modelio.org/
8	RunaWFE	https://runawfe.org/RunaWFE_Free_Workflow_System
9	simpl4	https://github.com/ms123s/simpl4-deployed
10	XML Frames	http://xmlframes.com/

Source: own elaboration

We applied the established selection criteria. Only Simpl4 and XML Frames did not provide information on (i) technical support. On the other hand, all the evaluated platforms met the criteria of (ii) availability of documentation, (iii) own forums and (iv) available languages. A detailed description of this information can be found on the following page on. The (vii) mentions in expert reports are usually indicated on each platform's website. However, when this information was not available, we used Google to search for studies or analyses that evaluated or mentioned these platforms. In addition to the "Business Process Management Platforms Reviews and Ratings" from Gartner[17]. We used two other reports to evaluate each of our possible BPM platforms: the "Market Guide for Business Process Automation Tools"[19]and the "Magic Quadrant for Intelligent Business Process Management Suites" – iBPMS [20].

Application of Criteria

The Tabla 3 presents Gartner. Platforms not included are not mentioned in any report.

Table : Gartner Rating

Gartner Reports	Bonitasoft	Camunda	Flowable
Gartner Magic Quadrant for iBPMS	✓	X	X
Market Guide for Business Process Automation Tools	✓	✓	✓

Source: own elaboration

Of all the Forrester reports, we selected the most recent one related to BPM, The Forrester Wave™: Digital Process Automation Software [21]; the study commissioned by Camunda, Total Economic Impact of Camunda [22] and a blog post related tangentially to Activiti Modeler, Hyland Accelerates Its Path To Cloud By Acquiring Alfresco Software [23].

Table 4: Forrester reports/studies

Forrester Study/Report	BPM Platform
The Forrester Wave™: Digital Process Automation Software, Q4 2021	BonitaSoft

Forrester Study/Report	BPM Platform
Total Economic Impact Of Camunda, July 2021	Camunda
Hyland Accelerates Its Path To Cloud By Acquiring Alfresco Software, 2020	Activiti Modeler

Source: own elaboration

Tabla 4 lists the reports or studies consulted that mention any of the BPM platforms in our list. The search configuration we used for LinkedIn is presented in Fig. 2.

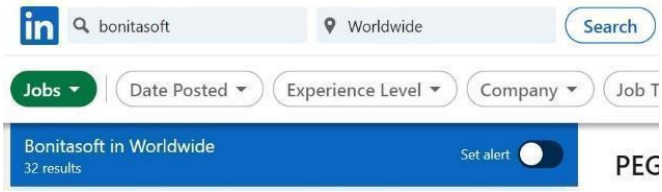

Fig. LinkedIn search configuration
Source: own elaboration

For example, to evaluate Bonita Soft, we searched for job postings that included “Bonita Soft” in “All the world”. In this case, LinkedIn returned 32 job postings. The summary of the results of this search for all the BPM platforms we considered is presented in the second column of Tabla 5. Camunda, jBPM and Flowable obtained the highest number of results in our LinkedIn search. In the case of Stack Overflow, we performed a full search with the name of each BPM platform.

Table 5: LinkedIn job offers and Stack Overflow issues for each BPM platform

BPM Platform	LinkedIn job offers	Stack Overflow issues
Activiti Modeler	13	187
BonitaSoft	31	72
Camunda	1000	500
Flowable	596	112
Imixs-Workflow	0	23
jBPM	924	500
Modelio	14	227
RunaWFE	0	0
simpl4	0	0
XML Frames	0	0
YaoqiangBPMNEditor	0	3

Source: own elaboration

To this end, we developed software that uses the Stack Overflow API to retrieve all issues related to a BPM platform; we named it “Stack Overflow Issues Searcher – SOFIS”[24]which queries the discussions created since 14 January 2014 (publication date of the BPMN standard) on a particular topic, up to a given date.

To reproduce this query, the name of the BPMS of interest must be passed to the tool as a parameter in the “search_topic” parameter (-€ of issue), with 30 June 2023 as the end date (-f of fecha). The repository documentation, published in the README, shows the different ways of accessing the tool, which can generate the results in a .CSV file or in a database. The tool can likewise be used via the command line or with a graphical interface on Windows. In the StackOverflow query, the Camunda and jBPM BPMSs tied for first place, followed by Modelio and Activiti Modeler.

We then used Google Trends, a Google service that presents the search trends of a term or concept, to compare the number of searches made for each platform over a given period in different locations.

All queries were made in June 2023, using the last 12 months as the query period. The resulting Google Trends page for each platform is presented in Tabla 6. This tool provides a geographic breakdown of searches for each BPM platform. There were not enough data available to generate a trend overview for Imix_Workflow, so it was not included in this table. Because the tool allows a maximum of five terms to be compared at a time, we selected the five most widely used platforms for our comparison.

According to the maps presented in Tabla 6, the platforms to be compared were (a) BonitaSoft, (b) Camunda, (c) Modelio, (d) Flowable and € jBPM. The result of this comparison is presented in Fig. 4. Camunda is the most searched BPM platform worldwide, followed by Flowable, jBPM, BonitaSoft and Modelio.

In Fig. 3, we present a results page from Google Trends, using jBPM as an example in[25].

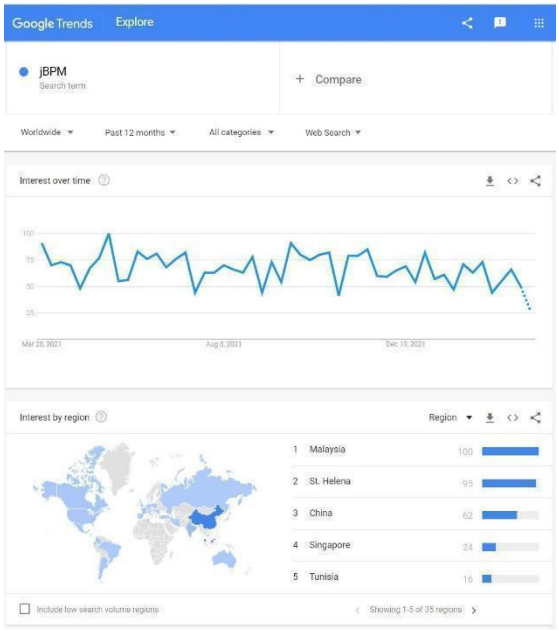

Fig. 3 Google Trends result for a platform
Source: Google Trends [25].

BPMS	Google Trends Geographic Searches	BPMS	Google Trends Geographic Searches	BPMS	Google Trends Geographic Searches
Activiti Modeler		BonitaSoft		Camunda	
Flowable		jBPM		Modellio	
RunaWFE		Simpl4		XML Frames	

Table 6: *Google trends by BPM platform*
Source: own elaboration

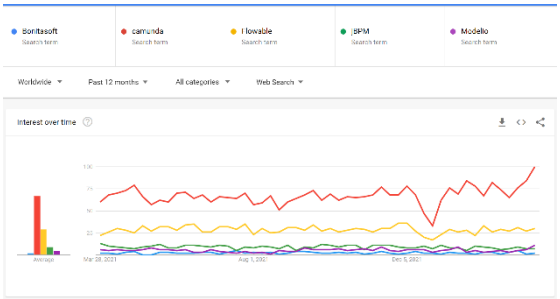

Fig. 4 Comparison of BPM platform trends.

RESULTS

The normalization defined previously and presented in section 3 allowed us to assign comparable numerical values to each criterion for the selection of a BPM platform. As a result, we obtained the matrix presented in Tabla 7.

Analysis

We decided to use a radar chart to make the analysis easier, since this type of chart presents the information clearly and completely, which allowed us to see directly the differences among all the platforms across all relevant criteria. The larger area of the chart clearly indicates which platform had the best overall rating.

Next, to simplify the interpretation of the chart, we decided to eliminate the criteria that did not present significant differences in this comparison. For example, the Documentation, Technical Support, Own Forums and Languages criteria were not useful, since all of them had the same score.

The normalized values of the Languages, Success Cases, Forrester, Gartner, LinkedIn, Stack Overflow and Google Trends criteria for RunaWFE, simpl4 and XML Frames show that they have a much lower rating (1 on the 1 to 5 scale) than the other platforms, so the co-researchers agreed that their exclusion does not affect the overall result of the comparison.

The BPM platforms Imixs-Workflow, jBPM and Modelio also obtained the lowest possible score in half of the relevant criteria and could be excluded without fear that they would offset these low scores with their scores in the other half of the criteria (these values can be seen in Table 7.

Table 7: Normalized BPM platform comparison criteria

BPM Platform	Tech. support	Documentation	Own Forums	Operative Systems	Languages	Countries	Success Stories	Forrester	Gartner	LinkedIn	Stack Overflow	Google Trends
Activiti Modeler	5	5	5	3	1	1	1	3	4	2	4	1
Bonitasoft	5	5	5	3	5	5	5	4	4	2	2	2
Camunda	5	5	5	3	1	5	5	5	3	5	5	5
Flowable	5	5	5	5	1	5	5	1	4	4	3	4
Imixs-Workflow	5	5	5	5	1	1	1	1	1	1	2	1
jBPM	5	5	1	5	1	1	1	1	1	5	5	3
Modelio	5	5	5	3	1	1	1	1	1	2	4	2
RunaWFE	5	5	5	3	1	1	1	1	1	1	1	1
simpl4	1	5	1	1	2	1	1	1	1	1	1	1
XML Frames	1	5	1	3	2	1	1	1	1	1	1	1

Source: own elaboration

Thus, the selection criteria considered relevant for the final classification of the BPM platforms can be seen in Table 8. Regarding the expert rating from Gartner for Camunda, it is worth clarifying that although Gartner did not include it in its Magic Quadrant for iBPMS[20], Camunda is classified as a representative vendor in the Market Guide for Business Process Automation Tools[19]and appears in the report Business Process Management Platforms Reviews and Ratings report[17], both publications by Gartner. For this reason, the co-researchers rated this criterion 3.

We used the radar chart as a multivariate visualization tool to represent simultaneously the relative performance of the evaluated platforms against the set of normalized criteria in Tabla 8.

Table 8: Classification of the BPM platform for the radar chart

BPM Platform	Success Stories	Forrester	Gartner	Linked In	Stack Overflow	Google Trends
Activiti Modeler	1	3	4	2	4	1
Bonitasoft	5	4	4	2	2	2
Camunda	5	5	3	5	5	5
Flowable	5	1	4	4	3	4

Source: own elaboration

Since the MCDA model produces, for each alternative (BPMS platform), a vector of scores per criterion, the radar chart (Fig. 5) facilitates the visual comparison of these multidimensional profiles and the identification of specific strengths and weaknesses per criterion, complementing the quantitative analysis of the aggregate score without replacing it.

We acknowledge, however, that the radar chart has limitations. In particular, this representation does not explicitly incorporate the criterion weights and does not reflect their contribution to the overall score, so visual differences along the axes should not be interpreted as direct impacts on the ranking.

Likewise, overlapping polygons and interpretation based on areas may induce non-linear perceptions as the number of criteria or alternatives increases. For these reasons, we use the radar chart only as descriptive visual support, while the study's conclusions rest on the MCDA model and on the sensitivity analysis of the results.

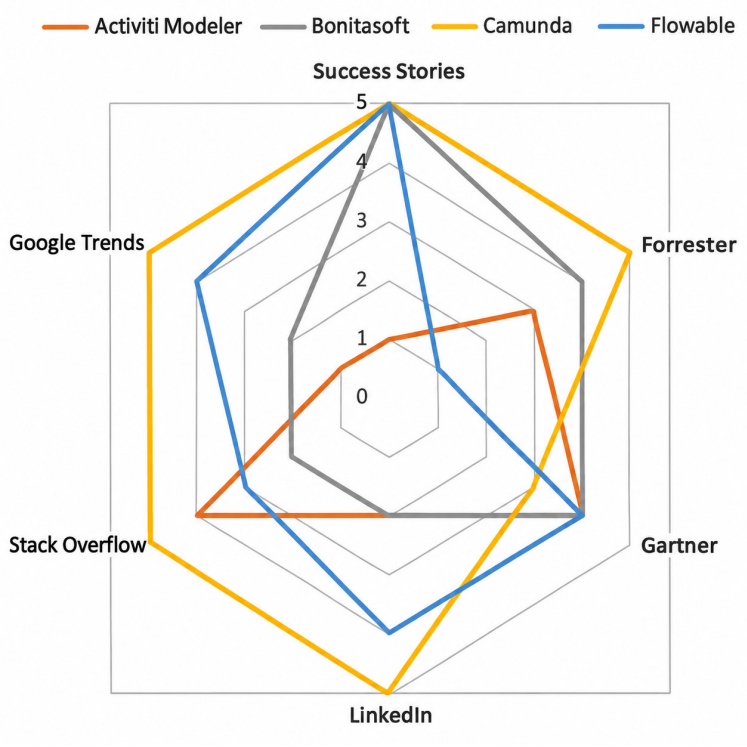

Fig. 5 BPM Platforms Comparison Radar Plot
Source: own elaboration

As can be observed in both instruments, Camunda is the leading alternative.

Sensitivity analysis

To assess the robustness of the proposed multicriteria decision model (MCDA), we performed a sensitivity analysis with controlled variations in the main methodological assumptions of the evaluation process. The base scenario uses equal weights for all criteria, that is, $w_j = 1/n$, a weighted additive model as the aggregation function, and a conservative strategy for handling missing values.

First, we analyzed the sensitivity of the results to variations in the criterion weights. To this end, we defined perturbed scenarios by increasing by 20% the weight of criteria considered relevant (for example, usability, coverage, expert opinion, and trend), proportionally redistributing the remaining weights to preserve the normalization condition $\sum_{j-1}^{n} w_j = 1$. For each scenario, we recalculated the overall score of the alternatives using the expression:

$$S(a_i) = \sum_{j-1}^{n} w_j x_{ij}$$

Second, we evaluated the sensitivity of the model to the treatment of missing values. We compared penalizing the absence of evidence by assigning the lowest scale with the alternative of excluding these criteria from the aggregation process and re-normalizing the weights over the subset of observed criteria.

We also rescaled the discrete scores $\{1, 2, 3, 4, 5\}$ to the continuous interval $[0, 1]$ in order to check how the evaluation scale influences the resulting ranking.

The results are summarized in Tabla 9. In all the scenarios evaluated, the best-positioned alternative remains invariant, while only minor variations are observed in the intermediate positions of the ranking.

These results show that the proposed MCDA model is robust to reasonable variations in the weights, the handling of missing values and the evaluation scale, which supports the consistency and reliability of the conclusions drawn from the comparative analysis.

Threats to validity

Table 9: Sensitivity analysis of the MCDA ranking under different scenarios

Scenario	Model modification	Leading platform	Changes in the ranking
Base	Equal weights $w_j = 1/n$; penalty for missing values	Camunda	—
S1	20% increase in the weight of the Usability criterion	Camunda	No
S2	20% increase in the weight of the Coverage criterion	Camunda	No
S3	20% increase in the weight of the Community - StackOverflow criterion	Camunda	Minor changes in intermediate positions
S4	Alternative handling of missing values (no penalty)	Camunda	Marginal variations
S5	Rescaling of scores to $[0, 1]$	Camunda	No

Source: own elaboration

In this work, we set aside some of the traditional criteria used in software evaluation, such as robustness, security, usability, portability or ease of implementation, to name a few. Under other circumstances, this could be considered a weakness in a study such as this one. However, these platforms have certain characteristics that allowed us to confidently rule out some of the criteria mentioned above.

First, they are not emerging software. Their widespread and continuous use indicates that they must be sufficient according to traditional evaluation criteria.

Second, we conducted a meta-analysis of various studies carried out by recognized expert firms, which gave us confidence in the value of our evaluation criteria. The criteria used for our comparison also guarantee that the chosen BPM platform will allow our future traceability research to have a significant impact.

The chosen methodology may also help solve possible technical problems that may arise in that research, since it guarantees the availability of a large repository of answers to technical questions (Stack Overflow). Finally, it guarantees that there are enough experts in the chosen BPM platform whom we can turn to for help or collaboration if necessary (LinkedIn). For these reasons, we consider that prioritizing these criteria over the traditional ones was the most appropriate decision for carrying out this study.

Finally, we acknowledge that we did not consider aspects such as the presentation of the interface or the complexity of the installation process of the BPM platforms in our comparison. For example, not including Bizagi[26], a platform known for its intuitive and attractive interface, might at first glance seem like a significant oversight in our study. However, compliance with the BPMN 2.0 standard (which all the platforms considered adhered to) already guarantees an adequate level of interface clarity and usability.

In addition, Bizagi could not be included in our evaluation because it is not completely free or open source, and, as mentioned above, one of our main objectives is to have the greatest possible impact on the BPM-based software development community.

It should be noted that our approach will be adaptable for implementation on any other platform. Regarding the complexity of the installation process of our selected platform, we must state that, although the modeler and the engine of Camunda are decoupled, which means each must be installed separately (the modeler through a simple download, and the engine either through an app container –Docker in this case[27]or by downloading the source code and compiling it afterward). This is an increasingly common configuration for installing software, as it facilitates continuous deployment.

Related work

To compare our study with other proposals, we reviewed scientific sources and grey literature. The latter was based on sources of recognized prestige in the field of technology.

In the scientific field, the study carried out by Lyakhovich[30]presents a survey of tools for implementing business processes, based mainly on documentation, analysis, evaluation, development and implementation, promoting operational excellence and transformation, workflow management, including real-time management, optimization and automation, common characteristics that all BPM platforms must meet so that the organization achieves its business objectives. However, the article presents the analysis only in a very general and theoretical way regarding the market of platforms for PBM.

In the undergraduate thesis of Quirant[31]we found a comparison of BPM tools in which, from a list of 10 BPM platforms selected by the author as the most prominent (the text does not justify the selection), the author selects only 3 platforms for analysis: WebRatio, BonitaSoft and Oracle BPM Suite. Two of them were chosen because the author already knew them, and a third on expert recommendation. The evaluation is reported according to the general quality criteria for software products under the ISO 25000 model: functionality, performance, compatibility, reliability, usability, security, maintainability and portability, in addition to 3 other criteria defined by the author's experience in handling the platforms. The evaluation was qualitative, and the conclusion about which platform is ideal depends on the type of business process to be implemented.

Other comparisons of BPM platforms have been made in the scientific literature; however, they often rely on traditional

selection criteria, which makes them of limited use for our purposes. For example, Jiménez[32]describes a series of internal characteristics of the BPM platforms that it evaluates; subsequently, a weighted rating of each is carried out to obtain an average score. It should be noted that these criteria are assessed qualitatively.

Mesa, Lochmuller and Tabares[33], for their part, perform a qualitative analysis of seven BPM platforms, but do not present their selection criteria. Furthermore, although they describe the criteria used for the comparison, they did not normalize the qualitative values across different criteria, nor did they provide a unified scale that would allow comparing heterogeneous data.

In contrast, Gallego, Giraldo and Hitpassy [34] present a framework called the PBEC-OTSS approach (Process-Based Evaluation and Comparison for Off-The-Shelf Software). This method organizes the evaluation data by assigning weighted numerical values to different characteristics of the BPM platforms to be compared. However, the resulting score of each platform in this study was based on the opinion of several experts on each of the evaluated platforms, which limited the total number of platforms that could be considered. For this reason, given the large number of platforms considered in this study, it is impossible to apply this method in our case. On the other hand, since the methods proposed in Hou, Song, Yang and Hao [35]; Silva, Poleto, De Carvalho and Costa [36] also depend heavily on the use of experts, so we discarded them as well.

The last set of proposals for comparing BPM platforms that we reviewed (Papademetriou and Karras[37]and Serrano and Castellanos Granados [38]) are not usable in this study, since these authors did not consider aspects crucial to our purposes, such as the coverage of the platforms, whether they were open source, and whether they had a significant community using them.

In the field of grey literature there are several recent comparisons of BPM; however, we cannot guarantee the independence of their evaluation processes, and many of them are sponsored by unknown actors. This to some extent contradicts our objective of choosing a widely used, free and open source platform.

However, we reviewed some of these comparisons to check whether they were useful for our interests. Trust Radius[28], for example, classifies BPM platforms according to the following criteria: “Best value for money”, “Best set of features” and “Best customer relationship”. The website explains that these criteria are based, in turn, on the following factors:

a) Would the customer buy the platform again?

b) Does the platform meet the customer’s expectations?

c) Sales and marketing promises.

The data for the comparison come from customer surveys and analyst reviews. This comparison would be useful for an organization seeking to implement a BPM strategy, but it offers no useful information for analysts, developers, and professionals interested in open source tools.

We also reviewed the comparison of BPM platforms by PeerSpot, based on the opinions, comments and reviews of professionals registered on its platform (around 576,000)[29]. Camunda is ranked as the best BPM solution in this report. However, the fact that only the platform’s affiliates took part in the comparison makes this source somewhat limited. Furthermore, as in the case of Trustradius, this analysis does not consider whether the evaluated platforms were widely used or whether they were open source.

In a related context, we found relevant evidence in reports and analyses of the technology market. These highlight the increasingly significant role of BPM platforms in the modernization and digital transformation of companies toward 2024–2025, particularly in workflow automation, support for hyperautomation initiatives, and the enablement of advanced analytics capabilities within business processes. They also point to a customer experience-centered vision, which is profoundly changing process management. Organizations that commit to next-generation BPM will be better prepared to increase their operational efficiency, raise customer satisfaction, and respond to global regulatory requirements.

Although the study presented in this document is still valid, the most recent comparative and market trend studies (2024–2025) for selecting BPM platforms still show the same traditional characteristics, with some novelties corresponding to the integration of AI, intelligent automation, and new disruptive actors (hyperautomation and integration with other technologies, IoT). Again, these continue to be evaluations that use traditional criteria, focused on technical aspects and therefore limited.

CONCLUSIONS

According to the analysis carried out in this study, Camunda is the BPM platform that best fits our needs and evaluation criteria. It is free and open source, which allows its application in research processes without additional investments. In terms of the evaluation criteria, it scored highest overall, combining the searches performed on it (Google Trends), the active community on platforms such as StackOverflow and LinkedIn, and expert opinion (Forrester and Gartner). We reached this conclusion after comparing the 107 BPM platforms in the exhaustive list we compiled by cross-referencing two sources: (i)

the BPMN tools matrix and (ii) Gartner's page of reviews and ratings of business process management platforms. We then selected the free and open source platforms for a more selective comparison. Subsequently, we compared the remaining 10 platforms using the following criteria:

(a) Usability, composed of (i) Technical support, (ii) Availability of documentation, and (iii) Own forums.

(b) Coverage composed of (iv) Operating systems, (v) Languages, (vi) Countries, and (vii) Success stories.

(c) Expert opinions taken from (viii) Forrester and (ix) Gartner.

(d) Community, measured by the number of job postings on (x) LinkedIn that require knowledge of a given BPM platform and by the number of threads started on (xi) Stack Overflow that mention it.

(e) Web search trends, estimated by analyzing the information provided by (xi) Google Trends.

With an initial analysis of the resulting data, we reduced our group of platforms to Activiti Modeler, BonitaSoft, Camunda and Flowable, and our comparison criteria to Success Stories, Forrester, Gartner, LinkedIn, Stack Overflow and Google Trends. The first because the other platforms scored very low compared with the rest; the second because the reduced set of platforms had the same rating on the other criteria.

Finally, we plotted the score of each of these BPM platforms on the comparison criteria in a radar chart, so that their relative strengths and weaknesses could be seen at the same time. The platform with the highest combined score and the largest area in the radar chart was Camunda. This will therefore be the BPM platform we use in our next research project. We thus aspire to contribute to an important international community working on business process-based software evolution. In the meantime, we hope this study helps other researchers who need to know which of the current free and open source BPM platforms have the greatest global presence and the largest community around them. Likewise, the methodology developed in this study, which incorporates criteria beyond those traditionally used, is expected to serve as a reference for researchers and software industry professionals carrying out similar analyses in other contexts.

Given the dynamic nature of BPM platforms and the continuous emergence of new solutions, one possible future line of work is to develop an observatory of BPM platforms that applies the proposed evaluation methodology to analyze how they evolve over time with respect to the different criteria defined in this study.

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CONFLICT OF INTEREST

None

AUTHORSHIP CONTRIBUTIONS

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Data availability statement

The data collected for this work are available (anonymized) in this Git repository: https://anonymousga.github.io/bpm_pc/.