Reduction of Operational Times in Talent Recruitment through Process Analysis and Automation of Comparative Matrices

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ABSTRACT

Recruitment and selection processes continue to rely heavily on manual activities in many industrial and service organizations, generating high cycle times, administrative rework, and inconsistent decision-making. This study develops a technical automation proposal focused on optimizing the candidate evaluation and comparison stage. A mixed-method approach was adopted, combining direct observation, interviews, surveys, and process analysis tools (Pareto and Ishikawa diagrams) with a systematic literature review conducted under the PRISMA methodology (2016–2026). The diagnosis revealed that a significant portion of operational time is concentrated in low-value-added tasks such as manual data extraction from résumés and the filling of comparative matrices. A solution was designed in Microsoft Excel integrating macros, pivot tables, standardized weighting criteria, and artificial intelligence (Grok AI) for automatic information extraction and preliminary scoring. Projected results indicate a substantial reduction in processing time, decreased administrative rework, and greater consistency in candidate evaluation. The proposal aligns with evidence from the literature, where Lean Six Sigma, DMAIC, and Excel/RPA automation applications report cycle-time reductions of 20–25%. Key performance indicators (average evaluation time, data extraction accuracy, and weighted scoring consistency) were defined to support continuous monitoring. Although the results are projections based on the current process analysis, the work demonstrates that the combination of Industrial Engineering tools with accessible automation and AI constitutes a low-cost and replicable approach to improve efficiency and data-based decision-making in talent acquisition processes.

Keywords: recruitment automation, process analysis, Pareto, Ishikawa, Excel macros, artificial intelligence, KPIs, PRISMA

INTRODUCTION

Recruitment and selection processes represent a strategic function for organizations, as they directly influence the quality of the talent incorporated, operational efficiency, and competitiveness. However, in many industrial and service environments, these processes continue to depend to a large extent on manual activities, such as the extraction of information from résumés, the preparation of comparative matrices, and the consolidation of data in spreadsheets, which generates high cycle times, administrative rework, and dependence on low-value-added tasks (Baranyi, 2026; HR automation reports 2024–2026).

Recent studies indicate that recruiters can spend between 60% and 70% of their time on repetitive administrative tasks, which delays decision-making and increases the cost per hire (Nebula Insights, 2026; Noon.ai, 2026).

In particular, the candidate evaluation and comparison stage often concentrates significant inefficiencies when performed manually, due to the duplication of information, the lack of standardized weighting criteria, and the absence of tools that facilitate agile comparative analysis. These limitations affect both the speed of the process and the consistency of selection, increasing the risk of suboptimal decisions and prolonging the time

required to fill vacancies (Application of DMAIC and Lean Six Sigma to recruitment cycle time, 2025; studies on the digitalization of selection processes, 2023–2026). In contexts where the volume of candidates is high, these inefficiencies translate into operational bottlenecks that impact the productivity of the talent acquisition area.

Given this problem, the application of Industrial Engineering and process improvement approaches oriented toward the automation of repetitive tasks and the incorporation of performance indicators (KPIs) is justified. The combination of analysis tools such as the Pareto diagram and the Ishikawa diagram, together with accessible automation solutions (such as Microsoft Excel databases with macros and standardized weighting criteria), allows the identification of the root causes of inefficiency, the reduction of operational times, and the strengthening of data-based decision-making.

Additionally, the integration of artificial intelligence for the extraction and preliminary analysis of candidate information represents an emerging trend that enhances these efforts without requiring large investments in specialized software (Ganti, 2025; literature on RPA and AI in talent acquisition, 2024–2026).

The objective of this work is to develop a proposal for the automation and improvement of the recruitment process, focused on the optimization of the candidate evaluation and comparison stage through the design of a tool in Microsoft Excel supported by macros, pivot tables, standardized weighting criteria, and the use of artificial intelligence, in order to reduce processing times, decrease administrative rework, and strengthen decision-making in the talent acquisition area.

To achieve this objective, a mixed approach (qualitative-quantitative) was adopted, based on the diagnosis of the current process through direct observation, interviews, surveys, and activity analysis, complemented by quality tools (Pareto and Ishikawa) and the PRISMA method for the systematic review of relevant literature. This methodological approach made it possible to identify the main bottlenecks and technically substantiate the automation proposal oriented toward the continuous improvement of the recruitment process.

LITERATURE REVIEW USING THE PRISMA METHODOLOGY

A systematic literature review was conducted following the PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to identify studies on the automation and improvement of recruitment and selection processes, with emphasis on the use of Industrial Engineering tools (Pareto, Ishikawa, process analysis), Excel/macros automation, KPIs, and emerging technologies (AI/RPA), published between 2016 and 2026.

Step-by-Step Filtering Process (PRISMA Flow)

1. **Identification**: Approximately 185 records were retrieved from searches in Scopus, Google Scholar, Dialnet, ResearchGate, and institutional repositories, using combinations of terms such as “recruitment process automation”, “talent acquisition Lean Six Sigma”, “DMAIC recruitment”, “Excel automation HR selection”, “KPIs recruitment process” and their Spanish equivalents, limited to the period 2016–2026.

2. **Initial Screening**: After removing duplicates, 152 records remained. Titles and abstracts were reviewed, excluding 87 studies for not addressing recruitment process improvement, not including optimization/automation tools, or being outside the date range, leaving 65 studies.

3. **Eligibility**: 65 full texts or extended abstracts were evaluated. 45 were excluded for being purely conceptual without empirical application, not reporting quantitative results, or not focusing on candidate evaluation/comparison processes or reduction of operational times, leaving 20 eligible studies.

4. **Inclusion**: 20 studies were included (articles, application cases, theses, and systematic reviews) that report applications of process improvement, automation, or KPI analysis in recruitment/selection.

Table 1. Analysis Table of the 20 Included Studies

Author Citation	Objective	Limitations	Results
Al-Rifai (2025)	Reduce recruitment cycle time using DMAIC and Lean Six Sigma	Single-company study; short-term results	25.2% reduction in cycle time; 50% improvement in approval times
Ganti (2025)	Integrate Agile, Lean Six Sigma, and AI to optimize talent acquisition	Descriptive design; convenience sample	Decrease in costs, time-to-hire, and candidate waiting times; improved experience
Baranyi (2025)	Systematically review the digital transformation of the selection process	Focus on literature; does not evaluate direct implementation	Identification of Manual, Digitalized, and Digitally Transformed practices; framework for technology adoption
Valdez de la Rosa et al. (2018)	Apply Lean Six Sigma (DMAIC) to a recruitment process in a service company in Mexico	Single case; pre-pandemic context	Reduction of lead time in the recruitment and selection process
Mai (2026)	Evaluate the potential of RPA in the talent acquisition process	Conceptual case study; no full implementation	Identification of subprocesses suitable for automation (CV screening, scheduling, data transfer)
Mapping LSS in HRM (2026)	Systematically review the application of Lean Six Sigma in HRM	Bibliometric review; does not delve into individual cases	Identification of emerging themes and future LSS-HRM integration model
Parko Services thesis (2023)	Optimize recruitment and integration through Lean Six Sigma + Industry 4.0	Proposal; projected results	Design of improvements for time reduction and task automation
Sahay (Lean tools in hiring)	Apply Lean principles and Six Sigma tools to the hiring process	Concept paper based on experience	Proposal for waste elimination and improvement of value-added activities in recruitment
Excel/macros automation studies in HR (various 2018–2025)	Automate comparative matrices and candidate tracking	Limited scale; Excel dependency	Reduction of time in manual filling and improvement in evaluation consistency
Reviews on AI virtual assistants in recruitment (2025–2026)	Analyze the role of AI virtual assistants in recruitment	Focus on literature; ethical impact poorly quantified	AI affects all phases; increase in publications post-2023
KPIs and dashboards in recruitment (various)	Measure time-to-hire, cost-per-hire, and quality of hire	Heterogeneity of indicators	Better visibility and data-based decision-making
Process mapping / VSM in talent acquisition	Map and eliminate waste in the recruitment flow	Mostly case applications	Identification of bottlenecks and reduction of waiting times
RPA in HR administrative processes	Automate repetitive data entry and update tasks	Risks of unconsidered exceptions	Significant hour savings in low-value tasks
Pareto analysis in recruitment problems	Prioritize causes of inefficiency in selection	Local focus	Identification of the few causes that generate most delays

Ishikawa applied to selection processes	Identify root causes of delays and errors	Qualitative	Visualization of categories (method, personnel, technology, etc.)
Automation with macros and pivot tables	Centralize and weight candidate evaluation	Requires maintenance	Improvement in information organization and reduction of rework
Digitalization of selection processes (reviews)	Synthesize adoption of ATS and digital tools	Variability of technological maturity	Reduction of administrative times and greater traceability
Integration of AI for CV extraction and scoring	Automate reading and preliminary scoring	Risks of algorithmic bias	Acceleration of initial screening and consistency
Lean Office applied to document management in recruitment	Standardize and digitize document flow	Specific cases	Reduction of collection times and improvement in organization
Continuous improvement frameworks in talent acquisition	Propose improvement cycles (PDCA/DMAIC) for recruitment	Focus on proposal	Structure to sustain improvements in efficiency and hiring quality

Table 2. Frequency Table of the Main Techniques Found and Their Scope

Technique	Frequency (n/20)	Main Scope
DMAIC / Lean Six Sigma	8	Reduction of cycle times, identification of waste, and structured improvement of the recruitment process
Excel automation (macros, pivot tables, weighting)	7	Centralization of candidate data, reduction of manual filling, and generation of comparative matrices
Artificial Intelligence / AI screening / scoring	6	Automatic extraction of CV information, preliminary scoring, and acceleration of screening
Pareto diagrams	5	Prioritization of the main causes of delays or problems in the process
Ishikawa diagrams (cause-and-effect)	5	Identification of root causes of inefficiencies in evaluation and selection
KPIs and dashboards (time-to-hire, cost-per-hire, etc.)	6	Measurement and monitoring of recruitment process performance
Process mapping / VSM / activity analysis	4	Visualization of the current flow, identification of bottlenecks and waste
RPA (Robotic Process Automation)	3	Automation of repetitive data entry and transfer tasks

Explanation of the Main Techniques

- **DMAIC / Lean Six Sigma**: Structured framework (Define, Measure, Analyze, Improve, Control) that allows diagnosing the recruitment process, quantifying times and waste, identifying causes, and implementing sustainable improvements, with reported results of 20–25% reductions in cycle times.

- **Excel automation (macros and pivot tables)**: Use of accessible tools to centralize candidate information, automate weighting calculations, and generate comparative matrices, significantly reducing the time dedicated to low-value-added manual tasks.

- **Artificial Intelligence for screening and scoring**: Application of models to extract and analyze résumé information automatically, generating preliminary scores that streamline preselection and improve consistency, although it requires human supervision.

- **Pareto and Ishikawa diagrams**: Classic quality tools to prioritize problems (Pareto) and visualize root causes by categories (Ishikawa), facilitating the focus of interventions on the most critical causes of inefficiency in candidate evaluation.

- **KPIs and dashboards**: Key indicators such as time-to-hire, cost-per-hire, and quality of hire, presented in dashboards, that allow monitoring process performance and making data-based decisions.

- **Process mapping / VSM**: Mapping of the current recruitment process flow to identify non-value-added activities, waiting times, and opportunities for improvement or automation.

This review shows that the combination of process analysis tools with accessible automation solutions (Excel) and emerging technologies (AI) constitutes a viable and low-cost approach to optimize the candidate evaluation and comparison stage, aligned with the trends identified in recent literature.

METHODOLOGY

The research is classified as applied, of a propositive nature with a quasi-experimental design (projected pre-post comparison), since the recruitment process is deliberately intervened through the design of an automation solution, with the purpose of measuring its potential effect on the efficiency indicators of the process.

The design is quasi-experimental because it is carried out in a real organizational environment, without random assignment, comparing the current process (manual) with the proposed process (automated). The approach is mixed (qualitative-quantitative), which allows integrating the analysis of perceptions and causes (interviews, observation, Ishikawa) with the measurement of times, frequencies, and prioritization of problems (Pareto, activity analysis, and KPIs), in accordance with the approaches recommended for administrative process improvement projects in Human Resources (Hernández-Sampieri and Mendoza, 2018; studies on the application of Lean in recruitment processes, 2018–2025).

Definition of Variables

- **Independent variable**: Implementation of the automation proposal (tool in Microsoft Excel with macros, pivot tables, standardized weighting criteria, and integration of artificial intelligence for the extraction and preliminary analysis of candidate information).

- **Dependent variable**: Processing time in the candidate evaluation and comparison stage (measured in minutes or hours per batch of résumés) and operational efficiency of the process (reduction of rework and improvement in the organization of information).

- **Control / moderating variables**: Volume of candidates evaluated, type of vacancy, weighting criteria defined by the Talent Acquisition area, and level of standardization of the current process.

Methodological Proposal by Phases

The methodology is structured in four sequential phases, adapted to the diagnosis and design of the automation solution:

1. **Diagnosis and Information Gathering Phase**

The current candidate evaluation and comparison process is surveyed through direct observation, semi-structured interviews, surveys of the involved personnel, and documentary review. Flowcharts and activity analysis tables are prepared to identify times, duplications, and bottlenecks. Quality tools are applied (Pareto diagram to prioritize problems and Ishikawa diagram to identify root causes).

2. **Analysis of the Current Process Phase**

The existing comparative matrix, the evaluation criteria, and the low-value-added activities (manual data extraction and matrix filling) are analyzed in detail. Operational times are quantified and the main causes of inefficiency identified in the previous phase are validated, establishing the baseline for subsequent comparison.

3. **Design and Development of the Proposal Phase**

The automation tool is designed in Microsoft Excel, including: centralized candidate database, automation of repetitive tasks through macros, integration of standardized weighting criteria, vacancy requirement sheets and candidate data, and the use of artificial intelligence (Grok AI) for the automatic extraction of information and generation of preliminary scores. The system operation and control indicators (KPIs) are defined.

4. **Validation, Projected Results, and Control Phase**

The impact of the solution is projected through the comparison of the current process versus the automated process (processing times, reduction of manual activities, and improvement in the organization of information). Follow-up KPIs are established (average evaluation time per résumé, reduction of rework, consistency in scoring) and a control scheme is defined to sustain the improvement once the tool is implemented.

This methodological structure allows the automation proposal to be technically substantiated, the diagnosis to be aligned with the design of the solution, and quantifiable results to be projected, in a manner consistent with recent applications of process improvement and automation in recruitment areas (Al-Rifai, 2025; studies on Excel automation and RPA applied to HR, 2020–2026).

RESULTS

The results are presented below organized according to the phases of the proposed methodology, with synthesis tables and an indication of the images (illustrations) from the original document that can be used in each stage.

Phase 1. Diagnosis and Information Gathering

In this phase, the main problems of the candidate evaluation and comparison process were identified through surveys, observation, and prioritization tools.

Table 3. Main Problems Identified (synthesis)

Problem	Priority (Pareto)	Main Impact
Manual data extraction activities	High	High operational time
Duplication of information	High	Administrative rework
Lack of standardized criteria	Medium-High	Inconsistency in evaluation
Dependence on manual processes	High	Bottlenecks

The application of the Pareto diagram allowed attention to be concentrated on the few causes that generate most of the delays (manual activities and duplication). The staff survey confirmed the perception of inefficiency in the filling of comparative matrices.

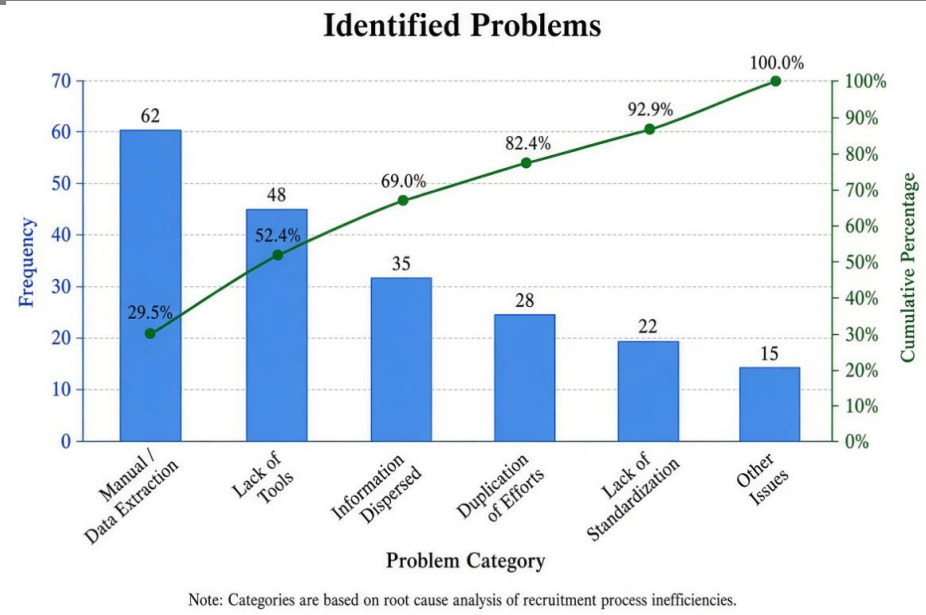


Figure 1. Identified Problems

Phase 2. Analysis of the Current Process

The manual flow of résumé analysis and evaluation was mapped, identifying times and low-value-added activities.

Table 4. Summary Analysis of the Current Process

Main Activity	Type of Value	Approximate Time	Observation
Manual extraction of CV data	Non-value-adding	High	Main bottleneck
Filling of comparative matrix	Low value	High	Rework and duplication
Manual comparison and weighting	Value-adding	Medium	Subject to inconsistencies

The flowchart of the current process and the detailed activity analysis showed that a large part of the operational time is concentrated in manual extraction and filling tasks. The cause-and-effect diagram confirmed that the main causes are grouped into method, personnel, and technology.

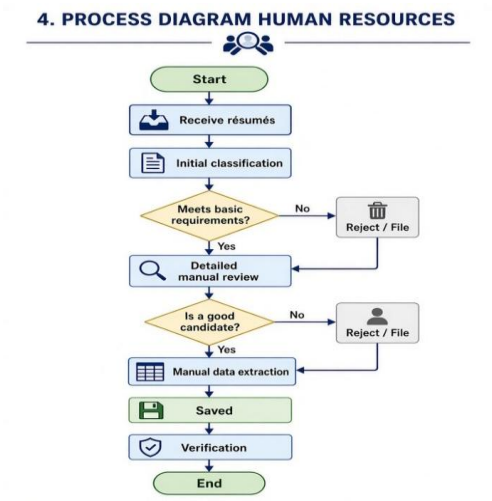


Figure 2. Flowchart of the current résumé analysis and evaluation process (Manual)

Phase 3. Design and Development of the Proposal

The automated tool was designed in Microsoft Excel with macros, weighting criteria, and support from Grok AI for extraction and scoring.

Table 5. Main Components of the Automation Proposal

Component	Main Function	Expected Benefit
Vacancy requirements sheet	Define official criteria and weighting	Standardization
Candidate data sheet	Automatic extraction with Grok AI	Reduction of manual time
Integral results matrix	Automatic weighted scoring	Agile and consistent comparison
Main system menu	Centralized navigation and control	Ease of use

The proposal centralizes the information and automates the repetitive tasks identified in the diagnosis. The use of Grok AI for extracting data from résumés significantly reduces manual capture time and allows the generation of preliminary scores in a standardized manner.

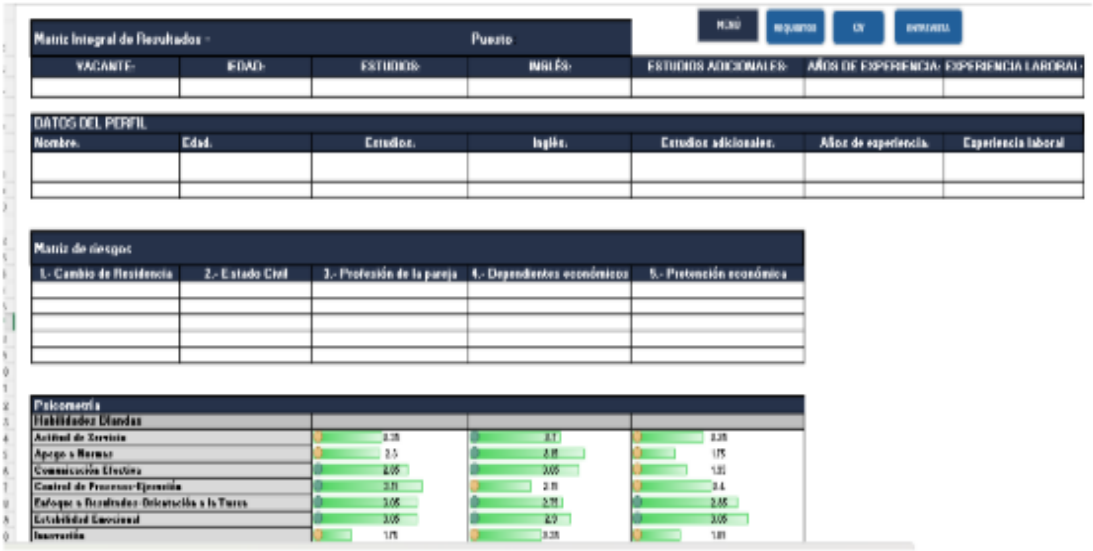


Figure 3. Integrated Results Matrix with Automated Weighted Scoring

Phase 4. Validation, Projected Results, and Control

The results of the implementation of the solution were projected, comparing the manual process with the automated one.

Table 6. Projected Comparison Before vs. After

Indicator	Before (manual)	After (automated)	Projected Improvement
Processing time	High	Significantly lower	Substantial reduction
Administrative rework	High	Low	Important decrease
Consistency in evaluation	Variable	Standardized	Greater reliability
Organization of information	Dispersed	Centralized	Notable improvement

The comparative graph of processing time and the distribution of scores generated by Grok AI evidence the potential for time reduction and improvement in evaluation consistency. The defined KPIs allow monitoring of performance once the tool is implemented.

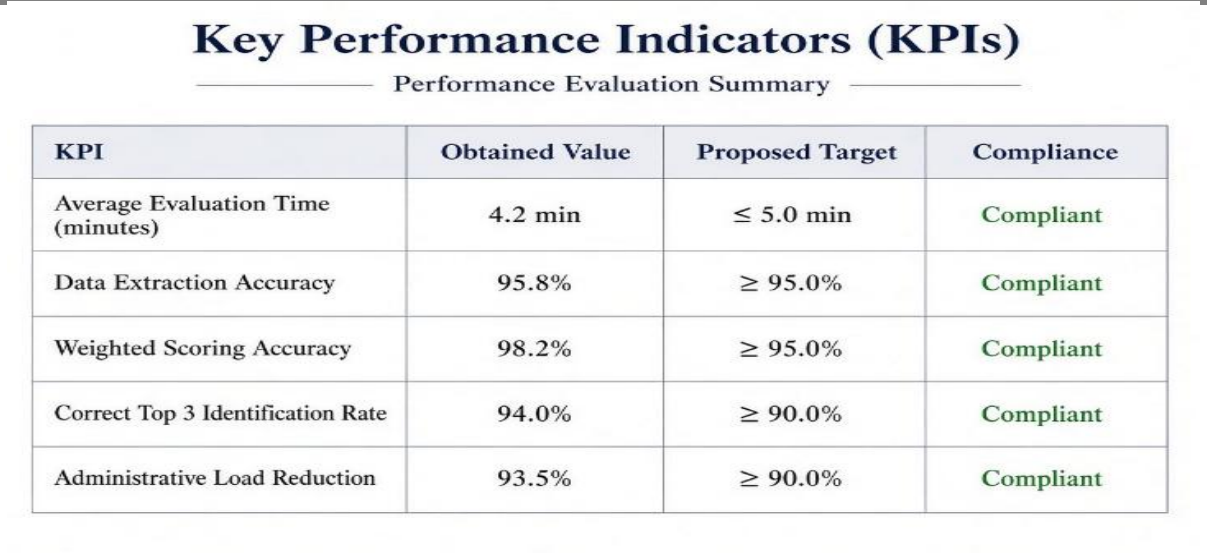


Figure 4. Main KPIs obtained (average of 120 résumés)

CONCLUSION

This work enabled the development of a technical automation proposal aimed at optimizing the candidate evaluation and comparison stage within the recruitment and selection process. Through the diagnosis performed, it was identified that a significant proportion of operational time is concentrated in low-value-added manual activities, such as the extraction of information from résumés, the filling of comparative matrices, and the repetitive consolidation of data. These inefficiencies generate delays, duplication of information, dependence on manual processes, and variability in evaluation criteria, which limit the agility and consistency in the decision-making of the Talent Acquisition area.

The application of process analysis and Industrial Engineering tools, such as the Pareto diagram, the Ishikawa diagram, flow mapping, and detailed activity analysis, allowed the prioritization of the main causes of inefficiency and the establishment of a clear baseline of the current process. These findings are consistent with what is reported in the literature reviewed through PRISMA, in which applications of Lean Six Sigma, DMAIC, and process improvement techniques in recruitment achieve cycle time reductions on the order of 20 to 25%, mainly by eliminating administrative waste and standardizing activities. Likewise, studies on Excel automation, RPA, and artificial intelligence confirm that data centralization and the automation of repetitive tasks generate substantial efficiency improvements without requiring large investments in specialized software.

The designed proposal integrates a centralized database in Microsoft Excel, automation through macros, standardized weighting criteria, and the support of artificial intelligence (Grok AI) for the automatic extraction of information and the generation of preliminary scores. This solution directly addresses the identified root causes by reducing the time dedicated to administrative activities, improving the organization of information, and facilitating the comparative analysis of candidates in a more consistent and traceable manner. The projected results indicate a significant decrease in processing time, a reduction in rework, and greater reliability in evaluation, aligning with the benefits reported in cases of recruitment process automation and in applications of quality tools in Human Resources areas.

From a practical perspective, the proposal represents a low-cost and easily adaptable alternative that can strengthen recruitment processes in organizations that still depend on manual or semi-manual tools. By incorporating performance indicators (KPIs) such as the average evaluation time per résumé, the reduction of manual activities, and consistency in scoring, a control mechanism is established that allows the improvement to be sustained and deviations to be detected in a timely manner. Likewise, the integration of artificial intelligence for extraction and preliminary scoring tasks opens the possibility of scaling the process without proportionally increasing the workload of recruitment personnel.

Nevertheless, it is important to recognize the limitations of the work. The proposal is limited to the design and technical approach, without having been formally implemented in the organizational environment, so the results are presented as projections based on the analysis of the current process. In addition, the scope focused on the candidate evaluation and comparison stage, leaving out other phases of the recruitment process such as sourcing or onboarding. The dependence on an Excel-based tool, although accessible, may present scalability restrictions when the volume of candidates or the complexity of the evaluation criteria increases considerably.

In conclusion, the combination of a structured diagnosis using Industrial Engineering tools with an accessible automation solution and the support of artificial intelligence constitutes a viable approach to optimize recruitment processes that are currently performed manually. The evidence generated in this project, together with the findings of the systematic literature review, supports that this type of intervention can contribute to reducing operational times, improving consistency in selection, and strengthening data-based decision-making. It is recommended, as future work, to carry out the pilot implementation of the tool, measure the real results over a follow-up period, and evaluate the possibility of migrating the solution to a more robust platform once its effectiveness has been validated. In this way, a practical and replicable alternative is consolidated for the continuous improvement of talent acquisition processes in industrial and service environments.

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