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Overview of Robotic Process Automation (RPA) and its application in Industry

Holman Montiel Ariza[1], Fernando Martínez Santa[2] and Fredy H. Martínez S.[3]

Associates Professors, Facultad Tecnológica, Universidad Distrital Francisco José de Caldas, Bogotá D.C, Colombia.

[1]ORCID: 0000-0002-6077-3510, *[2]ORCID:* 0000-0003-2895-3084
[3]ORCID: 0000-0002-7258-3909

Abstract

This document describes an overview of RPA (Robotic Process Automation) which is a tool that allows the optimization and standardization of processes oriented to the digital transformation of the productive business sector. Its ease of use and implementation allow a quick adaptation to the environment of information technologies to replace routine and repetitive activities developed by human labor. For this, in the development of the document describes the composition of its structure, the suppliers that offer the service, the sectors of application and its benefits. A detailed description of various existing environments in the market is made describing its advantages and most relevant characteristics; thus, providing a brief analysis associated with the impact of its application and development to increase the operational efficiency of the industrial production sector.

Keywords: *RPA (Robotic Process Automation), effectiveness, optimization, process automation.*

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1. INTRODUCTION

The constant search of organizations to optimize their processes has generated the incorporation of various methodologies that contribute to the efficiency of operations; some of them as Lean Six Sigma or Kaizen, have been implemented for years due to its high performance [1], however, given the incursion of the technological era new advances allow to improve the efficiency of processes through new paradigms [2].

An important factor has been the digital transformation because through the implementation of technological processes such as: automation, artificial intelligence, data science, robotics, among others, operations increase their efficiency, reducing processing times and optimizing available resources [3][4].

Consequently, one of the strategies used in recent years by industries and that is booming is the incorporation of RPA (Robotic Process Automation), which is a technology based on the combination of interactions between user interfaces (UI) and application programming interfaces (API), which allows automating processes through the configuration of software known as bot for the development of simple and repetitive activities that are executed by employees and are susceptible to automation [5][6].

On the other hand, RPA has bots in three modes: the attended mode, collaborates in real-time with professionals in processes that cannot be fully automated, developing review tasks to subsequently inform the professional about possible inconsistencies found during the process. The unattended mode, does not require the intervention of a human, nor their cognitive ability to perform an activity; and the hybrid model, is related to the use of a bot attended with artificial intelligence for the analysis of information in real-time and provide optimal solutions according to the activity developed [7].

Likewise, the software simulates human manual behavior and its interaction with other information systems performing tasks in an agile way, with high quality, reducing errors and costs [8], so the programs used in RPA for the development of automation have compatibility with a variety of applications that allow its use according to the task performed [9]. However, two perspectives on the software used in RPA are exposed, one of them mentions that it is based on rules to elaborate long operations of large volume; in contrast, the other indicates that the software is trained with data and adapts to the conditions of the process [10].

RPA is an easy to implement technology because it can be adapted and integrated into the systems and procedures of companies [7], it is also versatile, disruptive and transformative; as it is used in all sectors of the industry contributing to the transformation of tasks that represent high development times to convert them into standardized and accurate operations; so that customer satisfaction is guaranteed [11][12].

This document deals with RPA (Robotic Process Automation) technology, studying its infrastructure and composition; as well as describing the main suppliers, the sectors with the greatest use of hours in repetitive activities, and the areas in which it has had the greatest application within the industry and its benefits.

2. MATERIALS AND METHODS

In the first instance, an analysis of the RPA (Robotic Process Automation) tools is made describing the roles involved in its

structure, as well as the function of these; on the other hand, the suppliers that offer the RPA technology are described exposing the advantages and precautions of its product. Finally, its implementation in the industry is presented, analyzing the time involved in repetitive tasks, the sectors with the highest incidence and the most representative areas for the application.

For the integration of RPA within organizations, it is necessary to know the structure that makes up the implementation:

1. **Process Developers:** They indicate the activities to be carried out by the automation in RPA.
2. **Robot Manager:** Assigns and monitors the activities to automate.
3. **Robot:** It is the software installed in the work environment that allows interaction with business-related applications.
4. **Users:** They are those who are responsible for providing solutions to the news reported by the robot.
5. **Applications**: These are the programs that allow the robot to communicate with the user.

In turn, the RPA structure with the actors mentioned above is presented in the Figure 1.

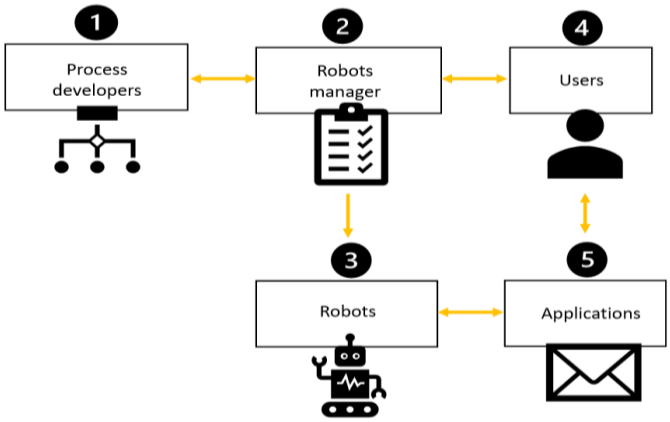

Fig.1RPA Structure [13].

In addition, thanks to the actors involved in the process, three service models can be offered, among which are:

- **Center of Experience (CoE):** Its function is based on the programming and deployment of robots, making the necessary adjustments for proper integration with applications, likewise, provides internal customer support.

- **Licensing:** Although the infrastructure used for the incorporation of RPA is the organization's own, the software and its programming are provided by a third party; so, it is necessary to maintain recurring licenses to keep the service active.

- **Service management:** Service management is outsourced so organizations act as users of the service and pay for the amount of transactions they develop on the providers' platforms [13].

3. DEVELOPMENT AND DISCUSSION

Thus, in the *RPA* market, there is a wide variety of providers that currently offer the service for implementation in companies, given above, *Gartner* Inc. developed research which states that the ten largest *RPA* providers represent about 80% of the market, of which the three largest symbolize 52%. The report also illustrates the quadrant for *RPA* that classifies each of the vendors involved according to their evolution in the market, as shown in the Figure 2.

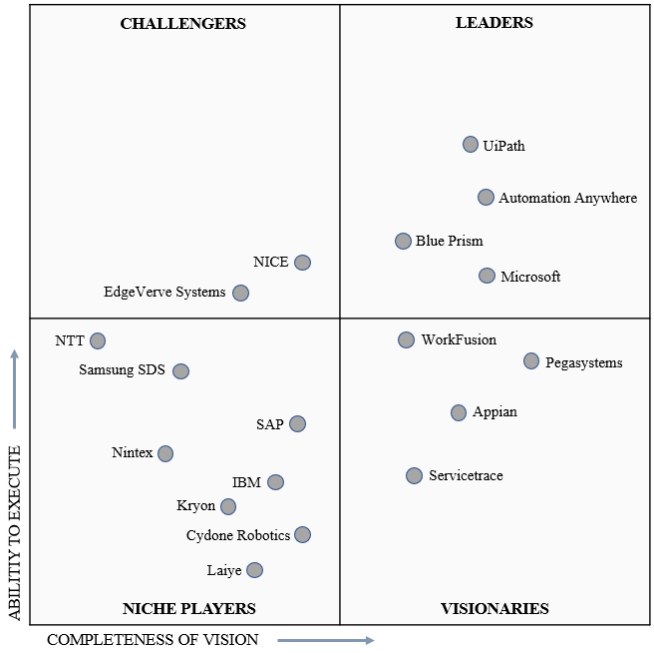

Fig. 2 Quadrant for RPA. Source: Gartner Inc [14].

The quadrant is made up of four categories which are: Leaders, Visionaries, Challengers, and Niche Players, where the vendors involved in the study are classified. Among the leaders are UiPath, Automation Anywhere, Blue Prism, and Microsoft; in the visionaries are WorkFusion, Pegasystems, Appian, and Servicetrace; in the group of challengers are NICE and EdgeVerve Systems; and in the niche players are NITT, Samsung SDS, SAP, Nintex, IBM, Kryon, Cyclone Robotics and Lalye [14].
Additionally, the report presents a description of each of the suppliers involved in the research; however, a comparison is made with the platforms that are in the quadrant of leaders and visionaries, identifying their strengths and cautions which are presented in the Table 1.

Table 1. Supplier Comparison (Leaders and Visionaries)

Supplier	Description	Advantages	Precautions
UiPath	The UiPath platform offers governance capabilities, user-friendly interface, enhanced IT insight, and orchestrated cloud service.	**Product strategy:** Includes a low-code platform with process mining, cloud delivery. **UX Application for Automation:** UiPath includes a low-code UX application builder to interact with on-premises and cloud applications, including ERP and legacy systems.	The platform lacks a web-based development environment.
Automation Anywhere	The Automation 360 platform has geographically distributed operations and has a balanced mix of large and small customers. The platform includes Automation Anywhere Robotic Interface, IQ Bot, process discovery, analytics, and market integration.	**Innovation:** It has two components: AARI computer vision, which is a low-code platform for creating applications that can control bots; and AISense, which increases the screen capture accuracy of automation Anywhere. **Cloud focus:** Offers RPA development and deployment on public cloud platforms such as Google's Google Cloud Platform and Amazon's Amazon Web Services.	Automation 360 has IQ Bot, with powerful features, however, accurately extracting data from the images is still a challenge.
Blue Prism	The Intelligent Automation Platform, includes among its components: Blue Prism Cloud, Automation Lifecycle Management (ALM), Capture, Interact, Decipher IDP and Digital Exchange (DX).	**Product portfolio:** Includes intelligent document procedure, in-loop human interaction, contact center automation, task mining and discovery.	Lacks low-code application development and API integration
Microsoft	The Power Automate platform includes API integration and orchestration capabilities, providing integrated features such as Power BI, Process Advisor, Power Apps, API connectors, and Power Virtual Agents.	**Product Strategy:** Includes RPA with API orchestration to integrate multiple systems of record to automate the work of transcribing data, while offering low-code application development. **Microsoft Ecosystem:** Its Azure-based RPA platform is accessible to millions of people, offering high integration with the Microsoft environment and its applications.	The platform depends on installing Power Automate Desktop (PAD) on virtual machines or desktop devices and does not support installation on ARM processors.
WorkFusion	WorkFusion Intelligent Automation Cloud is integrated with AI, ML and NPL capabilities.	**Financial Automation:** Attends banking and financial services automation requirements. **AI/ML approach:** Includes pre-trained ML models for loan processing, customer account creation and claims.	To use the platform, significant technical knowledge and programming skills in Java, AI, ML and Python are required.

Pegasystems	The Pega Robotic Process Automation product has low-code applications, AI features and X-Ray Vision technology.	**Innovation:** The platform includes X-Ray Vision technology for mapping low-level objects, a framework layer for serverless orchestration.	Their tactical approach differs from other platforms as other providers can generate a faster Return on Investment (ROI).
Appian	The Appian RPA platform offers a solution focused on augmenting and interacting with sophisticated processes.	**Product portfolio:** Business process automation and other applications requiring sophisticated rules and analytics, pre-built integration with various artificial intelligence services. **Feasibility:** Your tool is integrated with your low-code platform (LCAP) to provide end-to-end automation.	It only offers cloud orchestration and is not available as an on-premises service.
Servicetrace	Xcelerator One (X1) combines RPA, AI, BPM and task mining.	**Innovation:** Includes computer vision with pattern recognition, intelligent process recorder, native test automation, vertical scaling, ROI analysis and a Kanban board. **Auto-build Bot:** It oversees elaborating the automatic recording of several actions performed by the user, creating a BPMN 2.0 workflow. In addition, process mining is performed by analyzing the recordings of other users.	Because its market presence is not so strong, there is no direct communication with the supplier in case of being outside the regions where it has participation.

Source: Own elaboration taken from [14].

Industry Implementation

According to research, repetitive computer tasks account for 10% to 25% of the time that employees spend on their work, at the same time 52% of workers say that these activities interrupt their main functions reducing their productivity because they believe that if they did not perform a high volume of administrative tasks their productivity would increase [15].

As a result, the One Poll survey of more than 10,000 office workers in twelve countries around the world reveals the number of hours spent on repetitive administrative tasks globally by sector [16], as shown in the Figure 3.

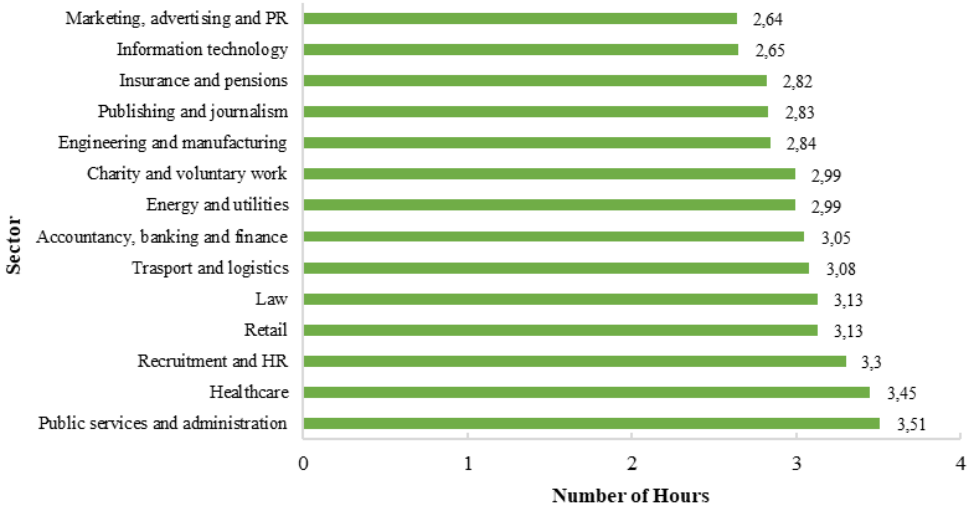

Fig. 3. Number of hours spent by sector [16].

The graph shows that the sector that uses the most hours is public services and administration with 3.51h, followed by health with 3.45h and recruitment with 3.3h. On the other hand, the sector that uses the least hours is marketing with 2.64h, indicating that no sector uses less than 2.5h for the elaboration of repetitive administrative tasks.

Considering the above and the results of another study conducted in 2019 which indicates that 80% of the companies surveyed have already implemented RPA in their processes, the industry sectors where this technology has been most welcomed are: financial services, energy and utilities, computing and electronics, government, healthcare [17], media and entertainment, transportation and storage, retail, and software and internet; where 30% of the companies represent large companies, 50% medium-sized companies and 20% are small companies.

Additionally, among the applications that are most integrated into RPA processes are Microsoft applications, ERP, CRM, SAP, Core applications and APIs (Application Programming Interfaces), and the areas where robotic automation is most used are in operations, IT, finance and customer service [18].

As a consequence, one of the research developed presents the transformation of the customer experience for the process of generating the payment receipt in an organization that offers outsourcing services (BPO). Therefore, initially, the procedure executed by the agents is broken down; as a first instance the customer contacts the call center to request the payment receipt; then an agent creates the case to then generate and send the receipt via email to the person who made the request and finally close the case; as shown in the Figure 4.

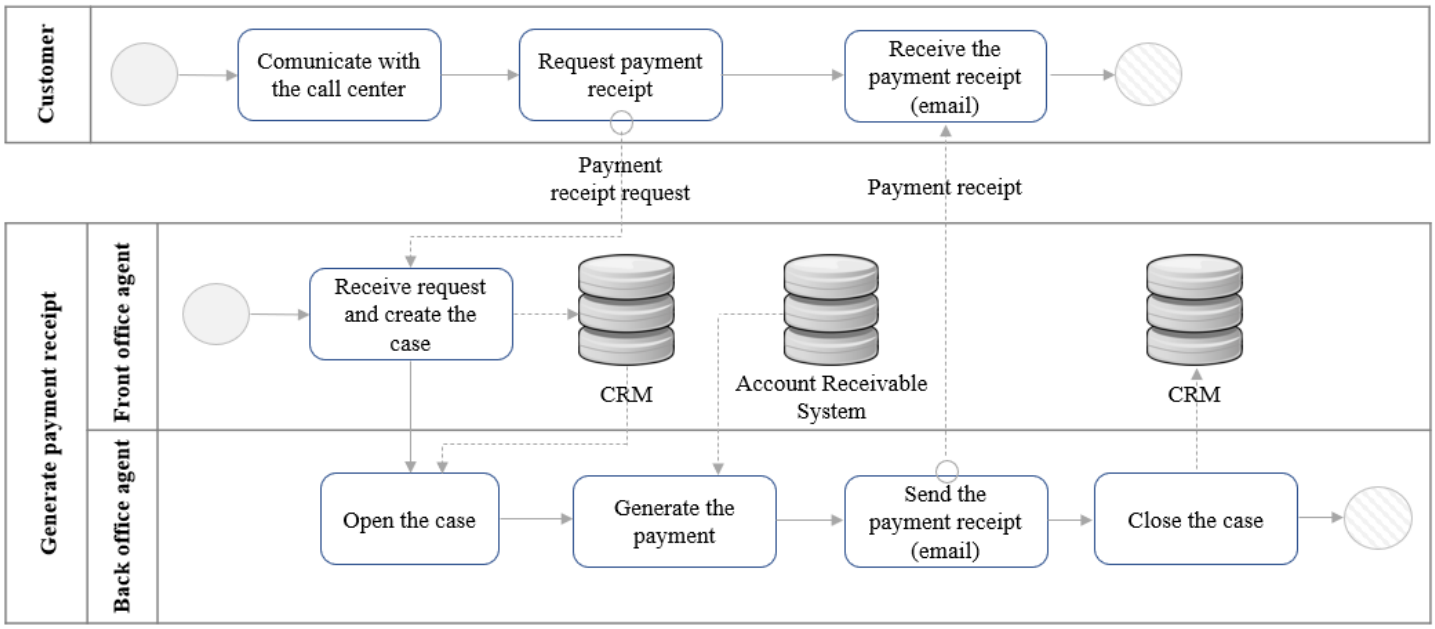

Fig. 4. Payment Receipt Generation Process (Without RPA) [19].

Subsequently, in the implementation the tasks performed by the back office agent are now performed by the robot, this generates that the process evidences an optimization in productivity of 21%, because, the study reveals that without RPA the number of cases attended per agent is 270 and with RPA the number of cases per agent rises to 326 with an average duration of 440 and 431 seconds respectively [19]. So, the final process is represented in the Figure 5.

Another project carried out in Dubai, configured a bot in a public administration process with the aim of processing transactions that can be executed by three agents; the study exposes the efficiency achieved by reducing times in each transaction performed because according to the results obtained the times are reduced by 50%. In turn, the commitment of employees increased by 30%, and workers who performed repetitive back office functions were assigned different tasks in new projects [20].

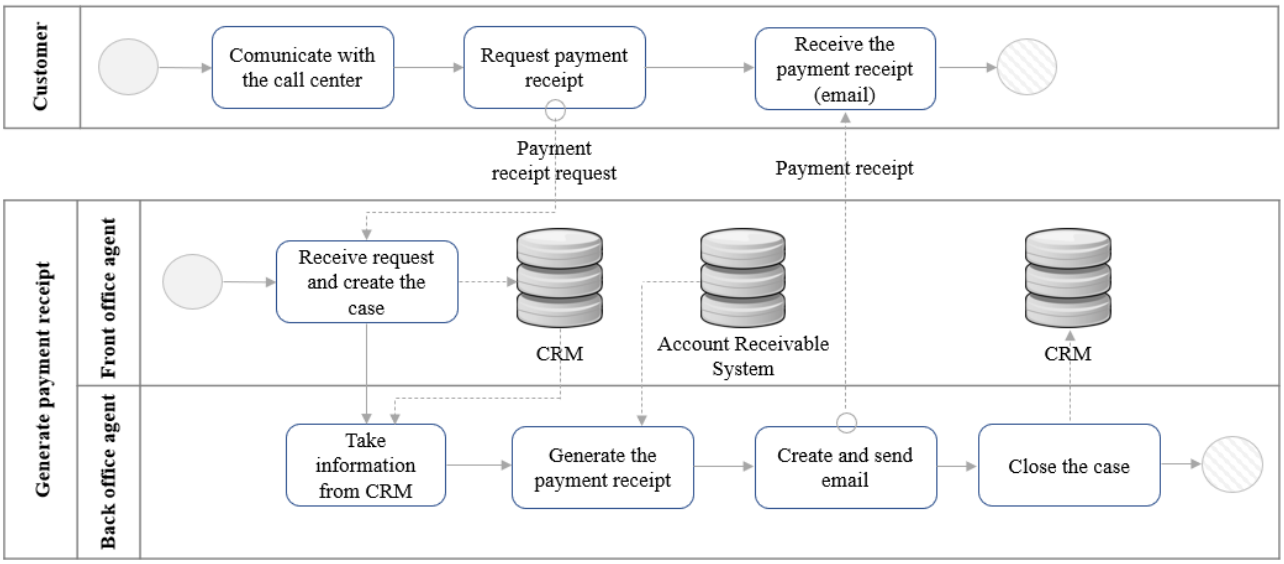

Fig. 5. Payment Receipt Generation Process (With RPA) [19]

Likewise, the research developed by an additive manufacturing company presents the implementation of RPA in its manufacturing process; so, its application is oriented to the reduction of design iterations, cost, and production time; in such a way that they compared the conventional workflow with the flow based on RPA where a time reduction of 15% was obtained. In turn, engineers and designers involved in the process used the time available in activities such as main design or creation of new processes; the Figure 6 shows the comparison made.

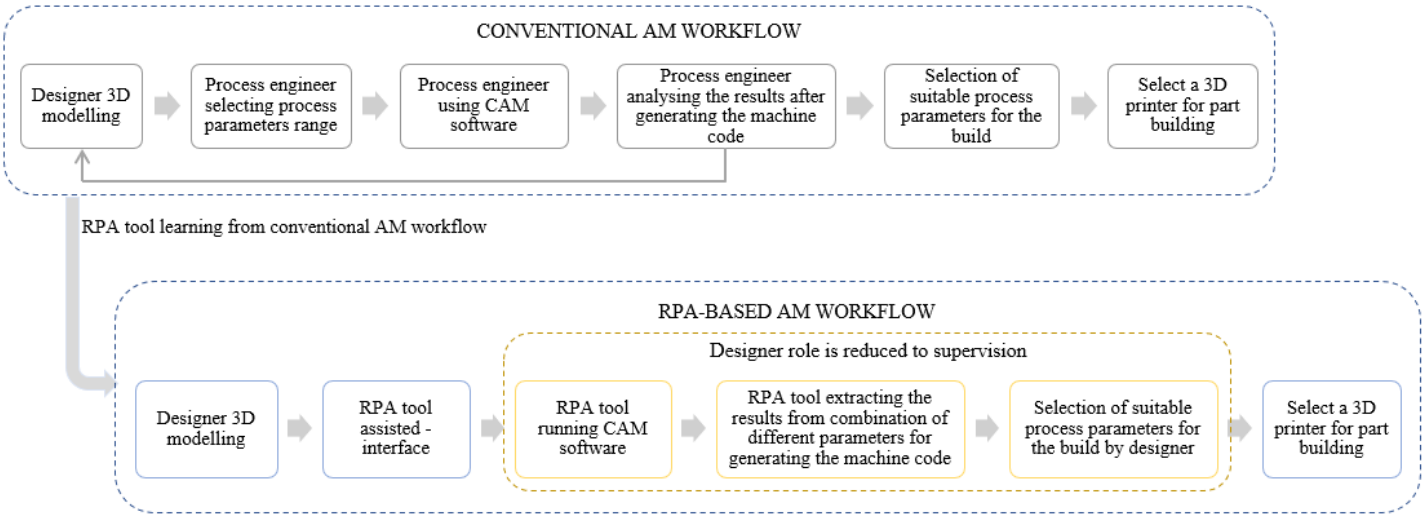

Fig. 6. Manufacturing process [21].

Considering the above, the application of RPA is incorporated in the second task of the process. Based on the training of the platform to execute the activities developed by the engineers; this by means of the sequence of the procedures executed in the CAM graphical interface, where once the 3D model of the part is elaborated, the range of the process parameters is selected and an iterative algorithm that tests all the combinations of the parameters is deployed.

The results generated and the machine code obtained are stored in a database to plot the combinations of materials and the values of the quantifications; with which the density, thickness,

material, cost and printing times; are analyzed for engineers or designers to make the necessary adjustments and the selection of the machine to be used to obtain the final product [21].

Finally, the most significant benefits within the implementation of RPA for executives in charge of decision making in organizations are: the focus of employees on more strategic tasks with 46%, cost savings and time savings each with 45%; in contrast, for employees the most representative advantage is time savings with 72%, followed by cost savings with 56% and accuracy with 53% [22][23].

4. CONCLUSIONS

RPA is a technology of easy access, offered by many suppliers; so, for its application it is necessary to know the needs of the company and the processes to which it is implemented; since this allows the optimal function of the software and an effective articulation with the programs used in the organization.

The implementation of this type of technology implies that the supplier becomes an external partner because given the lack of highly specialized skills in the area; sometimes their presence is necessary to provide solutions to novelties presented during the execution of tasks.

Automation with RPA does not seek the displacement of labor or elimination of jobs; on the contrary, seeks to automate repetitive tasks that do not add value to the operation and become tedious for the employee at the time of its development.

5. ACKNOWLEDGMENTS

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