Application of robotic process automation (RPA) for supply chain management, smart transportation and logistics

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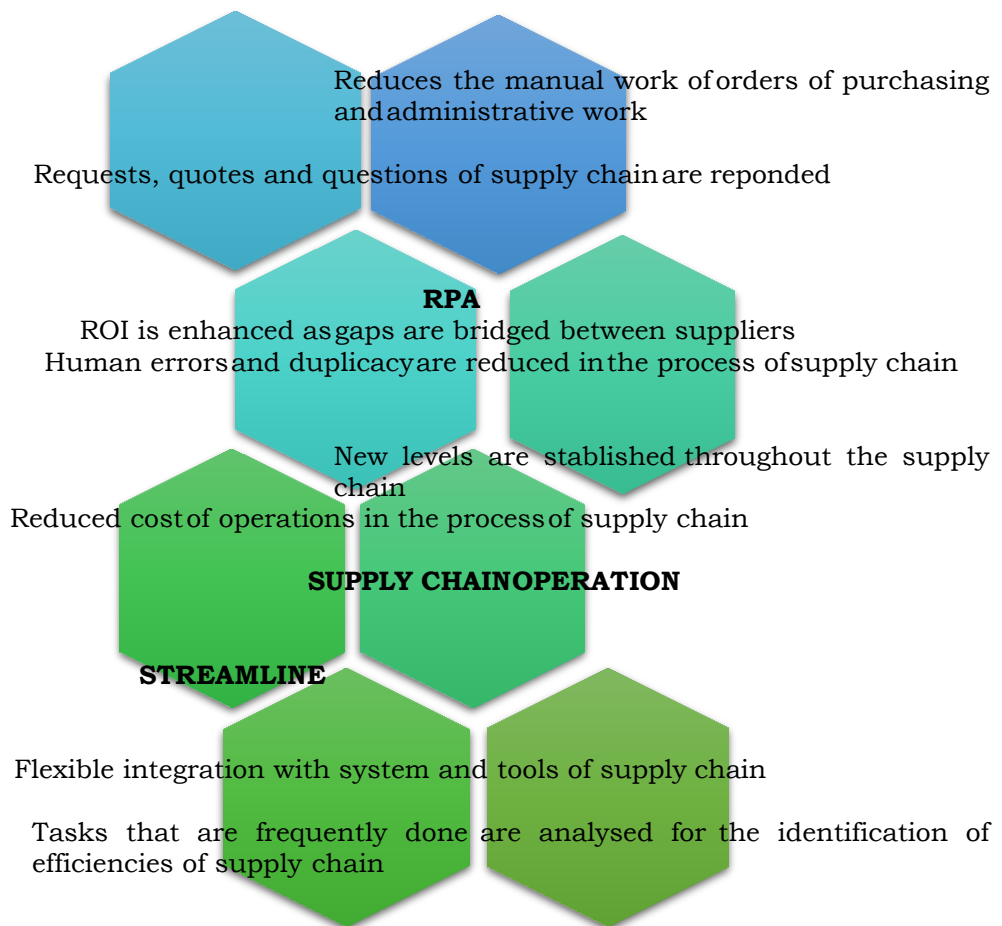Director, KC Group of Institutions, Nawanshahr India
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Abstract---Transportation is the biggest problem of each country. Each human being is associated with transportation directly or indirectly in their life. They want to reduce the pressure of transportation such as waiting for time, stress, staff management, and their work-life balance. The role of technology has also reduced these problems in transportation. Robotic Process Automation (RPA) helps in freights order routing, making reporting automated, management of freights, driver feedback, better decision making, the accuracy of inventory management can be enhanced, automated tracking can be done through which checking transport calls can be reduced, scheduling the shipment and tracking it, invoicing management, procurement management. The tools such as robotic process automation and artificial intelligence, have also given the freedom to minimize these problems. With the use of robotic process automation, various problems of transportation in airlines can also be minimized. Robotic Process Automation (RPA) can be helpful in airline transportation like departmental work packages can be created, the file can be fetched from previous systems, travelers can be notified,

data can be managed, scheduling of crew can be done. The phases or stages of robotic process automation can lead the transportation sector to better development and convert the cities into smart cities. This paper is explaining the application of Robotic Process Automation (RPA) for Supply Chain Management, Transportation, and Logistics of smart cities.

Keywords---artificial intelligence, machine learning, models, digital procurement.

Introduction

Application of Robotic Process Automation (RPA) in Supply chain management

Reduces the manual work of orders of purchasing and administrative work

Requests, quotes and questions of supply chain are reponded

RPA
ROI is enhanced as gaps are bridged between suppliers
Human errors and duplicacy are reduced in the process of supply chain

New levels are stablished throughout the supply chain

Reduced cost of operations in the process of supply chain

SUPPLY CHAIN OPERATION

STREAMLINE

Flexible integration with system and tools of supply chain

Tasks that are frequently done are analysed for the identification of efficiencies of supply chain

(Christian, Franziska, & Rainer, 2021) The digitalization of buying and supply chain management is a priority of significant investment for organizations considering increased competitiveness and price constraint, as this segment tends

to fall behind most business operations. Robotic process automation (RPA) encompasses robots and also business process automation (BPA). The technology comprises software licenses i.e., bots that imitate human actions and behaviors to automate monotonous tasks, and rule-based commercial operations. Due to significant cost reductions and saving time, effective implementation of RPA boosts productivity and competitiveness. (Viale & Zouari, 2020) A significant digital transition is currently taking place, traditional procurement is altering to adapt to a changing reality as the introduction of digitalization in supply chain operations has advanced, combined with a level of competition. Robotic Process Automation (RPA) has a relational, operational, organizational impact on procurement.

Tasks, not employment, are automated, enabling people to emphasize actions that are of higher value while relieving them from boring duties in a variety of industries. In supply chain management, Robotic Process Automation (RPA) automates work that is performed manually, enabling less chance for mistakes and defects. RPA tools and techniques are software applications that operate on a virtual server and could be begun and ended at any point in time. Instead of monotonous robotic tasks, companies recruit and instruct staff for solving problems and brainstorming activities using bots.

Process of Robotics Credit, collections, billing and other tasks have all benefitted from automation, these are advantages for the enterprises, but they will be mainly useful to firms that correctly control their complex supply chains. The implementation of RPA in the supply chain has been steady, but given the gains at risk, corporations are gradually resorting to automation to enhance the production process and gain a competitive and reasonable edge with clients. However, this could be the beginning of a technological shift in the way supply lines have traditionally operated.

The process involving robots through supply chain automation is in its inception, firms are increasingly incorporating it into their supply chains to enable them more flexible and productive. RFID (Radio Frequency Identification), ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), and other technology have long been used by businesses in fields including healthcare, retailing, and manufacturing. Software bots were not flexible enough to accommodate the complicated circumstances that occasionally arose in the early stages of RPA in the Supply Chain since they are uneducated and can automate areas of the supply chain that were simple and following a regular pattern. Human assistance was required for everything else, with the addition of smart robots with machine learning skills and cognitive capacities, RPA systems are beginning to resemble individuals to some level. RPA in Supply Chain can be utilized at a greater level to make predictions of outcomes and assist complicated decision-making, assisting workers with more than just automated jobs.

By automating repeated time-consuming processes like data entry, Robotic Process Automation (RPA) can enhance supply chain management, transportation, and logistics, resulting in improved processes. Robotic Process Automation (RPA) extracts files from one device and pastes them into another using automated software robots Robotic Process Automation (RPA) technology is

not quite as advanced or quick as other integration methods, but it is often simpler to execute. It also makes complementing technologies easier to implement. Robotic Process Automation (RPA) has been used in combination with other digital levers like IoT, intelligent document processing, chatbots, mobile applications, and even blockchain to reinterpret processes to confront inefficiencies and other substantial business difficulties," said Shirley Hung, vice president at Everest Group, a management consulting and research firm of Dallas. In supply chain management, RPA has been utilized to automate and speed up processes that were previously done by a human. RPA reshapes the business supply chain process and reduces inefficiencies across the organization as part of the continuous digital transformation.

Automation of email

Maintaining good communication between providers, producers, transport service agencies, and consumers is an essential part of any supply chain. Even though clear and effective communication is so important in supply chains, it is also one of the areas where there is a lot of room for improvement. Email communication must be established with RPA to ensure good cooperation between personnel in various departments. When products have been completed, when it is trapped in the middle or delayed, and when it is needed to be canceled, it is vital to establish communication processes. Consumers frequently inquire about the status of their shipments. A worker will manually open up each email, respond to the inquiry by making a notation of the consignment, and check ERP software to respond to the purchaser with the actual status of shipment. Though, by implementing RPA in this situation, the entire process can be automated, from opening up the email to understanding what the consumer requires, logging into the ERP system, and providing the accurate status to the consumer. In this approach, human assistance would be required in rare cases where a robot's handling capabilities are insufficient. For the client to have a pleasant experience, effective communication amongst all concerned parties must be established.

Planning of demand and supply

Before automation, supply, and demand planning for personnel in any firm was not an easy task. They needed to find and collect the necessary data, integrate it and organize it in usable formats, assess data exceptions, and eventually convey the plan. By using Machine Learning (ML) and Artificial Intelligence (AI), RPA in Supply Chain may help organizations estimate demand and be prepared to meet unforeseen surges in demand. Organizations may now reduce the chance of human mistakes and make processes effective, self-driven, and smart by automating a majority of supply chain functions. Because supply chain operations also comprise front-desk operations, the development, and maintenance of client relationships, thus human participation is still required. RPA can be utilized across a variety of tasks, including procurement, warehouse, inventory, and shipping, to help firms manage demand and planning of supply. Using artificial intelligence (AI) and machine learning (ML), the Robotic Process Automation (RPA) robot forecasts demand and automatically informs the procurement team members.

Services to customer

As organizations use a distinct system for business processes, consumer data is revised in different systems, which must be synchronized to enable good customer care. In the supply chain process, for example, the system demands that clients' ordering privileges be suspended until the account manager is informed. These manual operations, which span several information systems, can be automated with RPA. When a consumer submits a request for service via a mobile application, for example, an intelligent virtual assistant interacts with the consumer and subsequently submits the request to the system. Intelligent document processing solutions can read information from a variety of service request document types and work with RPA robots to record and manage service request data. A mobile application for third-party service and reverse logistics partners can enhance awareness on position, time of arrival, and period to finish work in the situation of maintenance if a consumer wishes to return anything. RPA robots may follow orders in actual time and automatically send order confirmation messages to consumers. This type of automation enables businesses to focus their customer service teams on high-quality tasks that develop client relationships.

Selection of vendor

RPA seeks to transform the way vendors are chosen, which is now a completely human process. All of these activities may be made more effective, productive, and automated with RPA in Supply Chain. Only the starting phases of describing the project, establishing a list of providers, and participating in face-to-face discussions require human interaction. Apart from these exceptions, once an enterprise's RPA installation is complete, humans will no longer be required to intervene in the vendor selection process. The vendor selection process comprises of various phases such as:

Quotation request preparation.

Vendor discussions and communications

Analysis of documents of vendor

Vendor evaluation and credit cross checking

Vendor finalization

Challenges faced in the implementation of Robotic Process Automation (RPA) for Supply Chains

Standardization of process is a challenge faced by Robotic Process Automation (RPA) as the robot becomes more complicated as a result of complex procedures. Organizations experience process standardization as a major problem at all phases of the Robotic Process Automation (RPA) journey. Process complexities raise the cost of RPA implementation while also increasing operational costs and causing interruptions. Unfortunately, organizations have discovered that even in situations where sufficient documentation is available, procedures are not always fully understood. It also faces problems in technical support as while implementing RPA in the supply chain, an IT firm's support and consulting are essential. Including an IT organization in the RPA implementation process is required and recommended. Solutions flexibility, initially, RPA was thought to be a halted automation process. It promotes the idea that bots can only learn once and must be taught precise lessons to perform subsequently. Solution adaptability can now be provided to all stages of automation due to Artificial Intelligence and Machine Learning, while adaptability is still seen as a concern. Various stakeholders have different expectations and participation of employees also becomes difficult.

Robotic Process Automation (RPA) and Robotic Process Automation (RPA) in transportation and logistics
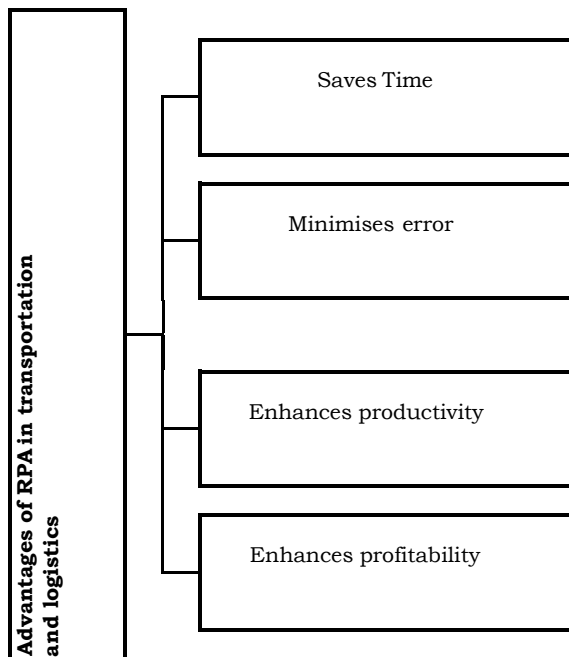
Robotic Process Automation (RPA) is a technology that allows developing, implementing, and controlling software bots that emulate people's activities while collaborating with electronic software systems, simple and straightforward. (Tailor, 2020) RPA is a tool for managing organizational tasks. Software bots do things such as detect what is on a screen, execute the proper keystrokes, inspect systems, recognize and gather information, and carry out a broad range of predefined operations, just like people. Software bots can do it faster and more consistently than people, and they don't need to stand up and stretch to feel good and refreshed. Robotic process automation (RPA) streamlines systems, allowing firms to be more productive, adaptive, and quick to respond. It improves the satisfaction of employees, dedication, and effectiveness by removing repetitive duties from their working day. RPA is non-intrusive and may be applied quickly to speed up digital transformation. It is perfect for automating old systems that lack an application programming interface (API), as well as virtual desktop infrastructures (VDIs).

Robotic Process Automation (RPA) is the process of teaching a machine to perform mundane, repetitive tasks. If a logical step is present, robots may copy the work and perform it. Returns processing has always been a time-consuming and costly process. RPA allows businesses to regulate returns without increasing costs or causing delays. The RPA program can now manage the return, which requires a series of recurring activities like sending a message acknowledging receiving of the return, changing the inventory levels, altering the payments to the customer, and ensuring that the internal billing system is updated, among many other things.

Robotic Process Automation (RPA) is becoming more mature. It is the use of software bots to analyze applications to perform activities, trigger replies, and communicate with other electronic systems. Organizations require expense-effective solutions that are compatible, perform work in a less amount of time, and can manage with quantity variations with velocity, flexibility, and durability to maximize the benefit of RPA. The seamless nature of RPA technology, as well as the speed with which bots may be configured, distinguishes it from traditional automation. RPA service allows businesses to establish a virtual workforce that is quick, reliable, cost-effective, and available around the clock for a variety of processes, resulting in operational efficiency.

Robotic process automation in transportation and logistics can simplify workflows and lower total operational costs and enhance efficiency and productivity by inserting data at the core of logistics organizations. The use of Robotic Process Automation (RPA) is continuing to reshape the logistics industry. Corporations use Robotic Process Automation (RPA) in transportation to effectively do the management of deliveries from distribution centers to individuals and businesses all around the world. The use of RPA in transportation is essential for management and gaining several cost and efficiency gains.

Advantages of RPA in transportation and logistics

Saves time

Robotic Process Automation (RPA) techniques indisputably execute work quicker than humans. Similarly, RPA can be used to execute lengthy work at a quicker speed, and this helps businesses to minimize the time of the process cycle. Overall

saves a lot of time and energy for humans and there can be proper utilization of resources as workers can invest their energy elsewhere.

Minimizes Errors

When tasks are performed by a human there are many chances of errors and mistakes that can happen but when takes are performed using Robotic Process Automation (RPA) robots there are fewer chances of errors. When errors are found then they can be resolved easily as it is easy to find the reason for error using Robotic Process Automation (RPA) as processes that are RPA driven are recorded and maintained.
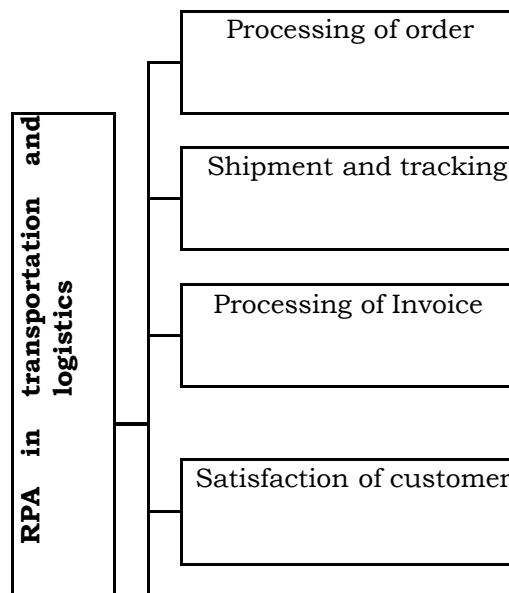
Enhances productivity

Robotic Process Automation (RPA) robots act as the constant personnel, they perform their duties as they have fixed models fitted in them, thus they perform work with high accuracy and reliability. Therefore, when there is 100% reliability and accuracy, and the quality of work is also high then the organization's productivity ultimately enhances leading to a higher level of operations.
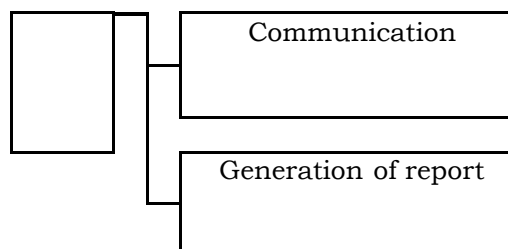
Enhances profitability

With the use of Robotic Process Automation (RPA) when the work-life balance of personnel is improved, and time is saved and the cost is also saved, errors in the organization in production is minimized and productivity has increased ultimately all this leads to increase profitability in the organization and also customer satisfaction is enhanced.

Application of RPA in transportation and logistics

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│          │     Communication        │
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│          │   Generation of report   │
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Inventory processing and order processing

Due to the massive amount of data entry, which is required to manage shipment and invoice data, this is difficult for manual labor to handle. However, this is also one of the reasons why robotic process automation in transportation and logistics is so important. The Progressive rotating order (PRO) numbers for shipments can be easily retrieved from the provider's website by robots. Keeping track of data and invoice amounts becomes simple with the use of RPA. Inventory management is essential for both producers and distributors since it ensures that consumers' needs are met. Procurement and inventory management are management of data operations that involve pulling information from numerous databases and comparing that to what is the want of customers. This is exactly what software bots are good at, they can even use real-time reports to optimize inventory levels. Order processing normally requires a lot of paperwork and entering data by hand. The procedure takes a long time and requires a lot of resources. Furthermore, manual errors are all too common. As a result, the process is wasteful, resulting in a waste of time, labor, and capital. RPA can be used for order processing automates the process. It shortens and streamlines the procedure. Orders can be completed rapidly and transported along the transportation chain with the use of RPA. RPA can also be used to improve procedures further down the transportation chain.

Scheduling of shipment and tracking

Initially, pick-up orders, as well as monitoring and reporting delivery status across internal operations and portals, are based on the regulation, high volume logistical jobs. This implies that the shipment processes appear to be built for software bots. Data management capabilities of robots are put to better use for extracting shipment information from email communications or tracking jobs in schedulers. Pick-up timings that are precisely accurate on client or carrier portals can greatly improve client satisfaction with the services. For personnel, retrieving evidence of shipment details by monitoring carrier websites continuously is a time-consuming task, but it is ideal for software robots. They can be used to connect the retrieved data to the record of original orders, allowing for easier tracking of orders and better customer service. One of the advantages of employing RPA in transportation is the ability to track products automatically. Customers can log into their profiles with these businesses to find out where their things are. Consumers can also find out when cargo is likely to arrive and whether there are any interruptions. Businesses might utilize Robotic Process Automation (RPA) to manage incoming check calls, saving them endless resources and ensuring that someone is ready to accept any delivery that demands a sign or should not be left undisturbed.

Invoice management

Because of their integrated potential, software bots are the best solution for this task because they can simplify the operation. Because bots can interface with commercial goods transportation, end-to-end automated order-to-cash procedures for many big third-party logistics providers are possible. RPA thus assists logistics organizations in overcoming the significant challenge of getting paid on time after completing work. By delegating this operation to bots, you relieve your personnel from time-consuming and error-prone operations like re-keying, cutting, pasting, and physically adding data to bills. The entire process, from extracting shipping information to updating client sites, takes seconds rather than days as it takes in the case when doing invoicing manually. The burden of processing invoices develops significantly as a big number of transactions are received, processed, and distributed regularly. Typically, invoice processing requires updating enormous volumes of data. Simply put, the procedure is time-consuming. And such long periods can mean the difference between a transport company's success and failure. RPA can automate the procedure of invoice processing, making it an excellent alternative. Automated solutions for monitoring outstanding payments, analyzing invoice details and extracting important information, and completing payments automatically are all possible using RPA.

Satisfaction of customers

When Robotic Process Automation (RPA) is used to gather information, the risk of manual mistakes is significantly decreased, causing higher satisfaction of customers. The chance of error is reduced with the use of Robotic Process Automation (RPA) to cleanse and collect information. Companies can communicate with clients in a more appropriate and customized manner if they are informed about data outside of traditional systems of record. As the process is done quickly and timely with maintaining accuracy customers get products on time with no delays and this will enhance their utility and satisfaction. A satisfied customer is more likely to return so it is important that the customer is satisfied. There is a lot of competition in the transportation and logistics industries, firms must not only attract new clients but also keep existing ones. One strategy to ensure a large consumer base is to ensure customer happiness. RPA ensures that clients are always satisfied. Businesses can use the RPA solution to connect information from numerous phases of transportation to respond to consumer questions as promptly as possible. Customers will receive the best service possible with frequent updates, alerts, and a chatbot available to answer questions. Customers will be willing to collaborate with your company for their transportation wants as a result. The application of RPA in transportation and logistics can assist achieve high levels of accuracy, reducing process production cycles, and increasing income creation prospects. RPA tools are simple to set up and use, requiring little effort to increase work process efficiency and financial rewards. RPA can certainly assist organizations in satisfying the different needs of people in recent times, where businesses are overloaded with customer expectations.

Communication

Good email communication with consumers is an essential part of successful logistics companies looking to strengthen customer loyalty. RPA can assist by automatically delivering messages to consumers whenever an order is processed, dispatched, or delayed through the system. Robotic Process Automation (RPA) has improved the communication between businesses and consumers, and this leads to greater satisfaction and better operations of management and enhances the profitability of the overall business. Higher managers, workers, assistants, advisors, and end consumers all need to be able to get product information when they need it. Communication can be a problem in the transportation chain because it includes several participants. It's possible that the responsible authority won't be able to interact with the preferred worker. This problem can be solved with RPA tools like a chatbot, auto-responder. At frequent intervals, the tools of RPA can either transmit updates in the form of emails alerts or notifications to the relevant authority. Same way if the customer wants questions to be answered chatbots can be used for it, they can reply related to the status of the order, about the shipment status, if there are order delays, any other order process-related queries can be answered using chatbots.

Generation of Reports

RPA tool helps simplify the process of report generation. Regularly, the transportation industry creates a large number of reports, reports on the status of orders, payment information, consumer feedback, updates of transportation equipment. Creating reports for a large number of frameworks for analysis reasons can become tedious, time-consuming, and inaccurate. Artificial intelligence-enabled RPA solutions can produce reports based on information automatically. The software can extract the essential data from the supplied information and add it to the report automatically. Therefore, it involves less to no manual interference when using an RPA solution for generating the report. There is other important work that can be utilized with the help of RPA as it saves a lot of time and resources.

RPA in Airline

Robotic Process Automation (RPA) provides good opportunities for transportation businesses, and they can make the resources and situations more effective for the airline industry also. Through RPA airline sector can enhance their pace of performing tasks, quality of the work, when quality and time are maintained, and rules and regulations are followers properly then cost is also reduced. Often the present scenario focuses on accounting automation instead of the traditional accounting method so it is essential to convert the whole process to robotic automation so that the passenger revenue and other factors of income and expenditure can easily be analyzed.

Application of RPA in Airline
Departmental work packages are created

Each day, numerous professionals must work together to complete this operation manually. This makes it monotonous, boring, and time-consuming exactly the sort of work that sets professionals under a high level of stress, reduces their employee satisfaction, and there are more chances of errors. Only one person is required to monitor the process and manage any potential problems when using RPA for package generation. Man-hour reductions, enhanced task management, decreased cycle time, and better services are the end effects.

Revenue outflow recognition

To plug income leakage, the airline firm must do synchronization with the tour operators. In the aviation industry, RPA simplifies synchronizing. First and foremost, we are going to get fault detection becomes significantly faster, encompassing all synchronized aspects. This provides greater understanding, which increases the possibility of making proper revenue restoration and security decisions. In the end, collecting lost income and reducing leakages through automation results in significant cost savings for the airline sector.

Fetching data from the old system

Traditionally, file retrieval was accomplished by either increasing staff workload by operating manually or by requesting that the software developer adjust the platform. Both are time and money-intensive. Software bots can be used to do it far quicker, cheaper, and more precisely, ensuring that all files on the system are retrievable and relocated to the new system promptly. RPA can therefore replace ineffective and obsolete IT systems that restrict creativity and expansion. All of this happens with very little human interaction. This indicates that RPA can help to better utilize human labor for relatively high-value tasks.

Notification to travelers

Travelers can be made aware of scheduled flights and the status of booking using attentive RPA bots and chatbot systems. Chatbots also can reply to passengers' questions, offering the correct answer and increasing their satisfaction with the company's services. This application of robotic process automation in airlines is an excellent example of how RPA may improve the satisfaction of customers.

Management of data

Airline operations use software bots to look for lost data and find the required transmitted data. They can then perform necessary inspections and tolerance levels as a result. Different processing stages can then be updated or approved using the necessary datasets. Not only that but robots can detect the right data values when exchanging coupon codes that are not reported correctly. The records can then be compared to determine when they need to be renewed.

Scheduling of crew

Robotic Process Automation (RPA) can assist you in assigning responsibilities across the team and effectively managing job demands. The use of automated alert notifications allows members of the crew to be notified of any modifications. Also, the situation of pandemics makes it more possible that modification will happen, so being ready to deal with them effectively is an asset to deal with the problem for the crew and the 3airline sector. Crew scheduling becomes easier with the help of Robotic Process Automation (RPA).

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