

THE IMPACT OF THE AUDIT ACTIVITY, USING AI, RPA AND ML IN THE ACTIVITY OF CREATING THE DELIVERY LIST AND THE PRODUCTION PLAN IN CASE OF A PRODUCTION RANGE. A CASE STUDY.

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Abstract: The realization of this case study aims to highlight the necessary steps in a subassembly production process, to create, to audit the economic processes behind such a production development. It will also monitor the impact of new technologies on how to prepare a delivery list and a production plan for a range of products in a factory that creates subassemblies for new electric cars. This factory produces subassemblies for several types of machines, from different suppliers, the way of working being very different from the series production, ie based on a special order. The use of new technologies, in this case we will discuss about AI - Artificial Intelligence, the implication of RPA solutions - Robotic Process Automation in these processes, how these technologies have been adapted to self-learning. Most companies have begun to integrate these new technologies. In the present case study, the authors will want a presentation that will refer to the economic processes behind the final process, that of production, what impact these new technologies have had, where they have taken their place, why they had to the decision is made to implement them, what was the reason behind their adaptation, etc. Initially, we will start with the specialized literature, finding the common steps used in other implementations, then we will go through the processes that take place in the production plant, then we will see where these new technologies have been implemented and what impact they have. had on the final process, when it was put into production.

JEL classification: C61, M15, M41, P41

Key words: ERP, SAP, RPA, AI, ML – Machine Learning, Project implementation, PP – Production Planning, Orders planning

1. INTRODUCTION

The approach of this article started from a desire to model an economic process encountered in one of the largest factories in Romania that produces subassemblies for electric cars. It is based in our country, but is a subsidiary of a major world producer. This discussed economic process refers to the possibility of automatically creating the production plan for a certain range of products, from car seats, steering wheels, door ends, headrests, front panels, etc.

All these are produced here in Romania and are delivered on the basis of special orders to Germany and England. With the last two years, since this COVID-19 pandemic affected our lives, the factories in our country have started to think about a refurbishment and an attraction of new technologies to optimize the work. There have been a number of interruptions of activity, these coming as a result of diseases that have affected our entire country.

Acceptance of new technologies such as AI and RPA has been possible due to the many errors that have arisen over the years but also the faulty way of working with computer systems, in this case with SAP as the core system. The purpose of implementing the new technologies was largely the desire to automate the existing economic processes but also their adaptation, where possible, to the new facilities that came with it.

The main purpose for this case study was to develop a project that could automate as much as possible the work process for drawing up the delivery list and production plan for certain products that come bundled in a sales order created for a certain working range. In this journey in which it was wanted to change the way of working with the SAP system, the incorporation of AI and RPA, a series of aspects were discussed with the following departments within the company, namely with the sales and distribution part, with those from logistics, industrial engineering, financial accounting and production staff. In the following figure (Fig. 1) we have a complete diagram regarding the digital transformation, from the initial requirements to how an implementation should be thought, knowing that this transformation must bring a series of changes in the mentality with which it is will go from now on.

iRPA - software bots – main directions used

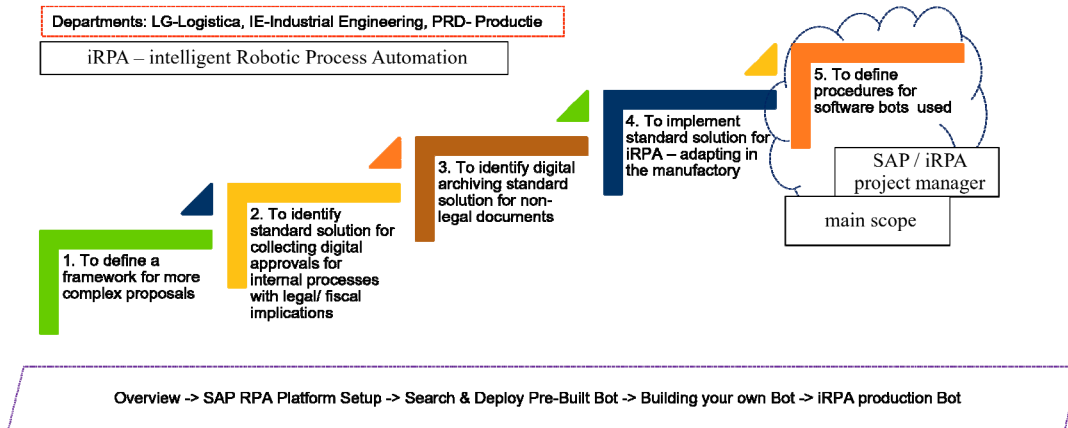


Figure no. 1 – The main directions for iRPA implementation - steps

2. LITERATURE REVIEW

The specialized literature in this area has a series of aspects, from the most diverse, from country to country, from methods used for qualitative or quantitative purposes, from conceptual ways of designing to an idea found in field studies. (projects, implementations, discussions), discussions but people involved in projects, specialists, professionals in the trade. The authors look at the fact that certain data are collected during the implementation projects, as a source of work possibilities in the future, so that aspects that were now non-essential, may become in the future, on other implementation projects, essential. It is difficult to analyze the data from the projects without having a series of knowledge about the processes that take place there and come up with a series of ideas to improve the calculation method, which is approached by those who implement, discuss, analyze and come up with a satisfactory result. Consistent with what (Hong, JL and Li, XZ, 2013) said about conducting a production audit, they came to highlight an analysis of how certain products are produced, what impact they have on the environment, what possibilities exist in terms of environmental protection. Another scientific paper, his (De Martinis, M. and Houghton, K., 2019) highlights the benefits of an audit production efficiency, which helps to be more efficient in terms of working with the documents that are need, in a public or private environment. It has its role and place, the effectiveness of such an audit - what are the repercussions after, why the involvement of new technologies can help to improve business. There are questions that in this article, in a subassembly production area, the authors want to bring a data set that will be beneficial in the future. According to (Knechel, WR, Rouse, P. and Schelleman, C., 2009) audits are more efficient for large firms and have a high level of automation of various activities, and such an audit is less effective when there is an internal control (audit), even more so if it has a series of branches.

3. THE EXISTING WAY OF WORKING - PERSPECTIVES - PROPOSALS

Regarding the way to work before implementing the automation and self-learning solutions, figure 2 highlights the collaboration of the logistics, engineering and production departments, supervised by the financial accounting part.

The main direction for production environment

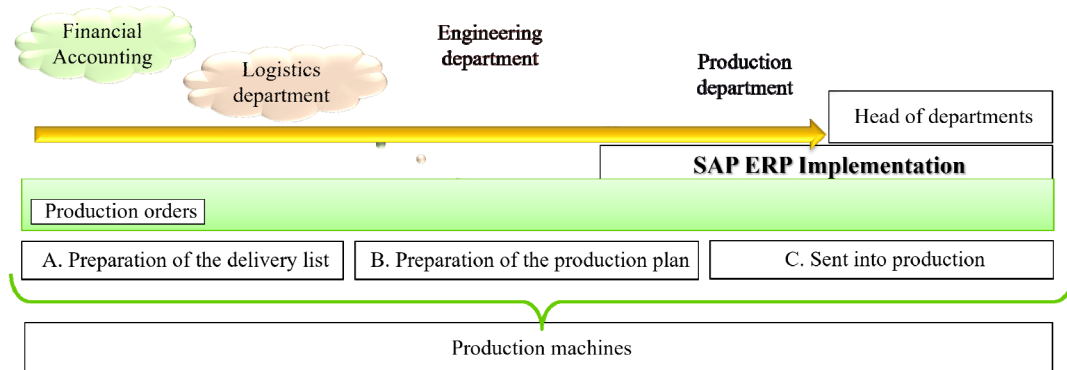


Figure no. 2 – The main directions for production environment - steps

As starting points in the analysis that was performed, we had the SAP system installed, most of the data to production coming from there, we have some external customers who add orders to the system, automatically, the requirements that the factory must meet / perform, we have a engineering department that according to a plan, outlines what needs to be done, and we have, finally, those in production who have to execute what they received from logistics. Detailing even more we will have the following steps, necessary in the process described above, namely those that you will see in the following figure (Figure 3):

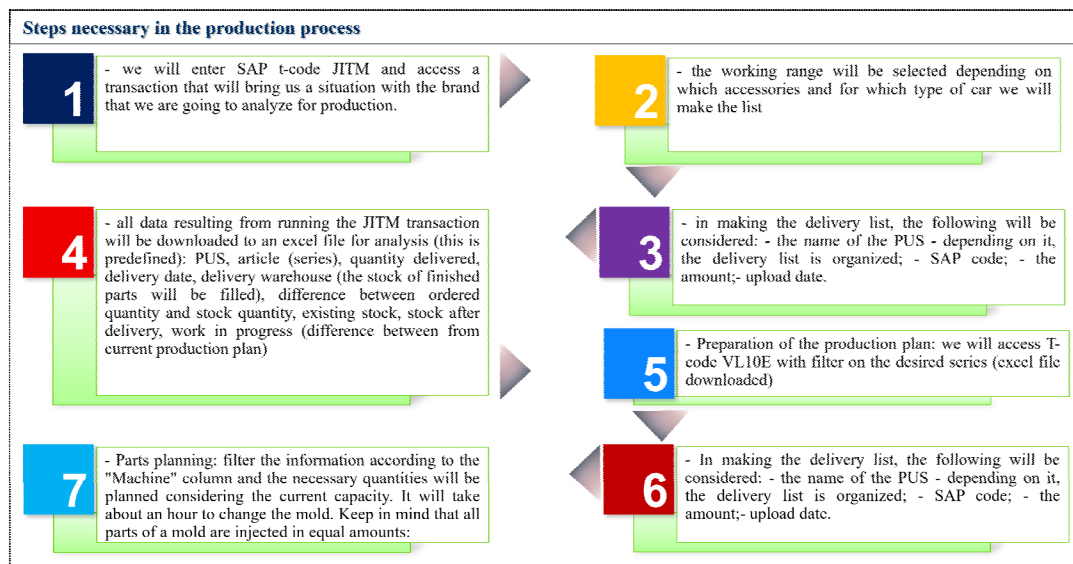


Figure no. 3 – The link between delivery and planning series

As can be seen from the steps listed in Figure 3, a number of features appear during this process, in which the possibility of production for a series of products (brand) is analyzed. The necessary stocks will be taken into account, if they exist, if not, they will be supplied, as can be seen in figure 4.

Quantities / series / production / stock / week																
Row Labels	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	
E2XX.10936.99.83		10	120	130	20		20	30	30	40	20	30	20	10	11	
E2XX.10937.99.83			119	130	20		20	30	30	40	20	30	20	10	11	
E2XX.10938.99.83				191	216	168	252	324	264	264	288	288	276	276	121	
E2XX.10939.99.83				191	216	168	252	324	264	264	288	288	276	276	121	
E2XX.17262.99.83	108	288														
E2XX.17263.99.83	110	250	40													
E2XX.17264.99.83																
E2XX.17266.99.83		120					120		120	120			120		120	
E2XX.17267.99.83		24	12													
E2XX.17269.99.83	100			100				100	100	100			100		100	
E2XX.17272.99.83		30														
E2XX.17274.99.83			300	400	500	500	600	500	600	600	600	600	600	600	400	
E2XX.17275.99.83	270	320														
E2XX.17277.99.83	120		240	360	600	480	600	480	600	600	600	600	600	600	360	
E2XX.17278.99.83	144	384	24													
E2XX.17281.99.83			256	256			256		256		256				256	
E2XX.17284.99.83	256	768	768	768	1280	768	1024	1024	1024	1024	1280	1024	1024	1024	768	
E2XX.17311.99.83	384	768	768	768	1152	960	960	1152	960	960	1152	1152	960	1152	571	
E2XX.17312.99.83	192	768	768	768	1152	960	960	1152	960	960	1152	1152	960	1152	571	

Figure no. 4 – Series – quantities vs stock / weeks

4. RPA IMPLEMENTATION - BENEFITS, RISKS, PLANNED SOLUTION

In what was found in the implementation process, a series of excel processing were done, which had to be replaced with bots software, for a more efficient processing and with as few errors as possible. Schematically, in figure 5 is presented the proposed solution, this being based on a part where the data received from SAP, a check will be made with popular data in Excel, a check of existing stocks will be made, and if it does not exist, supply orders will be placed automatically. The solution to the sending to the raw material suppliers was done by a software robot that will find in an location an excel file, completed by the first robot and will process the existing data there, sending electronically, based on data sets in the table of suppliers.

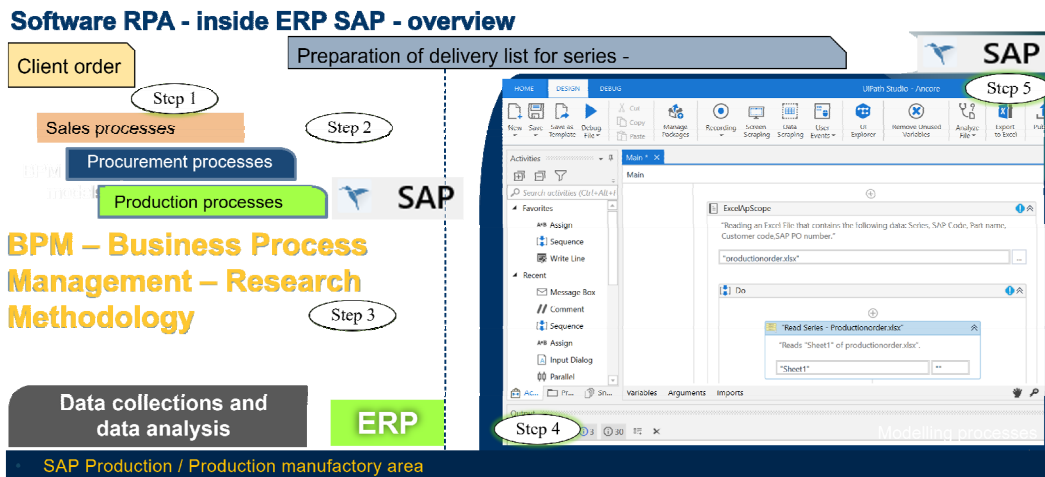


Figure no. 5 – Overview SAP – RPA – solution design

5. CONCLUSIONS

The conclusions reached after the creation of the software bots were that a series of errors inherent in the processes performed mostly in Excel were eliminated, these now being done automatically. Response times to customer requirements have been drastically reduced, by automating the completion of raw material requirements much faster and refreshing the production plan based on data in stock. Perhaps the greatest achievement was that auditing all the steps performed automatically is now possible, which highlighted the fact that where in the past there was human intervention, and long awaited for confirmation of a step, now this has been eliminated. The procurement process has been somewhat replaced by bots software, from the creation of a procurement order, receipt, uploading the received electronic invoice (this is now downloaded (from e-mail, or from an xml file, or from a txt file), transformed into an intermediate data file and uploaded to SAP - by a third party software bots. The payment of the supplier as well as the verification of the accounting notes is now done automatically - software bots, after each operation the balance of the supplier is also verified.

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