

# Automation of the Entry of Tax Invoices for the Optimization of the Process in a Metallurgical Company

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## Abstract

Acting to improve the process of entering the invoices that are received in the company, it was proposed to use software to automate the process. A quantitative study was carried out in relation to the time spent for these invoices to be sent in the company's ERP system before and after the implementation of the software, as well as the application of an interview for the employees who are more involved in the process. After the software implementation, a comparison was made between the scenario where the process was done manually (stage 1), and the stage that is characterized by the automation of the process (stage 2). In the results, it was noted that with the implementation of the software the process was 3.6 times faster, passing the time of waiting for the release of the invoices in the system of the company from 25 minutes to 8 minutes. And finally, it shows that the automation of processes with the use of the software can bring significant gains in terms of process execution time.

**Keywords:** Software; automation; process.

## I. INTRODUCTION

According to [1] when talking about automating processes in an industry, we are talking about greater efficiency, lower costs and better application of time, through the integration of systems and the replacement of human activities by automated actions. The industry is in transformation, stimulated by the development and use of new technologies, increasingly evolved and fast, this revolution will totally modify different scenarios. Professionals will also have to adapt, because with even more automated processes new demands will appear while some will cease to exist. Manual and repetitive work has already been exchanged for automated labor, and this is the basis of industry 4.0. A recent study by the National confederation of Industry [2] showed that of the 24 industrial fields in Brazil, 14 are behind in the use of digital technologies. The most interesting is that this group is responsible for about 40% of all

industrial production in the country, according to Brazilian Institute of Geography and Statistics (IBGE). In this way, almost half of all that the Brazilian industry produces is still not due to a fully automated digital reality. The present work aims to show that the automation of processes can bring significant gains in relation to the dynamism of the same. In the case studied, an initial study was conducted to know the feasibility of using invoice entry software, since some sectors of the company were being harmed by the delay in the entry of these invoices which were lauch manually. Subsequently, the software was implemented and a comparative analysis was performed between the scenario where there was no automation and the scenario after its implementation.

## II. LITERATURE REVISION

### A. Public digital bookkeeping system

According to the Public Digital Bookkeeping System [3], it was instituted through Decree 6.022 / 2007, and its purpose is to group the activities of reception, validation, storage, and authentication, which together form the accounting and fiscal books. Also, according to [3] books and accounting and tax documents are issued in electronic form, SPED is a technological solution that officializes the digital files of tax and accounting deeds of business systems within a specific and standardized digital format.

### B. Origin and evolution of the Electronic Nota Fiscal

According to [4] there have been significant changes in tax legislation and in accounting procedures. Technological development brought great benefits to professionals in the area, the use of information technology allowed the manual bookkeeping process to be replaced by the mechanic, and soon after, by the electronic. As a result, the accounting posting processes are carried out simultaneously, ensuring faster, more secure and reliable information processing.

**C. Integration of Invoices with TOTVS ERP Protheus**

According to [5] the purpose of this integration is to make it simpler and more flexible to include input tax documents, so a functionality is implemented in the pre-invoice routine. To include an input movement by importing an Extensible Markup Language (XML) file.

**D. Automated Systems**

Second [6] automating a process, it can significantly increase its performance. This reason is largely responsible for making automation more and more common throughout the world. Information technology has reached without exception, all extensions of knowledge, in the purpose of automating, industries first need to design, evaluate and obtain automated elements in order to architect an automated industrial system. For this reason, all needs can be allocated under an automated system, making it broadly suited to different demands. reduction of costs, becoming vital for the improvement of efficiency leading to simplification the measure of uniformity reduces the variability and exceptions that complicate the process productive.

**E. Inventory Management**

According to [7] stock management is the process that comprises from the choice of the type of material that will be stocked by the company, how it will be worked and how to organize it to the inventory that must be done periodically. Companies that act as manufacturers or assemblers, depend directly on a well-managed stock. A company that depends on production cannot survive without a good inventory management system.

**III. METHODOLOGY**

For the elaboration of the present article, bibliographical researches were carried out in books and published articles of magazines and periodicals, searching for the appropriate justifications and theoretical basis for the objective and practical accomplishment of the work.

After this, it started the execution of the stage of collecting data regarding the execution of the Invoices input process. The process was monitored and timed in the materials sector and in the fiscal sector for 12 weeks (March to May 2018) in step 1 and from (June to August 2018) in step 2, an Invoices count report issued by the company's ERP system was also used, such a report obtains information about the number of invoices that entered a year (May 2017 to May 2018) of customers and suppliers, used 90% of reliability in the samples collected. In addition to the application of an interview with questions directed to the people involved in the process. These questions were asked orally to two employees, since these are linked to the

entry of the products in the company, the launch of these in the system and the tax regularization, being a Materials Analyst who is responsible for receiving the products that arrive in the company's warehouse, and a Tax Analyst who has the responsibility of entering the invoices into the system, the validation of the interview in question was made through the application of two pretest, being applied to different people.

Soon after the data collection and analysis, they were entry in Excel software for better visualization in the form of charts and spreadsheets, with the purpose of analyzing in a quantitative way and showing the results achieved.

**IV. RESULTS AND DISCUSSION**

It was observed in the XPTO Company that the delay in updating the products in the system generated a bottleneck for several sectors because this delay made them unable to follow the arrival of these products in the company. Therefore, it was suggested to deploy an XML Importer integrated to the company's ERP system to better execute the process, in an automated way. The implementation of this integrated software aims to make the process faster and more compact in order to maintain the accuracy of the inventory, and to make the related data agile, in addition to solving problems with manual entry errors and facilitating access to vendors data.

The calculation was done through the collected samples to obtain the average time spent on each note entry, as described in the methodology and shown in Table 1 below.

**Table 1**  
**Demonstration of the average time of entry**

Stage 1	Stage 2
We collected 94 samples from a universe of 1739 (90% reliability). Sum of collected samples = 40.42 hours	We collected 94 samples from a universe of 1764 (90% reliability). Sum of collected samples = 13,16 hours
$40.42 / 94 = 0.43$ hours (mean of samples collected) or 25 minutes and 48 seconds	$13.16 / 94 = 0.14$ hours (mean of samples collected) or 8 minutes and 12 second

After the process that is divided into two stages, wherein the first moment (Stage 1) the XML Importer was not used, and in the second moment (Stage 2) that is characterized by the implementation of the software, a comparison was made between the stages, taking into account the time it took for the product data to be updated in the system and the time spent after its implantation.

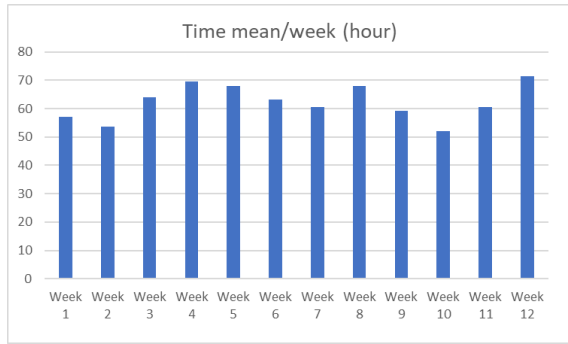


Fig.2 - Average time spent per week, Stage 1

Figure 2 shows the average time spent per week for launching the Invoices before the XML Importer deployment, in the weeks studied the company had an average admission of 144 invoices per week, with an average of 28.9 invoices per day.

According to the interviewees, at this stage the delay in updating the data referring to the components that enter the company, made the sequential processes of inventory, purchasing and production planning had bottlenecks, with that, there were daily difficulties in scheduling and production planning due to the lack of information about the inputs, that is, the delay in the input of invoices generated doubt about the receipt of the materials, causing delays in the processes.

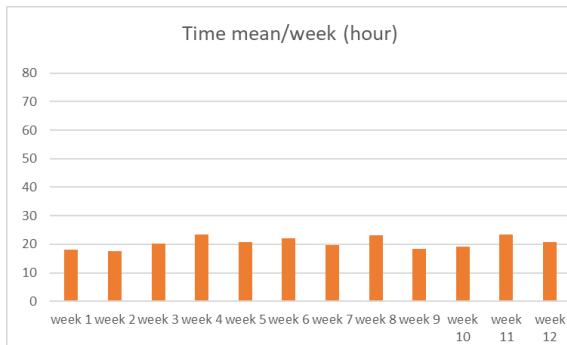


Fig.3 - Average time spent per week, Stage 2

Figure 3 refers to the second stage of data collection, with its corresponding average times per week, and in those other twelve weeks the average weekly incoming invoices were 146.5, and its average per day was 29.4.

It was noticed that with the implementation of the software the process stayed considerably faster, since in Stage 1 an spent of 0.43 hours (25 minutes and 48 seconds) was spent in order for a note with an indeterminate number of products to be updated in the system, and after its implantation in Stage 2, this number dropped to 0.14 hours (8 minutes and 12 seconds), reducing the time spent in stage 1 by 3.6 times, according to table 2.

table 2  
demonstration of time spent per process stage

Stage 1	Stage 2
Obtaining invoices (Electronic Invoice Assistant Document) after the arrival of the product to	Obtaining invoices (Electronic Invoice Assistant Document) after the arrival of this

the company this document is collected in the Matters sector by the person responsible for the release of the invoices. Average process length = 5 min and 45 seconds	document is collected in the Matters sector by the person responsible for the release of the invoices. Average process length = 5 min and 45 seconds
Verification in the Sefaz (check the XML with the purchase order, to see if there is any adversity with the data) Average process time = 10 min and 27 seconds	Automatic verification with Sefaz, (if there is any adversity in the XML regarding the purchase order, the system does not matter the note) Average process time = 1 min and 32 seconds
Manual posting (Fill in data such as, SPED, vendor, access key, quantity, vendor code, date of arrival, note type, note number and series, value, tax rates) Average process time = 9 min and 36 seconds	Automatic launch on the interface by reading the bar code access key or typing it. Average process time = 55 seconds
Total = 25 minutes and 48 seconds	Total = 8 minutes and 12 seconds

As stated by the interviewees, this process had the need to have greater agility in updating the stock to keep the existing balanced reliable, to monitor the arrival of the raw material and to improve the integration between the areas. The agility in the Invoices input process assists the other sectors that depend on the information to feed the data and continue with the manufacturing process, addition to preventing sectors such as Purchasing and Supplies from losing time in contacting suppliers. In this way, it can be observed that the results had positive impacts, since the sectors involved obtained the expected return from the beginning of the study, the greater agility in the process made that the Planning of Production, Purchases, and Supplies could act more reliably, since the necessary information for taking the necessary actions began to arrive in the necessary time.

## V. CONCLUSIONS

The automation of the process was necessary so that all the sectors that serve as support to the production could act with greater reliability and effectiveness, through the speed of obtaining information related to the inputs used in the manufacture. Thus, the study was done to conclude the true need for its implementation, and later the use of the software in practice to observe if the integration with the system and the ability to expedite the process would reach the expected result. The goal of making the process more agile, compact and reliable by automating it was achieved through software deployment, the process that had manual stages, now is done in an automated way, thereby making it faster and more reliable. After the software was deployed, sectors that were harmed by the lack of

information on the components that had already arrived in the company's Warehouse have access to this information more quickly and reliably, in addition to solving problems with manual launch errors and facilitating access to vendors. The process can be performed even more efficiently, it is proposed for future studies that the work of entering the invoices can be done in the company's own Ordinance, acting for it to be done in real time, that is, the products arrived at company would be launched in the ERP system even before being stocked, so that it reduces the process stages, making it more agile and compact. It can be concluded that with the implementation of the software, the invoices input process of the company met the needs of the sectors involved, solving the problems that existed at the beginning of the study.

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