INITIAL THOUGHTS ON THE IMPACT OF ROBOTIC PROCESS AUTOMATION ON THE ACCOUNTING DEPARTMENT

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Abstract
Robots represent a new technology used in all the departments, including accounting. So far, the number of literature contributions in the area is very limited. In this paper we explore the new concept. We synthesize the advantages and disadvantages of this technique, we review the academic literature in the area and we launch some future research avenues. The contributions of our work relies on the conceptualization of the phases necessary in the implementation of the robotic process automation, the benefits obtained and the difficulties encountered when using robotic process automation.

Keywords
Robotic process automation, accounting department, academic literature, professional reports.

JEL Classification
M14

Introduction
Started once as a need to record the "wealth", accounting underwent a long process of change. Only a decade ago one had to prepare all the statements for the state on paper and wait in long lines to hand them over to the state authorities. The questions asked nowadays are: "Are the robots going to replace the accountants?", "Is the accounting as a job going to disappear?"
Beginning in 1922 with Henry Ford's production lines, the automation process touches today all the departments of the business, including accounting in all its forms (management accounting, financial accounting, auditing etc.). Adopted by the big accounting and auditing companies, the robotic process automation (RPA) was little studied in the academic literature so far. Its importance is given by the fact that the right software can have a significant impact on the performance of the entity (Devarajan, 2018).
In this paper we explore the new concept and its impact on the accounting department. We synthesize the advantages and disadvantages of this technique, we review the academic

literature in the area and we launch some future research avenues. We use in our study academic papers and, also, reports issued by ACCA and the Big Four companies.

What is a robot and what does it do?

The technology for robots in finance and accounting existed since the 1990s. Back then, the IT department used macros (in Excel) for some activities, but the technology "was fallible" (ACCA, 2015). They were first used in businesses in the customer relations departments and in the production. Flexible manufacturing system meant the viable economical production of medium-size quantities. As such, it impacted management accounting (Dilts and Russell, 1985). For instance, the cost method changed. The variable cost included only the materials cost, as the labor was fixed. The absorption basis was no longer the labor hours or direct labor. The system collected information on machine hours, which becomes the base for product costing. The overheads increased. The need to control the costs and production mix appeared. The robots had implications on quality cost and decision making processes.

RPA was defined by IEEE Corporate Advisory Group (2017) as "A preconfigured software instance that uses business rules and predefined activity choreography to complete the autonomous execution of a combination of processes, activities, transactions, and tasks in one or more unrelated software systems to deliver a result or service with human exception management."

According to ACCA (2015) "Robotics is the application of flexible tools to automate manual activity for the delivery of business processes or IT services."

RPA is connected with the rest of the IT system which exists in the entity, using the other applications (such as Excel, e-mail, ERP, CRM, HR). It is a transversal technique, rather than being isolated at the level of one department (Hofmann et al., 2019). RPA is an intermediate between business process automation and people (Van der Aalst et al., 2018). A robot is a software which can do repetitive works such as monthly accounts closure, consolidation, reporting, payroll, accounts payable, accounts receivable, payments and other cash transactions, invoicing, which are traditionally performed by employees. It can have a user and a password assigned, just like any employee. It logs on to the system, performs its job and logs out when finishing. A process which can be performed by a robot has to have a few characteristics, as we present in Table no. 1.

Research method

The purpose of our paper is to review the literature regarding the robots created for the accounting department. We use in our studies academic papers and, also, reports issued by ACCA and the Big Four companies. We first conducted a systematic review of the literature on ProQuest databases. We used the terms "accounting," "robots," "robotic process automation." We added articles downloaded from Google Scholar to our database. We searched for reports issued by Big Four companies, ACCA and other professional organisations on Google.

The research questions are:

RQ1: Which are the outcomes, advantages and disadvantages of the robots implementation?

RQ2: Which are the main characteristics (theoretical frameworks, theories, methods, themes) of robots in accounting research?

Table no. 1 Characteristics of the processes suitable for RPA

Authors	Characteristic	Explanation/examples
Hofmann et al., 2019; Lacity et al., 2015; Moffitt et al., 2018	Highly standardized, well-defined, rule-based process	Invoices preparation
Lacity et al., 2015; Moffitt et al., 2018	Mature processes	
Lacity et al., 2015	Simple processes, which are completed in a few minutes	Exchange price differences
Lacity et al., 2015	Processes with identifiable beginnings and endings	
Hofmann et al., 2019	Multiple system access	The robot logs to a system (e.g. ERP, CRM), takes some data, searches for them in another database (e.g. ANAF) and updates the data from the first system.
Lacity et al., 2015	High levels of process interoperability across many platforms	
	Repetitive	Processes that are iterative are good candidates. Automation speeds up the execution of those processes resulting in increased productivity.
	Rules-based	If the way of handling a specific process does not undergo significant changes with each iteration, it can easily be translated into a set of rules that can be followed by RPA robots. A rules-based process is a good candidate for automation
	Structured	Are the aspects of the process well-defined or structured? If yes, the process's automation is easy to perform.
	Low Exceptions	

Source: Authors' compilation

Results of the study

RQ1: Which are the outcomes, advantages and disadvantages of the robots implementation

The outcomes of RPA appear at the level of the individuals and entity. From the point of view of the *outcomes*, the robots bring a technological process reframing (Issa et al., 2016), new process landscape (Hofmann et al., 2019) and workforce replacement (Frey and Osborne, 2017).

Technological process reframing (TPR) is "the reconsideration of methods and processes on an area of endeavor consequent of the advent of a disruptive technology" (Issa et al. 2016). In order to achieve it proactive planning and support from management and IT are needed (Lacity & Willcocks, 2015)

The workforce replacement doesn't mean necessarily that the people will be fired, but their roles and tasks will be different (IRPA, 2014). It means that the people will have to acquire appropriate skills (Lacity & Willcocks, 2015) in order to do the work that a robot can't do. The accountants will have to have communication, technical, IT and leader abilities, creativity, critical thinking and the capacity to solve problems (Ticoi, 2019; Jędrzejka, 2019). If they are to be accepted by companies, the robots have to replace first the humans in the tasks that they do not like; thus, they will be seen as a help rather than a threat (James Hall, Genfour, ACCA, 2015).

Research shows, however, that the use of RPA leads to a reduction of workforce (Lacity & Willcocks, 2015; Fernandez & Aman, 2018). The reduction can be obtained by not hiring more employees after adopting RPA (Chappell, 2017), which means that there is a lower number of job opportunities. As an outcome, RPA generates fear for the employees (Smith & Anderson, 2014).

RPA should be used by companies with an operational excellence strategy (Hofmann et al., 2019).

In terms of *benefits*, robots are non-invasive (Devarajan, 2018) and come to complete the ERP systems and outsourcing. However, they are a lot cheaper (Jędrzejka, 2019) and agile. Robots are simple, quickly and easy-to-implement and reconfigure, even by non-IT persons, adaptable (Hofmann et al., 2019). Robots work with virtually any existing desktop or server software (Moffitt et al., 2018).

They bring a reduction in human error, increased productivity, increased security, reliability, improved quality and reports, while decreasing delivery time (Lacity & Willcocks, 2015; Lacity et al., 2015; Hindle et al., 2018; Hofmann et al., 2019; Jędrzejka, 2019). The error tends towards zero. RPA assures geographical and cultural independence (Jędrzejka, 2019).

The robot keeps track of all the transactions it performs. The data is logged and audited instantly, minimizing the compliance risk and improving the control (Lacity et al., 2015; Hindle et al., 2018; Jędrzejka, 2019).

"Robots work twice as fast as a person and don't stop" (Deloitte's Peter Moller, ACCA, 2015). This generates a reduction in time used to perform a certain task and, ultimately, to deliver the service (Jędrzejka, 2019). The robots can work at any time (Kanellou & Spathis 2013). They log in, do the job and log out when finishing.

RPA can have a positive impact on the work of people. People won't perform repetitive tasks anymore and will have time for more challenging activities (Lacity & Willcocks, 2015; Jędrzejka, 2019). This improves the motivation and satisfaction of the employees.

For instance, in Romania at this point robots are being used by accounting firms to decrease the number of hours spent on repetitive activities, such us: the process of submitting the periodical tax returns (generating the tax returns from the accounting software, signing them using a digital certificate, submission on the designated website, verifying the message received during loading, sending the tax return to each client). Furthermore, robots are being used also for providing more flexibility to accountants, making work possible from any place.

For example, you can send a message via WhatsApp to a robot from you computer to send an email to your client with the trial balance that the robot has generated from the accounting software.

In conclusion, the benefits identified in relation with the RPA implementation can be synthesized as it follows:

- Economic benefits: e.g. increased ROI, improved total business value;
- Technical benefits: e.g. increased process automation;
- Organizational benefits: e.g. greater service quality;
- Social benefits: e.g. improved motivation and satisfaction of employees.

One of the *disadvantages* of the robots is that they cannot deal with the exceptions. Yet, the exceptions can be managed by the employees who, ideally, interact with the robots (Van der Aalst et al., 2018).

It takes a lot of time to "teach" them what they have to do, as they need more explanations than humans. If the rules do not cover all the aspects which can be encountered in a process, the RPA will make mistakes.

The RPA depends on the company's IT infrastructure. Unattended robots have to be supported by servers, software and network which keeps the pace with the robots, otherwise they won't be used at their full capacity. Yet others robots can be installed on computers and work with the employees.

The robots bring the disadvantages inherent to the new things: nobody wants to implement them, to invest in them before knowing that they work. As such, they will only be used at large before a big company will decide to use them and find that they work. "A try then buy" selling approach may be a solution (ACCA, 2015). The vendor will have to explain clearly the processes affected and the benefits of the solution. The robots are not considered a robot, but a technique.

Another issue in the beginning will be to trust the work of the robot.

Sometimes, the implementation is not well documented. As it is considered simple, it is sometimes performed by persons with no IT background and is not integrated with the rest of the company's software. As a consequence, 30-50% of the RPA projects fail (Hindle et al., 2018). Ideally, the project should be well-defined and the involvement of the IT department should be in line with the complexity of the work. Yet, RPA redesigns the traditional relationship between IT and other departments, as RPA should be implemented according to the instructions given by the implementing department.

The adoption of RPA can have negative emotional consequences on the employees (Fernandez & Aman, 2018). It creates competition between robots and people (Fernandez & Aman, 2018; Jędrzejka, 2019).

In conclusion, the difficulties identified in relation with the RPA implementation can be classified as it follows:

- Economic difficulties: e.g. cost overrun;
- Technical difficulties: e.g. tool selection; project time; implementation process; training; fit with the IT infrastructure; customization; security;
- Organizational difficulties: e.g. business process change; strategy;
- Social difficulties: e.g., they will need new skills in order to work with the robots; resistance to change; relationship with the solution providers.

RQ2: Which are the main characteristics (theoretical frameworks, theories, methods, themes) in robots in accounting research?

RPA in auditing was explored by Moffitt et al. (2018). The robots can be used for audit tasks as reconciliation, analytical procedures, internal control testing, detail testing. There are already specialised tools, such as IDEA, UiPath etc.

Another study dedicated to the implementation of RPA in various domains was published by Devarajan (2018). In presents the processes in which the RPA can be used in audit, insurance, retail and manufacturing.

Fernandez and Aman (2018) use a theoretical framework to document the impact on individual and on organization. They use the institutional theory and interviews in their work. They find that the people appreciate the accuracy brought by the implementation of RPA, consider that employees' time can be used for more challenging tasks. They reject the idea of the RPA use and the work processes changes because they are afraid that they will lose their jobs. All the problems have solutions at the level of the organizations. They can be solved with proper planning and communication. The RPA brings time and cost savings.

Collecting data from academics, researchers and professionals using a questionnaire, Abhishek and Divyashree (2019) discuss the benefits and the awareness level of the use of RPA. They find the accuracy, elimination of repetitive tasks, easier compliance with legal requirements, matching accounts with third parties among the benefits of implementing RPA.

Hofmann et al. (2019) identify as a gap in the literature the lack of "a theoretical ad synoptic analysis of RPA." They characterize the RPA and provide a set of directions for future research.

Lacity et al. (2015) present the successful implementation of a RPA (Blue Prism) at Telefonica, which started in 2010. The improvement started with the elimination of the non-value added processes, simplification and optimization of others. The implementation of RPA started with two simple processes, which supposed high volume of work. The trial lasted for two weeks and it was a success. The first negative reactions in respect of the RPA were generated by the IT department. Its employees felt threatened because the robot executed a lot of tasks in a very short period of time. In the beginning, the implementation team was made up of two back-office employees of Telefonica and one employee from the RPA provider. The employees received a week training and the consultant from Blue Prism worked for about one month at Telefonica. In 12 weeks the two employees could work independently. They began with 20 robots and increased to 75. Another employee joined the RPA team. In about five years, 15 core processes were automated, represented 35% of the back office transactions. Hundreds of people were redeployed to other departments.

Conclusions

Robots in accounting represent a new phenomenon. "Taking the robot out of the human" (Blue Prism, 2017), the general idea is that RPA won't replace people, but people will dedicate their time to complex, non-repetitive aspects which cannot be solved by robots.

The contributions of our work relies on the conceptualization of the phases necessary in the implementation of the RPA, the benefits obtained and the difficulties encountered when using RPA. This is the first paper to our knowledge, which deals with these three issues. We compared them with the ones generated by the implementation of the ERP systems.

After searching for references, we found out that the academic literature in the domain is scarce. There is a need for works in this domain because the depth of the research can inform on various aspects, such as:

- RPA in practice;
- RPA in specific accounting domains;
- Is RPA compatible with any legislative regime?
- RPA and other software (such as ERP systems)
- RPA and electronic markets
- The impact of RPA implementation on the accounting education

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