# Robotic Process Automation through Resource-Based View theory perspective: IS Resources and AI Capabilities creating Competitive Advantages and leveraging AI Strategy

Moderno, Osvaldo
School of Economics, Business
Administration and
Accounting, University of São
Paulo, Brazil
osvaldomoderno@usp.br

T.S. Nascimento, Paulo
School of Economics, Business
Administration and
Accounting, University of São
Paulo, Brazil
tromboni@usp.br

A. V. Gomes, Leonardo
School of Economics, Business
Administration and
Accounting, University of São
Paulo, Brazil
lavgomes@usp.br

Abstract — Recently, Artificial Intelligence (AI) enabling technologies have been associated with great sources of competitive advantage. Among such technologies, current Robotic Process Automation (RPA) is considered one of the most promising Artificial Intelligence (AI) implementation strategies. On one hand, we argue that the so far limited academic research on the literature sees RPA as an important tool at the tactical and operational levels. On the other hand, the literature has not properly considered the strategic contribution of RPA in terms of competitive advantages. Through Resource-Based View (RBV) lens, RPA can be seen as a tool that can change, integrate and improve groups of Resources, creating AI capabilities and generating competitive advantages. To date, we did not find any study approaching RPA through the RBV perspective. Also, this article contribuites in four important points. First by building a new Conceptual Framework which supports organizations to create an AI strategy by implementing RPA technology. Second, our RBV analysis showed that, to create an AI strategy, you must have AI capabilities. Third, RPA techinoly can change, expand and better articulate IS infrastructure creating competitive advantages for organizations. Finaly, it shows the best way to initiate AI capabilities is to start by implementing RPA technology. Complementing the purpose of this

research, all contributions were achieved through the application of a Systematic Literature Review, combining bibliometric and content analysis, with the aim of connecting the two bodies of literature.

**Key Words**: RPA, Robotic Process Automation, Resourced-Based View, Artificial Inteligence and Digital Strategy

#### 1. Introduction

Viewed as powerful internal aspects of a company, organizational resources and capabilities have been used as a way of achieving competitive advantages in current business scenario. "The finding that competitive advantage rather than external environments is the primary source of inter-firm profit differentials between them, focuses attention upon the sources of competitive advantage" (Grant, 1991).

Still according to Grant (1991), company can bring itself competitive advantage by possessing a scale-efficient plant, superior process technology, ownership of low-cost sources of raw materials or access to low-wage labor among other type of resources. However, these groups of resources no longer bring companies competitive advantages for a single reason. Many years after the formulation of the Resource-Based View theory (Grant, 1991; Margaret A. Peteraf, 1993; Nelson & Winter, 1973; Wernerfelt, 1984), these resources have become necessary for companies and no longer able of improving their competitiveness. Today, companies are still looking for competitive advantages but in a different manner. The world markets globalization and the emergence of a growing number of new enabling technologies have changed the business landscape as well as the way companies look for new capabilities and groups of resources.

"By definition, RPA is an umbrella term for tools that operate on the user interface of other computer systems in the way a human would do" (van der Aalst et al., 2018). RPA is more advanced than earlier Business Process automation tools, because "robots" act like a human inputting and consuming information from multiple Information Systems (Davenport & Ronanki, 2018). "RPA is the least expensive and easiest to implement of the cognitive technologies and typically brings a quick and high return on investment" (Davenport & Ronanki, 2018, p. 4). In addition, it was also created a 4-step framework able to integrate AI technologies helping companies to achieve their objectives of creating AI capabilities.

Cognitive technologies such as RPA, have been seen as important at the tactical and operational levels, but not so much on the strategic level of organizations (M. Lacity & Willcocks, 2015; Sahli & Davenport, 2019; Santos et al., 2019; Šimek & Šperka, 2019; V. K. Suri et al., 2018). This view hinders the understanding of the RPA strategic potential, which improves groups of resources by changing business processes, leveraging the firm's performance. By connecting the Resource Based View theory and RPA technology literatures, we show the strategic importance of RPA from two perspectives. On the one hand, creating AI resources through the best use of SI resources. On the other hand, showing how RPA can help create a Digital AI Strategy for organizations.

This study aims to show the strategic relevance of RPA technology through an RBV analysis. Thus, we propose the following research question: "How can RPA technology generate competitive advantages supporting company's Digital Strategy?"

We identified three theoretical and one managerial contributions on this study. As a first theoretical contribution, our RBV analysis showed that, to create an AI strategy, you must have AI capabilities. In the second, we proved that RPA can change, expand and better articulate IS

infrastructure creating competitive advantages. In the third contibution we presented that, the best way to initiate AI capabilities it is to start by implementing RPA technology. Finally, from a

managerial standpoint, we introduced a new Conceptual Framework which supports organizations on how to build an AI strategy by implementing RPA technology.

This article is developed into five sections. After the Introduction, section 2 presents the methodology approach utilized. In section 3, we show the discussion about results on the content analysis. Section 4 shows the conclusion with the contributions and future research. In section 5 it is presented the list of references.

### 2. Research Methodology

The connection between the RBV theory and RPA technology has no occurrences attested by the bibliometric research carried out to date. To enable such connection, a Systematic Literature Review (SLR) approach was selected to explore deeply both bodies of knowledge (Takey & Carvalho, 2016). A combination of bibliometric and content analysis was used to carry out the study. While the first dives deeply to better understand each literature, the second is fundamental for consolidating the findings, elaborate a perfect connection and develop a conceptual framework. Following in figure 1, it is detailed in a fluxogram the planned research design of this SLR.

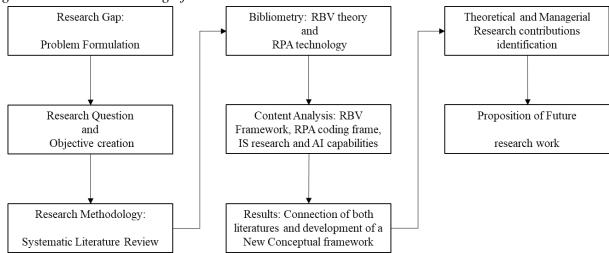


Figure 1 - A Research Design fo SLR.

Elaborated by the Autor based on (Tranfield et al., 2003, p. 214).

### 2.1. Bibliometric Analysis

The articles search was executed into the Scopus data base. It was chosen because it is one of the largest abstract and citation database of peer-reviewed literature representing, scientific journals, books and conference proceedings (Barleta et al., 2018). The word streams selected for RPA search were: ["Robotic Process Automation" and "competenc\*"] and ["Robotic Process Automation" and "capabilit\*"] and ["Robotic Process Automation" and "resource\*"] and ["Robotic Process Automation"], which results in 29 articles. Finally, after Title and Abstract analysis, 24 articles were selected to start the complete text review. We also performed a snowballing process analysis on the 24 articles references to look for other articles. More 15 manuscripts were included on the total RPA articles totalizing 39.

Regarding to RBV theory, we performed an articles search on Scopus data base using the word stream [Resouced-Based View Theory]. Many articles were identifyed however, only

seminal papers about the theory from the most relevant authors were choose to be part of the research resulting the list below.

- Barney, J. (1991) 21750 citations;
- Nelson, R.R. and Winter (1982/1973) 15656 citations;
- Wernerfelt, B. (1984) 10265 citations;
- Grant, R.M. (1991) 4020 citations;
- Peteraf, M.A. (1993) 4702 citations;

Then, using an integration of the word streams: ["RBV Theory", "Information Technology", "Information Systems" and "AI Capabilities"], we performed a new search on the Scopus and Google Academics databases looking for more articles. It results in more 12 articles that were download and read, totalizing 17 articles for RBV theory.

### 2.2. Content Analysis of Resource-Based View (RBV) and initial Framework identification

In this study we performed a four steps process to analyze the content of bibliometric results. In the first phase it was reviewed the Resourced-Based view (RBV) articles looking for a framework with the main elements of the RBV theory and their definitions. The second step was to creat, based on the RBV Framework, a coding frame to be used during the RPA articles analysis. The main idea of this step was to identify the RPA citations aligned with each RBV elements definition. Third step was to read all RPA articles, looking for those citations using them to fill in the coding frame. The fourth step was to find relevant information about AI Capabilities and Information Systems resources that could be usefull to the research objectives.

Looking for a framework that best represents RBV theory, indentifies the main elements and its definitions, it was performed an search on the 5 seminal articles: Barney, 1991; Grant, 1991; Margaret A. Peteraf, 1993 and Wernerfelt, 1984. After a comparative analysis, it was decided to go forward with Grant's framework (Grant, 1991, p. 115), due to its processual characteristics that facilitates the understanding of the study proposal and the clear definition of the main elements. Also, it was the most appropriated for explaining strategy formulation and facilitates the codification of RPA technology.

Actually, Grant's framework refers to a general perspective in terms of organizational and corporate aspects. However, since the focus of the research question it is to clarify the capacity of RPA to generate competitive advantage by managing resources that creates AI capabilities and support firm's AI Strategy, it is necessary to find in the RBV literature the same main aspect regarding to the Information Systems realm, which is the domain of RPA technology. The concept behind Grant's structure unfolds from a five-step process flow for strategy formulation as shown on Figure 2.

In terms of IS resources, many researchers indicated that IS Infrastructure, for instance, are easy to copy and therefore, do not bring any competitive advantage (Leonard-Barton, 1992; Teece et al., 1997). However, there are many evidences that competitive advantage depends on the firm's superior deployment of capabilities (Day, 1994). For instance, when it results from development of capabilities over a period of time becoming embedded in the company and are difficult to trade (Wade & Hulland, 2004), or when the firm may possess a capability that is idiosyncratic to the firm, for instance an IS expert who is loyal to the firm. Or even it is difficult to imitate due to path dependencies (Dierickx & Cool, 1989), or when they are incorporated in a firm's culture (Grant, 1991).

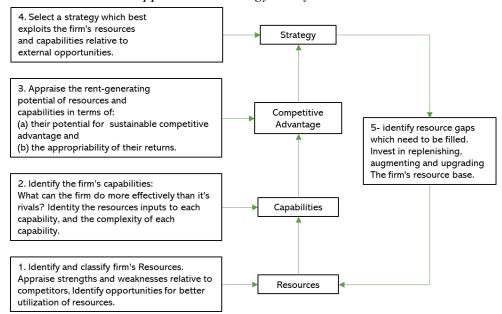


Figure 2 - A Resource-Based Approach to Strategy Analysis: A Practical Framework

(Grant, 1991, p. 115) adpted by the autor.

It would be very important to use a detailed specification of IS Recourses since they are complex and an important mean to reach capabilities leveraging competitive advantages. According to RBV perspective, competitive advantages are achieved through intelligent coordination and efficient handling of available resources and capabilities (Grant, 1991). It is not enough just to own them, it is necessary to understand how to handle them looking for superior performance and high business value focusing on competitors. In addition, the theory points out that resources include all assets, capabilities, organizational business processes, information and knowledges of an organization. It also establishes that some strategies need a mix of physical, human and organizational resources to be implemented (Barney, 1991).

On top of that, it was realized that the connection of both literatures of RBV and RPA, should be done through IS resources, since it is where RPA technology will be implemented and act into the firm. The reason lies in the fact that business processes provide a context for examining the locus of direct resource exploitation (Melville et al., 2004). Thus, to assure its connection, it

was decided to clarify IS Resources in a manner to enrich its definition and facilitate the understanding.

Wade & Hulland (2004) developed a Typology of IS Resources in three different types of Processes: Inside-out, Outside-In and Spanning (Table 1). The Author refers to Inside-out for the capabilities that reacts to market requirements, threats and opportunities in an inside-out manner, focusing on internal attributes. (e.g., technology development and cost controls). In an opposite way, Outside-in capabilities has an external orientation, emphasizing the anticipation of the market conditions (e.g., market responsiveness and managing external relationships). Acting in both directions, internally and externally, the spanning capabilities are used to integrate the previous ones.

Table 1 - IS Resources Typology

RBV IT Perspective	IS Resources	Constructs / Variables		
IS Resources: (Wade & Hulland, 2004)	Outside-in	Market responsiveness		
	Outside-III	External relationship Management		
	1	IS-business partnerships		
	Spanning	IS planning and change and Management		
	Inside-out	IS infrastructure		
		IS development		
		IS technical skills		
		Cost effective IS operations		

(Wade & Hulland, 2004, p. 112) adpted by the autor.

## 2.3. Content Analysis of Robotic Process Automation (RPA)

Still working with the Grant's Framework, we started examining the RPA articles through the RBV perspective. Each main aspects of the Grant's framework were used as a mainstream in a new framing and was used for content analysis and codification that is showed in Table 2. After the bibliometric analysis, we decided to focus attention on Case Study papers. It would allow us to be closer to the organizational context, where relevant factors about RPA technology are inserted and where their main contributions and results can be verified. Even though, during the review of the RPA articles, other approaches were analised due to its important information that could contribute to the study. The focus on Case Study approach served only to the coding frame utilization, supporting the connection of both literatures however, all articles on RPA were used in the research for other purposes.

*Table 2 – RPA Coding Frame* 

Article reference	Author	Business Sector	Resources	Capabilities	Competitive Advantage	Strategy contribution
Article's Name	Authors' Name	Development Sector	apprising	What can firms do better than it's rivals?	generating potential of resources and capabilities in terms of potential for sustainable competitive advantage and the	Select a strategy which best exploits the firm's Resources and Capabilities relative to external opportunities.

Elaborate d by the autor based on (Grant, 1991, p. 115).

We started the analysis of RPA articles looking for citations aligned to resources definition and thus focusing on business processes. Aiming to seek references that can lead us to identify opportunities for better use of resources through the assessment of strengths and weaknesses in relation to the competition (Grant, 1991), we search in the RPA literature where technology modifies business processes, integrates information systems and automates organizational routines creating competitive advantages.

Many of those examples were identified on the literature that fits to the criteria defined, on Telefonica O2 Case Study performed by (M. C. Lacity & Willcocks, 2016), two different processes were automated. First was a process replacing customer's "SIM" card keeping same number and other process applying precalculated credit to a customer's account. After perform 14 large

companies interview plan focusing on supply chain processes, it was identified 4 business process where RPA were successfully implemented, "Consolidating and entering customers' orders, Demand and supply planning, Procure to pay and Contracting Manufacturing" (Hartley & Sawaya, 2019). Another example of resources improved by RPA implementations is (Vipin K. Suri et al., 2017), in which authors highlight 11 internal process from 3 different areas as, Accounts Payable, Order-to-Cash, Procure-to-Pay, General Ledger, Financial Analysis, Financial Reporting, Payroll, Hire-to-Retired, Ticket Management and Database Management. It is possible to verify a briefing of the analysis for Resources on Table 3.

*Table 3 – Resources identification of better utilization* 

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Article	Author	Resources				
Robotic Process Automation at Telefónica O2		Process replacing customer's SIM card keeping same number. (pg.7)				
Robotic Process Automation at Telefónica O2	1 '	Process applying precalculated credit to a customer's account. (pg.7)				
Tortoise, not the hare: Digital transformation of supply chain business Processes	1	consolidating and entering orders from many customer (pg.3)				
Tortoise, not the hare: Digital transformation of supply chain business Processes	Hartley J. (2019)	Demand and supply planning (pg.3)				
Software Bots The Next Frontier for Shared Services and Functional Excellence		Accounts Payable (pg.9)				
Software Bots The Next Frontier for Shared Services and Functional Excellence	Suri et al 2017	Order-to- Cash (pg.9)				

Elaborated by the autor based on (Grant, 1991, p. 115).

The same process of coding using RBV perspective were used for each element of the theory through the analysis of the RPA articles. Including the above Resources table, other 3 were produced: Capabilities, Competitive Advantage and Strategy. All of those tables are available to be analised in the authors files.

### 3. Discussion

Paved in the results of the content analysis, it was possible to see a link between the two literatures. The foundational development of this study, through the application of the Grant's framework, was able to aggregate both literatures by creating an intuitive way towards the connection.

Starting from the premise that RPA technology is used fundamentally in business processes and organizational routines, and is inserted in the context of Information Technology (IT) and Information Systems (IS), RPA appears as an artefact able to integrate legacy systems and replace manual operations into many business process. Those actions improve firm's performance and bringing business value with substantially less investment compared to available options.

Wade & Hulland (2004) state that the IS infrastructure, formed by hardware and software, is where business processes are contained and RPA operates, so it cannot be a source of competitive advantage. However, our research shows that we can assume as a proposition that the competitive advantage comes from the complementarity of other IS resources, for example, through the coordination and management of the RPA implementation with the IS infrastructure, it is possible to change this premise.

Through the ability of using the External Relationship Management, a resource of the Outside-in type, firms can handle the implementation of RPA with vendors and develop appropriate solutions for its specific situations. Considering this, the set of information systems combined with the internal business processes and the IS technical skills of the experts involved in the solution, it can create such a combination of resources that can be difficult to be imitated or copied. Market responsiveness, another Outside-in resource, is fundamental to understand the market movements, making possible to the firm a quick reaction. We can exemplify the use of this

IS resource, observing the implementation of RPA tecnologies by the companies as part of a bigger trend (Ray et al., 2020, p. 22).

AI Digital Strategy is the one inserted into the Information Systems and Information Technology area. To understand how RPA can help on its formulation, we prepared a

Framework that conceptually shows the path of the main decisions to be taken to build such strategy. Figure 3 shows the three main concepts, brought from Resource-Based View of a firm, Artificial Intelligence and Robotic Process Automation literature.

### 4. Conclusion

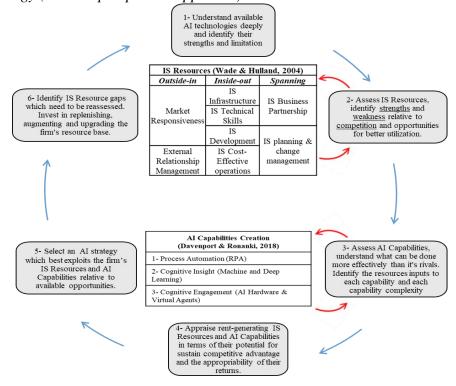
The main purpose of this study was to connect the body of literature on Resource-Based View of a firm and Robotic Process Automation technology. Through a Systematic Literature Review method, based on a detailed bibliometric study it was possible to collect the most relevant articles, which were subjected to a sufficiently in-depth content analysis to contribute to the results shown. This review was also fundamental to ensure that no study, as of the time we defined this research design, contributed to the objective, at least similar to that proposed by the authors. Our results demonstrate how RPA contributes to the theory by identifying AI capabilities in formulating AI strategy.

As the first theoretical contribution that our analysis has showed was that, to create an AI strategy, you must have AI capabilities. At second, it was the fact that, RPA can change, expand and better articulate IS infrastructure creating competitive advantages. And finally, it was identified that the best way to initiate AI capabilities, organizations should start by implementing RPA technology. Also, as a mangerial contribution, we have developed an new Conceptual

Framework which supports organizations to build an AI strategy by implementing RPA technology.

Through the perspective of RBV theory using Grant's Framework and the codification of RPA citations, we were able to show that it is possible to change IS Infrastructure through the changes of business processes. We also showed that these changes in business processes, require IS technical Skills, External Relationship Management and IS Business Partnership to be available for the firm, as well as to build IS Cost-Effective Operations. In this way, it is evident that through the complementarity and interaction between all these IS resources, firms can generate competitive advantages.

Figure 3 - Conceptual Framework for IS Resouces and AI Capabilities assessment to formulate AI Strategy (an RBV perspective approach).



Elaborated by the author.

The connection between the literatures came from the mapping of IS resources and AI Capabilities, which showed the purposes of each IS resources and clarify that it is through the IS infrastructure, that the RPA technology operates. This can be demonstrated through the new Concept Framework of IS Resources and AI Capabilities to formulate AI Strategy.

We also propose as a future work, the development of a research using a Case Study approach, preferably of cases where the firms really automate their business process and effectively the technology. The main objective should be to test the proposed framework of AI capabilities to formulate Digital Strategy.

Another possibility of future research could be a ressearch using a quntitative approach, through the use of a Suvey method to validate the existence of the information systems resouces relationships in the conceptual models and constructs proposed by the study.

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