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## Faculty of Business Economics

Master of Management

### **Master's thesis**

***New technologies leading to the revival of management accountant profession in business process management***

#### **Candela Freire**

Thesis presented in fulfillment of the requirements for the degree of Master of Management, specialization Business Process Management

#### **SUPERVISOR :**

Prof. dr. Mieke JANS



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**2018**  
**2019**



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## Summary

Studies have shown that globalization is playing a big role in business. Over the past thirty-five years the world has been transitioning into a global marketplace, thereby, today economy, financial markets, industry, and politics are all internationalized (Augustine, 2012). This internationalization has led to an increasing transfer of capital across borders, increasing importance of trade in the economy, and increasing communication throughout the world and competition between firms. Companies must be prepared to face the new challenges that arise at the international level quickly, in order to ensure competitiveness, efficiency and profitability in globalized environments. And this can only be possible due to the incredible advancements within technology fields.

Accounting does not escape this technology phenomenon; on the contrary, it reflects these changes, and more specifically, so does the Management Accountant profession.

Over the past years, it has been argued that Management Accountants are in danger of being marginalised with their roles potentially being performed by new technologies. Furthermore, it was also claimed that the development of management accounting was too isolated from other disciplines and was thus losing its importance in the organisational structure, therefore facing its soon extinction.

Today, an opposite description has appeared, claiming that the last two decades reflect a renaissance in management accounting, featuring that accountants can still create value in the business world. The main argument is that a range of strategically-oriented accounting techniques has been developed lately in the fields of Business Analytics and Business Process Management.

Following this position, it is believed that accountants are familiar with datasets, information systems and business processes, and also possess knowledge of general business fundamentals. Thus, rather than replacing accountants, new technologies complement accountants' skills and knowledge and bring tremendous areas of opportunity where accountants can grow.

In this sense, and being aware of these two utterly contrary positions, the aim of this paper is to perform a deep examination on the role of the Management Accountant. It has been taken into account how it seems to have shifted from being a book keeper and information facilitator to become an advisor to senior management, who takes financial as well as legal, administrative and operational decisions. Also, providing an insight into his background and qualities, and his ability to deal with great loads of information, it has been analysed his role in Business Process Management and in the development of strategies in the management field, both to keep the business going, achieve business processes optimization, and to generate competitive advantages.

For a better understanding and development of the proposed topic, I have decided to structure the present work in different sections. After this summary, and the introduction set as section one, section

two will describe the research methodology that is used. In the third section, the evolution of Management Accounting over the years will be described, mentioning its key aspects, its importance, and the impact that Big Data has recently made on it. A fourth section will provide an insight into Business Process Management, its key concepts, including its lifecycle and considering whether the accountant can add value to it, as well as how it can be leveraged by, once again, Big Data. Next, a fifth section will link the previous concepts, thoroughly exploring if the Management Accountant, given the presence of Big Data, can offer substantial support to Business Process Management. By accompanying the entire lifecycle of BPM and making use of different project evaluation tools to assess in the management decisions, it is evaluated if instead of disappearing, the profession may become more significant in the years to come. Finally, a conclusion will sum up the outcome of this research.

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# 1. Introduction

Previous studies and surveys state that continuous progress in artificial intelligence and machine learning, tied to an increasing capacity to analyse Big Data, has amplified the threat that a great range of jobs will be computerized in the future (Brynjolfsson, 2014) (McAfee, 2012) (Ford, 2015) (Frey, 2013). Frey and Osborne (2013) predict that this threat may be particularly salient for accountants and that there may be a 94 percent likelihood that accounting and auditing jobs will eventually become automated.

According to Frey and Osborne, “data analytic techniques applied to Big Data (hereafter, Big Data analytics) have the potential to replace many of the tasks traditionally performed by accountants and auditors. Entry-level accounting and auditing tasks, such as the posting and collection of accounts receivable, have already become automated. In the near future, more complex tasks currently performed by accountants, such as business analysis, external reporting, and auditing, may become automated as well, due to the routine nature of these tasks and the lack of machine inimitable skill requirements associated with these tasks.”

Following the same line of thought, a consensus is emerging among academics that in the future, accounting firms may face competition for the provision of services from non-accounting firms. Advances in data analytic and data visualization techniques will make it easier for non-accountants with data analysis competencies to complete financial statements by applying data analytic techniques (Brown-Liburd, 2015) (Earley, 2015) (Issa, 2013).

Furthermore, (Mokyr, 2015) has also been keen on investigating this topic, reaching to the outcome that if accounting firms do not exploit opportunities or neutralize threats made possible due to emerging technologies, then existing tech firms such as Google or FinTech start-ups may seize the opportunity to enter the market and this would increase the already intense competition among accounting firms.

Thus, the following question arises: is the era of new technologies leading to the extinction of the management accountant profession, or on the contrary, is it bringing new opportunities to develop broader and novel tasks?

Oppositely from the statements detailed above and consistent with different findings regarding past computerization (Arntz, 2016) (Spitz-Oener, 2006), claim that rather than substituting the profession, new technologies, mainly data analytics and Big Data will instead change task structures within the accounting profession, and this will provide opportunities for accountants to leverage their existing skills in conjunction with newly acquired ones.



Accordingly, the CEO of the American Institute of Certified Public Accountants (AICPA) stated: "Big Data has increased the demand for information management specialists, while dramatically increasing the potential for visionary professional growth and positioning. CPAs are perfectly suited to take a leadership role in deciphering and using Big Data to achieve strategic business goals." (Melancon, 2012).

Accounting is said to be the language of business. "Just as mastery of a language allows one to understand and interact with native speakers of a language, mastery of accounting grants an ability to interpret and understand concepts native to a business environment. This ability is central to accountants' capacity to add value in a world of Big Data. The advantage inherent in understanding the language of business is the ability to think holistically about the information presented rather than responding in a formulaic way. Big Data presents many opportunities to businesses, but in order to effectively leverage those opportunities and truly generate value from Big Data, businesses require individuals who understand not only Big Data and their analyses, but firm fundamentals and business strategy." (Stapleton, 2017)

This paper takes the second perspective as starting point: the era of new technologies is bringing new opportunities to develop accountants' skills among broader and novel tasks, instead of extinguishing their profession. The objective of this text is to explore the ways in which Big Data represents an opportunity to the accounting profession. "The work that will be automated is not a CPA's responsibility. That work was simply something that needed to be done for CPAs to start their job." In a world of seemingly infinite data, new concepts of value will need to be defined by accountants. There are huge opportunities there, noting that automating routine tasks could free up professionals to properly identify issues. (Sheedy, 2017)

Further, we will examine the ways in which accountant profession has evolved among the last years, being able now to play a strategic role in the business world. In this respect, researchers, practitioners and professional associations have emphasised the importance of increasing management accountants' prestige (Friedman, 2001) (Siegel, 1999) (Simons, 2012). Indeed, there is also some descriptive evidence that their prestige has improved over time. For example, Siegel and Sorensen (Siegel, 1999) reported that an increasing number of people outside the finance function 'believe that management accountants bring more value to the company'.

Besides, we will discuss how this release from traditional tasks could enable accountants to get deeper into the business process management field. This paper will identify whether there are particular management accounting activities and skills that could support different BPM activities. This will help the management accountant to organize their change efforts and provide a "road map" for their involvement in managing the changing needs of firms.

## 2. Research methodology

The literature in this investigation consists on topics related to the evolution of the management accountant profession, Big Data analytics, Business Process Management, and academic studies and journals and other relevant literature related to these topics.

The research carried out for this paper examines if the management accountant profession is being re-born or is being extinguished due to the appearance of new technologies and its impact on their traditional tasks.

For this thesis, both exploratory and descriptive approaches were used. As much data as possible about the study object was collected, using various sources of information. Specifically, a number of articles and other sources related to the evolution of accounting management profession, business process management and Big Data analytics general guidelines were consulted. Additionally, we analysed selected authors' opinions about the accountant profession future scope. This data collection provided an extensive background on a variety of views on the subject of this research.

This study applies a qualitative method. Qualitative methods give the researcher the opportunity to explore the results, and to provide a greater understanding of the issues (Silverman, 2001). We aim to obtain a deeper understanding of the study object and do not try to prove the credibility of our conclusions using quantitative methods or statistical tools. The data that are gathered, analysed and interpreted cannot be meaningfully expressed in figures.

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### 3. Evolution and key concepts of Management Accounting

Throughout this section, a background will be provided into the changes that have taken place during the last century within the accountant's profession, explaining how it has evolved over the years and how it has been re-thought nowadays. Besides, different definitions of the Management Accounting profession will be detailed by different authors, and also an insight will be provided into how Big Data is increasingly influencing it, releasing accountants from their traditional tasks and operational work, and leading to a gain of productivity and focus towards the business objectives.

#### ***3.1 From book keeping to Management Accounting***

The changes in Management Accounting that have occurred over the years are related to the information needs and the economic changes at a general level.

In the fifteenth century, double entry book keeping was originated to satisfy the requirements of Venetian merchants. From the Industrial Revolution, with the emergence of mass production, the first cost accounting systems appeared to understand the costs of manufactured products. With them, not only monetary data but also accounting data related to quantities became more relevant. They focused on the analysis of efficiency and productivity.

In the nineteenth century, the invention of the railroad and the telegraph caused companies to establish themselves in a more dispersed way as communication and transfer were facilitated, thus allowing the emergence of large distribution companies. For these reasons, the accounting records had to be adapted to serve the company's branches (Herrscher, 1979).

Although the origin of accounting is unknown, Luca Pacioli, called the Father of Accounting, is believed to have authored in 1494 the first publication of the double-accounting method. After this, financial accounting standards emerged as the result of statutory requirements, and management accounting information was based on accounting information designed for financial reporting purposes. To meet their information needs, accountants developed skills to interpret information from multiple sources. (Stapleton, 2017)

In its beginnings, Management Accountancy was guided towards what can be called "past and inward accounting", that is, focusing its attention on expressing the aims and financial results obtained in productive efficiency regarding cost reduction, in the control and in the administration of available resources. That is, "MAs have evolved from "number-crunching" preparers of financial statements and cost reports to business partners, involved in strategic planning and decision making." (Mahenthiran, Business Process Change and the Role of the Management Accountant, 1998)

Towards the end of the 20th century with globalization (the boom of the Internet, telecommunications, information systems), raised the fact that management accounting did not satisfy the needs of managers within companies. The scope and context in which they were immersed had changed profoundly and the information that before was sufficient, was no longer adequate by the end of 20<sup>th</sup> century. (Alejandro j Telias, 2007)

In this way, two particular criticisms of conventional management accounting have been widely discussed during the past years. The first one is the lack of a strategic focus, meaning that conventional management accounting was too focused on operational issues. This operational orientation has placed the profession and discipline as a whole in a subordinate position relative to other professions with a more strategic posture, such as marketing. The second one is passiveness, meaning that management accountants' role has traditionally been limited to providing useful information to managers who have then made decisions, while accountants have not been involved in any other aspect of decision-making processes.

Such criticisms have extensively challenged the management accounting profession and triggered two significant changes in their behaviour. The first challenge was to tackle strategic issues to process a broader scope of information than before. While conventional management accounting was primarily concerned with historical and internal information about a product's costs, strategic decisions primarily require future-oriented and external information such as information about competitors and customers. Second, to take on an integral and active part in decision-making processes they were expected to redefine their role above the mere provision of information to decision-makers. (Bostjan Aver, 2009)

In this way, and adding up that many accounting routine tasks that accountants used to do before, are now performed by new technologies or ERP systems, they can finally start focusing on strategic decision-making, business process management and information technology initiatives, to add actual value to the companies where they contribute value, instead of being just information facilitators and book keepers. They will also start to take part in Big Data analysis and Business Process Management among other tasks that will be explained clearly in the following sections.

### ***3.2 Management Accounting: Current definition and scope***

As it was described previously, the role of management accountants has changed dramatically over the past two decades. From simple providers of financial information to active members of the management team, they have become increasingly involved in day-to-day as well as strategic decisions. (White, 2014)

Generally, it could be remarkable that the traditional definition of management accounting that has been popular among different literatures over the last years, is described as merely providing information to the managers, so management accountants were considered as information providers, as we notice from the following definition: "Managerial accounting is concerned with providing information to managers, that is people inside an organization who direct and control its operations"(Garrison, Noreen & Brewer, 2006).

Along the same lines, the Institute of Management Accountants (IMA, 1981) defined management accounting by describing its traditional roles: " The process of identification, measurement, accumulation, analysis, preparation, interpretation, and communication of financial information used by management to plan, evaluate, and control an organization and to assure appropriate use of and accountability for its resources. Management accounting also comprises the preparation of financial reports for non-management groups such as shareholders, creditors, regulatory agencies, and tax authorities" (IMA, 1981).

Moreover, some of the contemporary authors are still going on the same boat of traditional definition. Helton (2006) defined management accounting as it was defined by (IMA, 1981). He stated that managerial accounting is: "The process of identifying, measuring analysing interpreting and communicating information in pursuit of an organization's goals".

On the other hand, in current studies and researches, it is clear how managerial accountants are no longer described as information providers and start to be described in a broader way as decision-makers and partnering of management members. Also, IMA adapted its former definition of management accounting: "Management accounting is a profession that involves partnering in management decision making, devising planning and performance management systems, and providing expertise in financial reporting and control to assist management in the formulation and implementation of an organization's strategy."

It is noticeable to what extent management accountants have become more effective and indispensable for decision making. It has become an integral part of the management process and management accountants have become substantial strategic partners in an organization's management team (Hilton, 2004). It is strikingly that the management accountants became more significance in the management team. Recently, more emphasis has been put on giving on commercial, efficiency and effectiveness advice to management, while it was in the past limited to provide information to the management. (Augustine, 2012)

Management accounting continues to develop from focusing on reduction of waste to creation of value through effective use of resources (IFAC, 1998). In other words, management accountants play an important role in creating and adding value to the organizations by managing resources, activities and people to fulfil the organizations' objectives (Hilton, 2004).

To that extent, an excellent summary of the main areas where management accountants currently perform their activities can be made. Firstly, cost behaviour; regardless of whether we gain or lose ground to operations, finance, or marketing researchers, there always be cost accounting. A heartening trend is that a solid body of accounting research has emerged in the area of cost behaviour. A hallmark of this area is that it uses archival, analytical, field, and experimental methods to examine the various aspects of product or service costs. Accounting signals can provide sufficient information about the economic benefits associated with product planning and capacity investment decisions. Secondly, Business Process Management; the Accountant can play a leading role in any BPM approach by helping managers develop long-terms goals and implement specific process changes to achieve them. He can act as an internal consultant, by taking part in strategic planning and process improvement, and by understanding the performance evaluation process. (Mahenthiran, Business Process Change and the Role of the Management Accountant, 1998). And thirdly, Accounting and Analytics; Big Data is the new reality and most companies must find a way to manage more data than they can potentially even fathom. Big Data is unstructured and not amenable to traditional methods. The areas of information systems, marketing, and management have employed methods and techniques to study Big Data, and insights from their research are beginning to emerge. Big Data is going to fundamentally alter the nature of decision making in organizations and markets, and companies in all industries are coming to realize that they are tech companies. (Krishnan, 2015)

The roles of management accountants vary from one organization to the next, their roles are depending on the size of organization, the type of organization, culture, industry and other factors, and also these factors are different from time to time, the roles of management accountants in the past are not the same nowadays, because the circumstances are different. Notwithstanding, such differences do not change the basic roles of management accountants, but the size of organizations and other factors influence them and determine their complexity (Edirisinghe, Ismail & Emerson, 2009). So, the changing role of Management accounting can be seen as parallel with the market circumstances. From only providing information for the purpose of internal business activity, it already moves towards creating value demanded by customer and other stakeholders. Moreover, management accountants nowadays have more responsibilities than before as a result of decentralization and delegation of authority.

However, along this paper, the main focus will be made in the relevant role that management accountants have gained over the years in the specific areas related to Business Process Management, and how the appearance of Big Data has enabled them to make great improvements in the field.

### ***3.3 How Big Data is changing the Management Accountant performance***

Management Accounting today is oriented to the future with both internal and external views. It is looking towards the client and the competition, while at the same time gaining efficiency and optimization of processes and resources. Nowadays, the business world is characterized by a changing, dynamic and competitive environment, which requires companies to adapt quickly in order to achieve success. In this environment, the required information must be highly selective and strategic, and not least important: it has to be available quick and on time.

The idea of systematization has arisen all over the world. Its ability to process all kinds of data according to accurate instructions, its versatility to adapt to any need and finally its speed is the greatest focus nowadays.

Given the centralization of the entire information process, it is the responsibility of accountants to integrate the accounting technique so that all the possible elements that can configure data for the best decision making are understood, facing an integral information. In this context is where the impact of Big Data takes place.

The term “Big Data” has been in use since the 1990s, with some giving credit to John Mashey for coining or at least making it popular (Lohr, 2013). Big Data usually includes data sets with sizes beyond the ability of commonly used software tools to capture, curate, manage, and process data within a tolerable elapsed time (Chris Snijders, 2012). Big data philosophy encompasses unstructured, semi-structured and structured data; however, the main focus is on unstructured data (Dedić & Stanier, 2017). Big data further requires a set of techniques and technologies with new forms of integration to reveal insights from datasets that are diverse, complex, and of a massive scale. It is based on the three V’s: volume, velocity and variety, meaning that it can store large amounts of different types of data, and process it in a surprisingly speedy way (see section 4.3 for more information on Big Data).

The enterprise data ecosystem is exponentially expanding, and this environment presents a dynamically changing set of characteristics that most likely will require the development of an enhanced theory of information. This enhancement to theory will require recognition of the nature of the data capture (manual versus automatic), the volume of the data, the efficiency of the integration with the existing data



corpus, the efficiency of the transformation of data into information, the granularity of data, types of operations/decisions supported, and other variables. Corporations, seeking a competitive advantage, have progressively expanded the scope of their information systems from traditional data processing to automated data capture where they rely on automated sensing to fully automate their management and production support systems. (Miklos A. Vasarhelyi, 2015)

Big Data is changing the frame of business measurement and its assurance. Organizations are being given opportunities to capture transactions before their official accounting recording, identify inventory movement prior to its actual receipt or delivery, identify customer calls before actual service actions are taken, and many other forms of economic activity identification. Furthermore, these same and other anticipatory measurements and techniques of predictive auditing can be applied to measurement assurance. (Miklos A. Vasarhelyi, 2015)

Big Data is a concept that promises to help in all areas, using the three V's (Erevelles, 2016): volume, velocity and variety. Volume, meaning that big data can be known as an "Ocean of data". It is represented by information that can come from every possible sensor. The challenges of having such a big quantity of data is that is very hard to sustain it, to store it, to analyse it and ultimately, to use it. Velocity is all about the speed of data traveling from one point to another and the speed of processing it. Sometimes it is crucial for the manager to be able to decide in a very short time on a variety of issues. The most important issue is that the resources that analyses data is limited compared to the volume of data, but the requests of information is unlimited and usually information gets through at least one bottleneck. And variety is represented by the types of data that are stored. Because there are many types of sensors and sources, the data that comes from them can vary much in size and type. (Mircea Răducu TRIFU, 2016)


In general, Big Data analyses can facilitate the discovery of important measures to be incorporated in Management Control Systems (regulating devices that align organizational goals with the behaviours of management and employees). It can discover behaviours correlated with specific goal outcomes, which would prompt the creation of corresponding performance measures in every area of a company. Within each area, Big Data can identify new activities that influence respective goal outcomes. For instance, web use while at work may be tied to learning and growth goals and internal emails may correlate with the effectiveness of internal business processes as well as customer service quality. The goal of monitoring and performance evaluations should be to improve productivity. Consequently, Big Data may hold the key to discovering new motivational measures for workers and identifying harmful ones, while discovering relationships between good management performance and variables previously not considered. The more data that is captured, the greater the opportunity to discover useful knowledge.

In this sense, budgeting represents one area of management control that has branched out from traditional data sources and embraced new methods of control. Accountants no longer need to execute traditional budgeting activities that have been criticized for being too inwardly focused, monotonous and non-creative. On the other hands, now they can make use of alternative and more efficient sources of information for operational planning, performance evaluation, communication of goals, and strategy formation. (J. Donald Warren, 2015)

Besides, Big Data can also improve transparency of traditional financial information and can provide usefulness for decision making. “For instance, relative to fixed assets, ERP systems can augment records with video clips and other types of multimedia. In this way, the user obtains a more comprehensive view of each asset’s condition, features, and characteristics. This improved transparency not only assists in meeting stakeholder needs, but also provides benefits to auditors addressing pertinent assertions about fixed assets.” (J. Donald Warren, 2015)

Regarding the auditing environment, it has also been shown that many internal procedures can be automated, thus saving costs, allowing for more frequent audits and freeing up the audit staff for tasks that require human judgment. The initial drivers for the use of analytics and Big Data by auditors are already in place, with the increasing complexity of client transactions, analytics, and data sources, and the subsequent increase of audit risk if analytical procedures are manual. Moreover, many audit tests may be conducted on 100 percent of the test population thanks to Big Data aids. (Deniz Appelbaum, 2017)

Nevertheless, there are practical implications that Accountants should take into account in order to be able to make use of the advantages that Big Data can offer. Accounting and reporting standards must adapt to deal with the continuous transmission of data. Standards need to consider addressing company-specific data, as well as macro-level data that may be important to the analysis of a company’s financial condition. Accountants need to consider enhancing historical reporting to include other data elements that may enable predictive analysis by users. Regarding auditing, standards must address situations where data are abundant, not only where data are sparse. The concept of materiality in relation to a company’s financial statements, taken as a whole, needs to be re-evaluated. Moreover, auditing standards must also do more to address the concept of process auditing. When data are available on a continuous basis, the processes generating those data must be continuously assured. Internal and external auditor competencies must be broadened to include more advanced types of data analytics. All parties along the financial reporting value chain must recognize the latent value in unstructured and semi-structured data and they must take care to minimize the expectations gap between users and auditors in the face of increasing data and analytical capacity. A user’s role (and responsibility), which could change, must also be considered. (Titera, 2015)



In this way, it has made clear that by a proper use of Big Data, taking into account the practical implications mentioned before, accountants have been freed of loads of manual and operational work. Audits can be performed more automatically, budgeting repetitive and monotonous activities that no longer need to be performed by accountants, and even fixed assets controls are carried out in an easier and faster way. Traditional accounting tasks such as identification, measurement, accumulation, preparation, and communication of financial information, and also preparation of financial reports is currently excluded from the accountant scope, as Big Data is now doing it for them. This does not necessarily mean that accountant profession is extinguishing, on the contrary, all of this might lead to a gaining of productivity within the company, enabling accountants to work towards the accomplishment of objectives, looking for improvements opportunities related to processes and efficiency that can result in nothing but benefits for the company. Business Process Management is now the area where the accountant can make a real difference in the business.

## 4. Business Process Management

This section will approach the Business Process Management key concepts, its lifecycle and the added value that it can deliver to companies, as well as how it was leveraged by Big Data. In this way, the aim of this section is to provide an overview on what this new area that was not included in the accountants' scope is all about, enabling them to cross the threshold to an entire new working field that was not considered before.

### *4.1 Introduction to Business Process Management and its lifecycle*

Business Process Management (BPM) is the art and science of how work should be performed in an organization in order to ensure consistent outputs and to take advantage of improvement opportunities. Typical examples of improvement objectives include reducing costs, execution times or error rates. Improvement initiatives may be one-off, but also display a more continuous nature. Importantly, BPM is not about improving the way individual activities are performed, but rather about managing entire chains of events, activities and decisions that ultimately produce added value for an organization and its customers. (M. Dumas, 2013)

In general, BPM can be seen as a continuous cycle comprising six phases.

The first phase is about process identification. Here, a business problem is posed, processes relevant to the problem being addressed are identified, delimited and related to each other. The outcome of process identification is a new or updated process architecture that provides an overall view of the processes in an organization and their relationships. In some cases, process identification is done in parallel with performance measure identification.

The second phase is related to process discovery (also called as-is process modelling). Here, the current state of each of the relevant processes is documented, typically in the form of one or several as-is process models.

In the third phase, a process analysis is carried out. In this phase, issues associated to the as-is process are identified, documented and whenever possible quantified using performance measures. The output of this phase is a structured collection of issues. These issues are typically prioritized in terms of their impact, and sometimes also in terms of the estimated effort required to resolve them.

The fourth phase includes the process redesign (also called process improvement). The goal of this phase is to identify changes to the process that would help to address the issues identified in the previous phase and allow the organization to meet its performance objectives. To this end, multiple change options are analysed and compared in terms of the chosen performance measures. This entails that process redesign and process analysis go hand-in-hand: as new change options are proposed, they are analysed using process analysis techniques. Eventually, the most promising change options are combined, leading to a redesigned process. The output of this phase is typically a to-be process model, which serves as a basis for the next phase.

The fifth phase is where the new process is implemented. In this phase, the changes required to move from the as-is process to the to-be process are prepared and performed. Process implementation covers two aspects: organizational change management and process automation. Organizational change management refers to the set of activities required to change the way of working of all participants involved in the process. Process automation on the other hand refers to the development and deployment of IT systems (or enhanced versions of existing IT systems) that support the to-be process.

Finally, monitoring and controlling of the process is needed. Once the redesigned process is running, relevant data are collected and analysed to determine how well is the process performing with respect to its performance measures and performance objectives. Bottlenecks, recurrent errors or deviations with respect to the intended behaviour are identified and corrective actions are undertaken. New issues may then arise, in the same or in other processes, requiring the cycle to be repeated on a continuous basis.

The BPM lifecycle helps to understand the role of technology in BPM. Technology in general, and especially Information Technology (IT), is a key instrument to improve business processes. Not surprisingly, IT specialists such as system engineers often play a significant role in BPM initiatives. However, to achieve maximum efficacy, system engineers need to be aware that technology is just one instrument for managing and executing processes. System engineers need to work together with process analysts in order to understand what the main issues affecting a given process, and how to best address these issues, be it by means of automation or by other means. Even more importantly, it is crucial that both IT specialist and process owners are assessed by an Accountant along the whole cycle, as it will be explained in detail in the following section. It is necessary to align the process changes to a business perspective, including both a financial and economic view, to make sure the complete success of the modifications, as well as being certain that the potential changes are in line with accounting rules. As a renowned technology businessman, Bill Gates, once famously put it: "The first rule in any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency". (M. Dumas, 2013)

## **4.2 Stakeholders in the BPM lifecycle**

A complementary view point on the BPM lifecycle is given by the stakeholders in the BPM lifecycle. These are the roles in a company that are directly or indirectly involved in BPM initiatives. The list of role highlights the fact that BPM is inter-disciplinary. A typical BPM initiative involves managers at different levels in the organization, administrative and field workers, business and system analysts and IT teams.

The Management Team, depending on how the management of a company is organized, might include the following positions. The Chief Executive Officer (CEO) is responsible for the overall business success of the company. The Chief Operations Officer (COO) is responsible for defining the way operations are set-up. In some companies, the COO is also responsible for process performance, while in other companies, there is a dedicated position of Chief Process Officer (CPO) for this purpose. The Chief Information Officer (CIO) is responsible for the efficient and effective operation of the information system infrastructure. In some organizations, process redesign projects are driven by the CIO. The Chief Financial Officer (CFO) is responsible for the overall financial performance of the company. The CFO may also be responsible for certain business processes, particularly those that have a direct impact on financial performance. Other management positions that have a stake in the lifecycle of processes include the Human Resources (HR) director. The HR director and their team play a key role in processes that involve significant numbers of process participants. In any case, the management team is responsible for overseeing all processes, initiating process redesign initiatives, and providing resources and strategic guidance to stakeholders involved in all phases of the business process lifecycle. (M. Dumas, 2013)

Another important role is carried out by Process Owners. A process owner is responsible for the efficient and effective operation of a given process. A process owner is responsible on one hand for planning and organizing, and on the other hand for monitoring and controlling the process. In their planning and organizing role, the process owner is responsible for defining performance measures and objectives as well as initiating and leading improvement projects related to their process. They are also responsible for securing resources so that the process runs smoothly on a daily basis. In their monitoring and controlling role, process owners are responsible for ensuring that the performance objectives of the process are met and taking corrective actions in case they are not met. Process owners also provide guidance to process participants on how to resolve exceptions and errors that occur during the execution of the process. Thus, the process owner is involved in process modelling, analysis, redesign, implementation and monitoring. Note that the same individual could well be responsible for multiple processes. For example, in a small company, a single manager might be responsible both for the company's order-to-cash process and for the after-sales customer service process. (M. Dumas, 2013)

Besides, there are Process Participants who perform the activities of a business process on a day-to-day basis. They conduct routine work according to the standards and guidelines of the company. Process participants are coordinated by the process owner, who is responsible to deal with non-routine aspects of the process. Process participants are also involved as domain experts during process discovery and process analysis. They support redesign activities and implementation efforts.

On the other hand, Process Analysts are in charge of conducting process identification, discovery (in particular modelling), analysis and redesign activities. They coordinate process implementation as well as process monitoring and controlling. They report to management and process owners and closely interact with process participants. Process analysts typically have one of two backgrounds. Process analysts concerned with organizational requirements, performance, and change management have a business background. Meanwhile, process analysts concerned with process automation have an IT background. (M. Dumas, 2013)

When it comes to process redesigning and implementation, System Engineers take part. They interact with process analysts to capture system requirements. They translate requirements into a system design and they are responsible for the implementation, testing and deployment of this system. System engineers also liaise with the process owner and process participants to ensure that the developed system supports their work in an effective manner. Oftentimes, system implementation, testing and deployment are outsourced to external providers, in which case the system engineering team will at least partially consist of contractors.

Along the whole BPM lifecycle, The BPM Group (also called BPM Centre of Excellence) has a key role. Large organizations that have been engaged in BPM for several years would normally have accumulated valuable knowledge on how to plan and execute BPM projects as well as substantial amounts of process documentation. The BPM Group is responsible for preserving this knowledge and documentation and ensuring that they are used to meet the organization's strategic goals. Specifically, the BPM group is responsible for maintaining the process architecture, prioritizing process redesign projects, giving support to the process owners and process analysts, and ensuring that the process documentation is maintained in a consistent manner and that the process monitoring systems are working effectively. In other words, the BPM group is responsible for maintaining a BPM culture and ensuring that this BPM culture is supporting the strategic goals of the organization. Not all organizations have a dedicated BPM Group. BPM Groups are most common in large organizations with years of BPM experience.

If we wanted to capture BPM in a nutshell, we could say that BPM is a body of principles, methods and tools to design, analyse, execute and monitor business processes. It has been also shown that process models and performance measures can be seen as foundational pillars for managing processes. It is on top of them that much of the art and science of BPM builds upon. The provided definition

encompasses the main phases of the BPM lifecycle. Moreover, there are different roles throughout all the organization that need to be clearly differentiated and taken into account during the whole process, as well as the stakeholders involved. Nevertheless, the role of the accountant, as it will be explained in section five, is also crucial and needs to be present among the entire cycle.

Along the next subsections, the value that BPM brings to business will be discussed, and how a proper implementation is a key factor on its development. Finally, Big Data will be highlighted again, this time mentioning the advantages it can bring to Business Process Management.

### ***4.3 BPM builds shareholder value***

In today's business environment of fast change one of the most valuable characteristics of an organization is its ability to adapt to the dynamic environment in which it operates. To this end, it is argued that focusing on process-oriented structures helps organizations to be more responsive to its need for change.

Business process management plays a key role in establishing a process-oriented environment, culture and technology (Farideh Heidari a, 2014). The approach of describing organizations in terms of business processes not only helps organizations to be more responsive to environmental changes but also helps them to overcome problems due to functional differentiation (Kedad Z, 2011). It is argued that BPM helps organizations to have more integrated information systems and to facilitate increased quality in the development and maintenance of such systems. (WMP, June 12-16, 2007)

Taking a fresh look at the achievements of BPM during the past decade, makes clear how far BPM has come. It was in 2000, when analysts, vendors, and consultants recognized that a market had been born and coined the terms "business process management," to describe the integration of planning, budgeting, and reporting processes.

However, it all began in 1990, when top companies were focusing on improving the quality of performance information by reducing their manual manipulation of data during the financial close cycle. They were linking their reporting frequency to the operational needs of the business, producing daily or weekly reports in fluid environments and monthly reports in more stable ones. Many added to their management reporting a level of detail that had not been achievable before. Along with the gathering of this additional information came the need to analyse it — and eventually the challenge of limiting the information to a small group of key measures that managers could act upon. This approach to reporting built on earlier developments in the effort to align goals companywide, and several leading companies explicitly linked their corporate strategy to their annual planning and financial budgeting processes.



BPM developed over the years through corporations seeking to improve business decision-making by developing more relevant measures, more rapidly or easily accessible information, and better tracking of results against objectives that are clearly linked to strategy.

To support the company's IT investment decisions, a group of BPM visionaries developed a single integrated, collaborative tool for building business cases in a consistent way across all business segments and for helping manage the investments once those projects launched. Not surprisingly, the system enabled projects to be scrutinized and resources to be shifted among them with more agility than formerly was possible. And not only it included big and expensive projects and technology-driven solutions for a more tailored approach, but also it could creatively use the technology that the company already had available, making impressive progress without spending lavishly on new applications. That is, including developed its performance reporting dashboard in-house using low-cost applications, supported by a small monthly programming and maintenance budget. (Pancoast, 2006)

In this way, it is agreed that with a proper performance of BPM, companies can improve shareholder returns by reducing complexity in their software systems. Not only businesses that use BPM tools tend to close their books faster than those that do not use it, but also they are able to focus on actions such as reducing the number of databases for financial reports and minimizing the company's reliance on spreadsheets for budgeting. Moreover, they can explore a more radical idea for consolidating financial systems: integrating tax data with other accounting information that is already in the organization's BPM applications. Therefore, daunting manual effort is no longer required to integrate tax and performance management systems. These new systems have given managers within their organization the right information, when they need it, in an easy-to-understand format. That is why real-world companies are using BPM software to boost corporate value. (Meg, 2007)

Nevertheless, it has to be considered that even the most enthusiastic BPM practitioners concede that a successful BPM program alone cannot guarantee, say, a higher stock price. But there is no question that when this technology is coupled with a corporate culture that supports its basic tenets, being controlled, analysed and monitored by the Accountant along with the management of the organization, it can drive results to grow shareholder value. (Tad, 2005)

Consequently, to bring actual value to the business, all the stakeholders within the process have to be committed to the project to guarantee its accomplishment, along with the Accountant monitoring and controlling. However, the first step is crucial for its success: aspects that need to be accounted for its implementation will be addressed in the following subsection.

#### **4.4 Success in BPM implementation**

Business Process Management is a management practice which encompasses all activities of identification, definition, analysis, design, execution, monitoring, measurement, and continuous improvement of business processes. Consequently, Business Process Management encompasses not only the analysis and modelling of business processes but also the organizational implementation, leadership and performance controlling.

Facing the importance and vital role of Business Process Management for the transformation and organizational change of enterprises the question arises on how different organizations perform in their development of Business Process Management.

From an operational point of view, process management is about having defined processes, measuring their performance, and improving them incrementally as part of daily business. It is also about defining performance goals for processes “top-down”, based on benchmarking results or strategic goals derived from corporate initiatives, and performing major re-engineering activities on processes to close existing performance or cost gaps. Process standards and a common process framework are a fundamental basis for a systematic design and optimization of results, processes, and resources.

The process management methods represent a comprehensive set of tools, concepts, conventions, procedures, and guidelines which are needed for any implementation and operation of process management. Thus, the process is structured into generic steps that consider setting goals, analysing the ‘as is’ process and identifying improvement levers; defining the target process including interfaces and implementation plan; implementing the target process, evaluating and adjusting the process if necessary; and reviewing the process performance and identifying improvement potentials. (Becker J, 2003)

Experiences show that business transformations are often a consequence of good process management. Thus, the implementation of process management itself has to be organized as a business transformation program covering all relevant aspects of an organization’s development. (Rohloff, 2007)

To give a deeper insight into the implementation steps, there are main topics that should be considered, beginning from the process management organization, establishing process management roles and bodies and assigning the responsible persons.

It is also crucial the processing of documentation and standardization, developing consistent and organization wide valid process definitions, driving the standardization and alignment of business processes, establishing a process house based on the reference process house and where necessary

more detailed process definitions, initiating process improvement initiatives for relevant processes of the process portfolio covering: visualization of as-is processes as required, derivation of improvement potentials and measures, design and implementation of to-be processes.

By achieving a correct organization of the processes, it is possible to achieve process optimization, consisting on selecting, assessing, and prioritizing the processes which have to be standardized and optimized. And then, setting targets and incentives to define process harmonization/standardization and process performance goals, which will be boosted by carrying out trainings that derive competency development measures for the people involved in process management; defining and conducting target group specific qualification programs and verifying the success.

Throughout the whole cycle, establishing an efficient communication of specific information about objectives, content, roles and responsibilities, will determine progress of process management to create awareness and support the implementation. Besides, a process performance controlling will define key performance indicators (KPI) and metrics for the portfolio processes derived from business goals and strategies, introducing a continuous KPI-based performance measurement and assessing for the processes. This will lead to a process management maturity that will enable implementations of improvement measures. (Dayal, 2009)

Only if each of these topics are planned and implemented to a certain degree and in a coordinated way, the effects necessary for overall success are achieved. The overall maturity degree of a process management implementation is therefore directly linked to the maturity degree of each of the implementation topics. In addition, the successful implementation and operation of business processes highly depend on providing a data management and leverage of the business processes and the organization by supporting information systems.

Of course, the business situation, the cultural environment, and the readiness of an organization are additional boundary conditions which have to be considered in the setup of the content and the timeframe of the implementation program.

Essential for a successful BPM implementation is the establishment of a Process Management Organization with defined roles and decision bodies which actively manage and drive the implementation of Business Process Management, as it was explained before with the six main stakeholders.

Moreover, the review phase that closes the cycle of BPM implementation is critical. Thus, it is important not only to review the performance of each implemented process but also to assess the overall BPM implementation initiative and all BPM related activities. As outlined, the stakeholders within the process and its respective board are responsible for development and implementation of all BPM methods.

In addition, a company must also possess or establish organizational capabilities that allow the business to offer a supportive environment; including leadership of senior executives who support the process; an organizational culture that put emphasis on a customer focus, teamwork, and willingness to change; expertise, including skills and methodology needed for process redesign, and governance counting on mechanisms for managing complex projects and change initiatives (Rohloff, 2007)

All the methods and tools that need to be accounted in order to thrive in the implementation or changes of process within companies have been mentioned. Having a clear process structure, with defined steps to follow, standardized methods, set targets, measures and controls, are the key of success. Nevertheless, Big Data importance needs to have a special mention, that is why it will be explained with details in the final part of section five.

#### ***4.5 BPM: Benefits obtained from Big Data***

In the previous section it was thoroughly explained what Big Data is, how it is making a great impact on the Accountant's normal tasks, and all the implications that they might be aware of in order to take advantage of the high number of benefits that Big Data can bring. With this clear background, it is now easier to understand how this is opening the way to great achievements in the Business Process Management field.

“Within organisations, managerial perceptions and process are also changing along with a data-driven decision-making strategy, which leads to changes in organisational culture, leadership, human resource management and other management practice” (Sheng, Amankwah-Amoah, & Wang, 2017). As organizations consider Big Data as technologies increasingly used for large-scale analytics, there is an opportunity to make sure that business processes are not ignored, and even more, can be improved hand-in-hand with the new analytics.

Normally, more analysis should lead to more actionable insight. Sometimes this insight can be used to improve business processes, or even make firms able to perform wholesale business process redesign. This means that as managers get more and more data to play with, they will have more ideas, and desire for process change may increase. (Tim Huenemann, 2013)

In this way, data collected over a period of time, is used for predictive analysis, to improve the current processes within the organizations, and also assess the impact of changes to these processes.

Specifically, Big Data initiatives test absorptive capacity in terms of the ability of the firm to take action based on results from its findings. This means that some processes can explicitly benefit from the results

of Big Data analysis. What used to be a gut-feel decision, or a crudely automated decision can now be supported with large-scale analysis. Business Process Management solutions with strong document management capabilities are now enabling the flexibility and streamlined workflows needed in the business area, where coordination of knowledge, content, correspondence and human tasks need to be managed and controlled.

However, it is extremely important to perform a "process impact analysis" of the new big data capabilities to evaluate in which processes they will be used and also if they will effectively make any worth improvements. It would not make any sense to deploy a high number of analytical capabilities into a functional area without anticipating and managing the process changes that will be generated.

Big Data is a global phenomenon (Brumfiel, 2011). However, A common problem with Big Data initiatives is making a tremendous effort to obtain a high amount of data without a detailed plan on how to use it afterwards. The best approach is to identify statistics that are both predictive and persistent, and only then analyse the data to improve performance based on the evidence. This means, that companies should always make sure to include process management in their big data efforts.

It can be assured that findings are turned into plans that bring about changes to organizational processes needed to deliver optimum results. Therefore, management commitment is required to ensure change is implemented over time. Outcomes are evidenced in better economic returns, greater stakeholder satisfaction and/or greater operational efficiencies. (Braganza, 2017)

To conclude, it has been agreed that Big Data's main impact in BPM is related to the support and documentation that it can bring to management decisions of changing or implementing new processes. Even more, analytics obtained from Big Data can be used for predictive analysis and therefore, assess the impacts that these changes may have. It can provide a great amount of information and ideas to bring about new improvements. However, it has to be taken into account that the only way of this to obtain actual benefits within the firm, is by making sure that the efforts made to acquire and process this data, are actually used in a detailed improvement plan, and not be just a waste of time and resources.

So far, it has been enlightened how Big Data has brought about new fields of performance for the Management Accountant, by setting him free of many operative tasks, and enabling him to use that time on focusing on activities that can generate value to the firm. Besides, it has been explained how Big Data per se can bring advantages to the whole Business Process Management ground. In the next section, it will be broadly described how the Management Accountant, given the assessment that can get from Big Data, could be able to support Business Process Management.

## 5. Management Accountant: key support to BPM

We have so far seen in this paper that in BPM, managing entire chains of events, activities and decisions that ultimately produce added value for an organization and its customers, is imperative for success. Therefore, there is a need of establishing roles and responsibilities upfront, processing documentation properly, communicating information in an efficient way to all the areas involved, and monitoring and controlling results.

Following what was also explained, the accountant might be in a position to assist in this. Not only because they might have the ability to align the process changes to a business perspective, including both a financial and economic view while at the same time being certain that the potential changes are in line with accounting rules, but also because they might also be able to face the challenge of limiting the information to a small group of key measures that managers could act upon. Moreover, they possess a deep understanding of Information Technology and Big Data analytics, which are key instruments to improve business processes.

Nevertheless, success will always depend on practical implications that accountants should take into account, such as adapting data standards to the company's specific characteristics to deal with the continuous transmission of data as well as macro-level data for the analysis of its financial condition. Accountants need to consider enhancing historical reporting to include other data elements that may enable predictive analysis by users. Besides, when data are available on a continuous basis, the processes generating those data must be continuously assured, and accounting competencies must be broadened to include more advanced types of data analytics.

In this section these subjects will be explored. Starting from the key aspects of BPM implementation, the way in which accountants could be present during the complete BPM lifecycle, the importance of balance scorecards for their assessment, and ending with the prospects for the future regarding accounting role in BPM.

### ***5.1 BPM implementation: Costs and benefits assessment***

Throughout the previous section, the main concepts of BPM were developed. Its lifecycle and the benefits that can bring to enterprises were discussed, as well as how a correct exploiting of Big Data can result in outstanding achievements.

Having explained the key factors for a successful BPM implementation, it could be derived that the Accountant might have an active participation within the whole process, as he can bring added value to this transformation. First of all, he has a global understanding of the business itself, and even more deeply, of all the processes that take place during the normal business operations. Thus, by a proper evaluation with the support of the areas that need to be involved, he can identify what can be improved in each of these processes. Besides, he has all the required tools and knowledge in order to make a proper cost and benefit analysis of general business cases regarding changes in processes or even implementing new ones. In other words, the finance and accounting perspective should go along during all the implementation and post-implementation steps.

From another point of view, there can also be economic consequences of letting processes fail to comply with finance and accounting criteria, and therefore once again, the accountant role is crucial. Consequently, there are main subjects that should be revised by him during the whole process.

First, cost calculation. It needs solid grounding in accounting theory, as it is usual to find direct costing or oversimplified and misconstrued activity-based costing approaches, as processing times and frequency data that can be extracted from event logs suggest that cost calculations can be accomplished easily. Therefore, it is highly important to count on the accountant professional role in this topic.

Secondly, economic implications of individual process states need to be accounted. The business process should create and capture vast amounts of business events, which are stored in event logs, transaction logs, data bases, or data warehouses. Usually, tools that make use of these event logs, such as business activity monitoring and process mining tools give decision makers insights into the structural properties of processes and process instance behaviour like processing times, frequent process paths, and shadow processes. However, in many cases, these tools cannot account for the economic implications of individual process states. Accounting information, such as resource expenses, current inventory, resource consumption, current sales, and order volume on a value basis must be readily available, making it easier for process managers to conduct sound economic analyses

Thirdly, economic reciprocity must be explicitly accounted for in process design and process control. Processes create not only costs but also income, revenue, payment receipts, receipts of goods, and so on. Moreover, established process definitions that regard business processes as a sequence of activities creating value for the customer may imply an overall unbalanced approach to process evaluations, as this definitions address only the customer perspective. While satisfying customer needs surely must be a central concern in BPM, first business processes must serve the economic interests of the organizations that own them. Therefore, BPM needs the accountant perspective to consider both “giving” and “taking” in the design, execution, and control of business processes.

Lastly, strategic decisions in BPM must be taken based on economic consequences from business-event data, and not on subjective plausibility considerations. Accounting data must be present in event or transaction logs to enable managers to draw correct conclusions. Accounting data in ERP systems should contain references to the process instances that create or manipulate accounting. (Sonnenberg, 2014)

To summarize, the active participation of the Accountant needs to be addressed upfront the implementation of a business process, and also needs to go hand-in-hand during the whole process. It is important to have a clear visibility of the costs incurred, and the benefits that the project can bring about, so make sure of what is convenient for the firm. Therefore, a deep examination of incomes and expenses regarding the project needs to be carried out carefully. In this way, proper accounting data can be obtained referencing all the steps of the process.

## ***5.2 Accountant accompanying BPM lifecycle***

After being described the different steps included in the lifecycle of BPM, it is necessary to dedicate a space to analyse the role that the Management Accountant fulfils within this cycle, and what is the contribution that this function makes to the current schemes.

Therefore, a review of each step of the BPM lifecycle and the support that the Accountant can provide will be assessed within this subsection. Since there is an overlap between the activities that have been described in the previous sections, the focus will be made in the challenges that the Accountant need to face to be able to make the cycle faster and obtain higher value from it.

Starting from process identification, as modelling processes in detail is extremely expensive and most of the organizations do not have the resources required, the processes that it should focus on are found in areas where there is either great value created, or significant trouble present. Therefore, process identification is concerned with two successive phases: designation and evaluation. The objective of the designation phase is to gain an understanding of the processes an organization is involved in as well as their interrelationships. The evaluation phase, based on the understanding that is established in the previous phase, intends to develop a prioritization among these for process management activities. Hence, the number of processes that are identified in a designation phase must represent a trade-off between impact and manageability. (M. Dumas, 2013)

During this first step, a deep analysis of an Accountant is vital to ensure the profitability of potential projects. Apart from correcting unhealthy processes for the organization, where the perspective and knowledge of process owners is necessary, it is also necessary to perform an evaluation of the potential



value that the new project can create. That is, making a correct cost-benefit analysis that can only be made by reuniting all the necessary economic, business and financial tools that the Accountant should possess. In this way, he can obtain an actual value to the project that can be used as a criterion to support the decision of the Management of approving or not the project.

Process discovery is the next step, defined as the act of gathering information about an existing process and organizing it in terms of an as-is process model. Modelling is a part of this activity, but can only start once the information is put together. Indeed, gathering information often proves to be cumbersome and time consuming in practice.

The first challenge of process discovery relates to fragmented process knowledge. Business processes define a set of logically related activities. These activities are typically assigned to specialized participants. This has the consequence that a process analyst needs to gather information about a process not only by talking with a single domain expert, but with several domain experts who are responsible for the different tasks of the process. Typically, domain experts have an abstract understanding of the overall process and a very detailed understanding of their own task. This makes it often difficult to puzzle the different views together. In particular, one domain expert might have a different idea about which output has to be expected from an upstream activity than the domain expert actually working on it. Potential conflicts in the provided information have to be resolved. It is also often the case that the rules of the process are not explicitly defined in detail. In those situations, domain experts may operate with diverging assumptions, which are often not exactly consistent. Fragmented process knowledge is one of the reasons why process discovery requires several iterations. Having received input from all relevant domain experts, the process analyst has to make proposals for resolving inconsistencies, which again requires feedback and eventually approval of the domain experts. (M. Dumas, 2013). The performance of the Accountant within this step could be of great support, as he can offer a broad view of the business as a whole, which can make it easier to put all the puzzle pieces together. Besides, by the help of Big Data, collecting information is no longer a big issue, as the Accountant can analyse and gather all the information needed.

The second challenge of process discovery stems from the fact that domain experts typically think of processes on a case level. Domain experts will find it easy to describe the activities they conducted for one specific case, but they might have problems responding to general questions about how a process works in the general way. It is indeed the task of the process analyst to organize and abstract from the pieces of information provided by the domain expert in such a way that a systematically defined process model can emerge. Therefore, it is required to ask specific questions about what happens if some task is completed, what if certain conditions do or do not hold, and what if certain deadlines are not met. In this way, the process analyst can reverse engineer the conditions that govern the routing decisions of a business process. (M. Dumas, 2013) However, this task not only accounts for the process analyst. By

working hand-in-hand with the Accountant, he will receive the assessment that can lead to a better understanding of general processes, being able to respond general questions of how the processes work in an overall way, and use this common links as tools that can be used for every process of the company.

In other words, the different methods of process discovery may have some limitations in terms of objectivity or may not be strong in providing rich insights into the process. Accountants involved in this step might be a good source to obtain clear information and a broad process view that can elucidate reasons and objectives for why a process is set up in a certain way. Even more, they can do it in an efficient way, taking advantage of the benefits of Big Data analytics, avoiding time-consuming approaches.

The third step consists on process analysis, that includes two different types; qualitative and quantitative analysis. The first one is a valuable tool to gain systematic insight into a process. However, the results obtained are sometimes not detailed enough to provide a solid basis for decision making. Regarding quantitative analysis, there is a range of techniques in terms of performance measures. Specifically, subsection 5.3 focuses in one of the mains techniques used by accountants to evaluate projects: the balanced scorecard.

Fourthly, process redesign; the analysis of a business process typically sparks various ideas and directions for redesign. In other words, a to-be process which would address the issues identified in the as-is project. The problem is, however, that redesign might not be approached in a systematic way, but rather considered as a purely creative activity. There may be multiple redesign options, and each of them needs to be analysed, so that an informed choice can be made as to which option should be chosen. (M. Dumas, 2013) Hence, after the different scenarios of redesigning are set up, they need to be evaluated. This evaluation can be done using the same technique as mentioned before: balanced scorecard.

Fifthly, process implementation step. Once redesigned, the necessary changes in the ways of working and the IT systems of the organization should be implemented so that the to-be process can eventually be put into execution. Deploying such an information system means not only developing the IT components of this system. It would also relate to training the process participants so that they perform their work in the spirit of the redesigned process and make the best use of the IT components of the system. More generally, process implementation may involve two complementary facets: organizational change management and process automation.

Organizational change management refers to the set of activities required to change the way of working of all participants involved in the process. These activities include explaining the changes to the process participants to the point that they understand both what changes are being introduced and why these

changes are beneficial to the company; putting in place a change management plan so that stakeholders know when the changes will be put into effect and what transitional arrangements will be employed to address problems during the transition to the to-be process; and training users to the new way of working and monitoring the changes in order to ensure a smooth transition to the to-be process.

On the other hand, process automation involves the configuration or implementation of an IT system (or the re-configuration of an existing IT system) to support the “to-be” process. This system should support process participants in the performance of the tasks of the process. This may include assigning tasks to process participants, helping process participants to prioritize their work, providing process participants with the information they need to perform a task, and performing automated crosschecks and other automated tasks where possible. (M. Dumas, 2013)

During this phase, not only the IT experts acquire the major relevance by configuring the pertinent systems. It is important that the Accountant can be present during the both steps that include this stage. As he possesses a general understanding of the business and processes that take part in it, he has to make sure that all the members of the company affected by the new processes can also understand the changes that have effectively occurred, and how their work will have to be adapted from that certain point. Besides, he can be aware of all the implications of the changes, making sure that everything can indeed run smoothly. In other words, he might have the general knowledge to make everyone aware of the effects associated to the project and has to make sure that the rest of the company can comprehend them as well.

Lastly, process monitoring and controlling: over time, some adjustments might be required because the implemented business process does not meet expectations. To this end, the process needs to be monitored and analysts ought to scrutinize the data collected by monitoring the process in order to identify needed adjustments to better control the execution of the process. This phase is important because addressing one or a handful of issues in a process is not the end of the story. Instead, managing a process requires a continuous effort. Lack of continuous monitoring and improvement of a process leads to degradation. As Michael Hammer once put it: “every good process eventually becomes a bad process”, unless continuously adapted and improved to keep up with the ever-changing landscape of customer needs, technology and competition. This is why the phases in the BPM lifecycle should be seen as being circular: the output of monitoring and controlling feeds back into the discovery, analysis and redesign phases. (M. Dumas, 2013)

The Accountant might possess the abilities to collect useful, quality information by performing a continuous control and monitoring of the projects realized within the company and the processes included in them. Therefore, he can create reports with summarized indicators to offer them to the management to account the functioning of the processes. The quality of the reports that are prepared is a key condition to consider the Accountant as an important part of the business, and, as it was mentioned

before, it is here where the Accountant should exploit all his knowledge in order to properly advise the management on the direction expected for the business.

By having explained the role of the Accountant along the BPM lifecycle, it can be concluded that it is not only important to count on them as a CFO taking part of the Management Team, as it is often common nowadays. It is also important that the Accountant can also take part into the BPM group, complementing the process by making sure that all the goals expected can actually be achieved, as well as offer support continuously to process owners, while also preserving the knowledge and documentation of the process. In other words, making sure that everything can work out successfully. It has to be comprehended that not only is the Process Owner the one that the company should consult at the time of intending to bring up a new project. It could be also useful that the judgement of the Accountant is presented parallelly from the beginning to the end of the lifecycle of BPM.

### ***5.3 Balanced Scorecard for BPM evaluation***

In this subsection, the way in which the Management Accountant, through the implementation of the Balanced Scorecard tool, is established as a contributor for BPM evaluation. In this sense, the Accountant will aim to carry out a careful selection of quantifiable measures to communicate to the stakeholders the results and performance indicators that derive from BPM. In this way, he has to take into account the objectives and goals that are intended to be achieved after the project development by capturing and integrating the main activities carried out throughout it.

It is pertinent to quote the notion of Balanced Scorecard to know what this management tool consists of: "It gathers information of different nature in a summarized form, to evaluate quickly and with the least possible effort the business' progress". (Albornoz, 2012)

In turn, "it is an integrated, balanced and strategic way of measuring current progress and providing the future direction of a company that will allow it to turn vision into action through a coherent set of indicators grouped into four different perspectives, through of which it is possible to see the business as a whole." (Ramirez, 2005)

In this sense, the Accountant would need to basically seek to complement financial and non-financial objectives, trying to achieve a balance that allows obtaining good short-term results and building a more successful future based on the company's vision. For this, it is necessary that in the elaboration of this tool, financial indicators are included. Moreover, they should account for the results of actions already taken and complemented with operational indicators on customer satisfaction, internal processes and innovation and improvement activities within the organization. The number of indicators used to

minimize information overload should be limited, focusing only on those that are relevant to meet the defined strategic objectives.

To make a better reading of what happens in the company regarding to the potential project, it is always convenient for the Accountant to create a scorecard for each sector, analysing what happens in each one of the sectors affected by the project, detecting possible deviations or opportunities for improvement. This will help the Accountant to focus on smaller information centres to then develop the meeting points and create the management report for the entire company. The combination of different indexes allows to examine interrelations between sectors that would otherwise be more expensive or demand greater resources of time and personnel. Do not forget that the indexes summarize many real events in numbers.

The decision is based on assumptions or hypotheses that relate the company to the environment. Both change and then the strategy formulated must be revised and redesigned as changes are detected, and this adaptation to these changes is the essence of management control. Opportunities must be seized and problems anticipated, including estimating future scenarios.

Accordingly, the Balanced Scorecard is based on four performance dimensions – each one covering a fundamental concern of a company.

In the first instance, Customer Measures are addressed. The Accountant should analyse how a company is performing from the perspective of its clients, as it has become a priority for top executives. For this, the Accountant, with the help of executives, should translate their general mission of service to clients into specific indicators that reflect the factors that really matter to them. For this, it is necessary to articulate different variables such as time, quality, performance and service as perceived and measured by the client. Generally, in this perspective the indicators include customer satisfaction, customer loyalty, customer profitability, acquisition of new customers, reoccurrence rate in purchases, on-time deliveries, number of complaints, and orders returned between others.

In the second instance, Internal Business Measures take place. It is interesting to know the internal perspective since it provides a notion of the crucial internal operations that should be developed in the company to satisfy the expectations and needs of its clients. The internal measurements carried out by the Accountant should focus on the business processes that have the greatest impact on customer satisfaction, among which are factors that affect cycle times, quality, employee skills and productivity. Therefore, it will be necessary to decide which processes and competences should be the best ones, and specify indicators for each one. The indicators that take relevance in this perspective are related to improvements in efficiency, reduction of unit costs, improvements in morale, recycled resources, increased use of employee capacity, and cycle time, to ensure efficiency and low levels of inventory in the case of manufacturing organizations.

The third instance is about Innovation and Learning Measures. Customer-based and internal business process measurements are important when identifying the parameters that the company considers most significant for competitive success, therefore, the emphasis placed on them should not be ignored. Innovation, improvement, learning and expanding capabilities, are the goals for success that are constantly changing. At this point, the innovation and learning perspective is developed. To achieve them, the businesses needs to invest in employee training, enhance information systems and technologies and coordinate procedures and routines of the organization. Only by its ability to launch new products, create more value for customers, invest in training and improve operational efficiencies on a continuous basis, can a company penetrate new markets and increase revenues and margins, and thus increase the value for shareholders.

Finally, a Financial Measure is developed, and here the Accountant might become relevant. It is important that a cautious analysis is carried out on the financial performance. This enables to indicate whether the company's strategy, implementation and execution are contributing to improving the last line of results. Typical financial goals are related to profitability, growth and value for the shareholder. Its importance in the balanced scorecard contributes to the value of financial indicators in summarizing economic consequences. Financial indicators are usually related to profitability; measured with capital income, production costs, human capital performance, profit rate, return on investment, growth, economic value added, cash flow, profitability of shareholders' funds, among other examples. This perspective will define the expected financial performance of the strategy and will serve as the final objectives and measures of all other perspectives of the tool, in relation to cause and effect of the different objectives set. The result in the financial are being able to serve customers optimally, as long as the internal processes are handled perfectly, and are nurtured according to the proper functioning of the organizational learning infrastructure.

The only way of taking advantage in BPM of the benefits that the Accountant can offer when introducing the balanced scorecard, is by having an efficient information and communication system among all areas, mainly between the stakeholders of the process. In turn, it is important that in its implementation the consent and support of the higher level for the project and the involvement of the employees of the organization are ensured.

To summarize, it is observed that the Balanced Scorecard is a useful tool for Accountants to define performance measures and evaluate potential projects. Nevertheless, a classical implementation may overemphasize the functional division of organizations, not paying enough attention to processes view. Accountants implementing the Balanced Scorecard in conjunction with BPM need to carefully consider the relation between the measures in the Balanced Scorecard - both at the corporate level, departmental level and lower levels- and the performance measures associated with the business processes. One

way to ensure this alignment is to implement a Balanced Scorecard structured according to the company's process architecture. (M. Dumas, 2013)

#### ***5.4 Accounting role in BPM towards the future***

Best practices are always changing and expanding our capabilities in this area, and this will be an ongoing journey. The past decade has seen tremendous improvements in BPM. Interestingly, although many companies now have the processes in place to link thoughtful strategies with individual actions, better performance can be achieved through those processes. Currently companies' BPM efforts have many behavioural rough spots and greatest opportunities for improvement, where accountants can play a leading role.

One of the first great opportunities is develop better organization strategies. It is often heard that failure occurs when aligning plans with strategies, and that is caused by not setting a strong enough strategy, documented, agreed upon the whole company, or grounded in marketplace reality and competitive positioning. Organizations that fail to meet their plans may find that their underlying strategy isn't what it needs to be.

The development of better strategies is the responsibility of the executive team, but battles over resource consumption, operational efficiency, and the business's ability to execute the strategy for many executive teams. Clarifying these issues with facts improves the quality of corporate strategy, and the performance analytics data that is part of many BPM initiatives is crucial in successfully defining and/or validating strategic goals. (Pancoast, 2006)

The business strategy will respond to the opportunities and threats, and it is perhaps the strategy's greatest challenge to identify them. "Companies that set goals that involve challenges will not always be closer to growth than those that raise conservative aspirations. The gain is linked to the entrepreneurial risk and will be greater depending on the proportion that it is decided to assume, although it does not make sense to set objectives that are known to be very difficult to achieve." (Peralta, 2009)

In relation to this, it can be said that the Accountant is responsible to perform a correct analysis to meet the organizational objectives that lead to achieve the company strategy, appealing both to the information that is provided from the different sectors within the company as well as the information which comes from the environment and its clients, being able to advise the senior management on the correct development of strategies and possible improvements in the face of the changes that are presented in the daily operations. (Grayson Morison, 2015)

Since an organization's performance depends upon the collective ability of its business processes to achieve its strategy and fundamental objectives, the quality of business processes is central to high performance organizations. (Shaw DR, 2007) However, this is not a straightforward task. There are different perceptions of quality corresponding to different stakeholders (managers, modelers, software engineers, etc.) and there are no well-established or even widely accepted approaches, quality criteria and evaluation to assist in this process. Therefore, the study of quality of business processes in terms of their models is a timely and important research undertaking that the Accountant should focus in. (Farideh Heidari a, 2014)

The second spot of improvement for BPM is the planning process within the company. Plans that are developed in a more collaborative environment yield more commitment from the people who have to bring them to fruition. To improve collaboration, senior leaders should take three big steps. They should approach planning as an open and honest, team-based process. They should decouple personal incentives from budgets. And they must make decisions about growth, profitability, and capital spending priorities before they ask managers to generate individual business units' budgets. (Pancoast, 2006)

Not only the Accountant, but also all the people in the company who are responsible for carrying out the activities included in the planning process should have had a role in setting it. If they have helped in their formulation, their commitment is much stronger. It is also crucial that the senior management is involved, challenging and questioning the different division proposals, and they were all examined to see if they are mutually consistent.

However, this planning process, of course, should be consistent with the financial goals, and, in fact, there should be interaction of the Accountant in accompanying all the sectors within the company during this process. All the figures should be analysed, discussed and challenged by him.

The third one, involves the improvements that can be made in the accuracy of business forecasts. Having correct expectations for the future is critical both in developing an operating plan and in managing performance over the course of the plan's time horizon, but a lot of organizations struggle to ensure that their forecasts are accurate. Although many businesses have dedicated a substantial amount of effort to improving their financial forecasting capabilities within the current reporting year, very few have yet addressed the accuracy of their operational forecasting or of their longer-term financial forecasting. Improving the accuracy of forecasts requires a commitment on the part of functional leaders, who must begin sharing information openly and working through multiple iterations of their projections until they reach the desired result through trial and error. (Pancoast, 2006)

The Accountant possesses the qualities to collect useful, quality information, working collaborative with IT, and perform an accurate business forecast, exploiting all his knowledge in order to offer proper advice on the direction of the business. That is what adds a true value in his work, evolving from the



registration and observation of deviations, to take part in future decision making, becoming a true strategist in order to achieve organizational objectives. (Sean Stein Smith, 2016)

To sum up, it can be claimed that the Accountant can play a leadership role in any BPM approach by helping managers develop long-range goals and implement specific process changes that support those goals. More specifically, the MA can become a change agent by acting as an internal consultant, by being in strategic planning and process improvement, and by understanding the performance evaluation process. (Mahenthiran, Business Process Change and the Role of the Management Accountant, 1998)

Accountants are the right professionals to understand how, where, and when a business process creates economic value in order to decide which processes should be redesigned, improved, or eliminated. In particular, they should know what the contribution of business processes is in order to coordinate their BPM activities properly. Therefore, they acquire a leading role in finding means by which to account for the creation of economic values in a process context.

Notwithstanding, we are aware that decision making in BPM might eventually lack an economic perspective stemming primarily from the absence of relevant, process-oriented accounting information in the context of planning, designing, and controlling business processes. Process-aware information systems as main facilitators of BPM initiatives and central information sources for process managers, cannot readily provide relevant accounting data for decision support since, in many cases. And although Accountants are making a big effort to keep the focus on, it is the main challenge to face during the evolution of BPM in the next years. (Sonnenberg, 2014)

## 6. Conclusions


The existence of a complex and dynamic environment, characterized by great competitive pressure, in a globalized context and technological development, has made it necessary to implement various management tools within organizations to develop an efficient but also effective strategic direction. From this, also, it is derived that the need to have information in a fast, timely and reliable way for the measurement and evaluation of the overall performance of the company, is a consequence of the importance that under current conditions has the adoption of appropriate strategies to achieve competitive advantages, to survive in an aggressively growing business world.

In this sense, not only the organizational objectives and means to achieve their progress have changed, but the profile of the accountant has also changed. These professionals have acquired a deep understanding of business management issues to carry out business process management, which strengthens their academic training, seeking to achieve an increasing participation in organizational processes.

The results of the study show that the management accountant's knowledge of underlying cost structures of the processes being reengineered, might be valuable in reducing the risk of possible failures in new processes implementation. Accountants might be the best positioned to take a leadership role utilizing organizational resources and increasing efficiency with a validated cost benefit analysis. They should accompany all the sectors within the company during the process, and all the figures should be analysed, discussed and challenged by him.

Another important finding is that the greater the involvement of the Management Accountant in the different phases of the BPM lifecycle, the more likelihood that the project will succeed. Accountants might be constituted as prepared professionals to carry out business process management because of the tools which they have acquired over their studies and professional experience. They might be able to understand how, where, and when a business process creates economic value and decide which processes should be redesigned, improved, or eliminated.

It is important to note, however, that the driving purpose of better BPM is to provide decision makers with information that has been generated and reviewed by the accounting function. And this revision should be based on the definition of the company's vision and strategy. Accountants should identify the objectives and initiatives necessary to comply with said strategy. If they are already on the proverbial short-list of personnel and advisors leaned on to help management make decisions, it is logical that they take a leadership role in rolling out business process management initiatives. Assuming a proactive role in the company will lead them to take responsibility for the processing of the data obtained from Big Data analytics to turn them into management information useful and relevant to understanding



processes and find the areas of improvement among them. Delivering value through report writing and managing the flow of data from the front end of the organization to senior leadership; and being able to have a critical attitude that allows the entry of new knowledge that does not filter or convert the information into false information, will guarantee a better administrative management.

Besides, it is necessary to identify the most relevant management tools, adapting to the type of company and the strategy to be followed, such as budgets, indicators and Balanced Scorecard. The Balanced Scorecard should allow, in turn, to support the implementation of the strategy, focusing and aligning the company around the objectives set, which would contribute, on the one hand, to the identification of opportunities for improvement and, on the other, to better use of available resources to achieve the expected results.

In summary, the results of this research indicate that the Management Accountant has an important role to play in radically improving organisational performance. This paper has tried to demonstrate that he has in his hands the essential instrument of improving processes within companies. And this is due to for several reasons: for their high degree of analytical ability of great amount of business data, for their knowledge of the accounting technique with the limitations they provide, and for their knowledge and ability to correctly interpret financial statements and to master the various tools of management.

## 7. References

- Albornoz, C. (2012). *Gestión financiera de las organizaciones*. EUDEBA.
- Alejandro j Telias, R. P. (2007). *Contabilidad para gerenciar*. Temas Grupo.
- Arntz, M. T. (2016). *The Risk of Automation for Jobs in OECD Countries*. Obtenido de [http://www.oecdilibrary.org/social-issues-migration-health/the-risk-of-automation-for-jobs-in-oecd-countries\\_5jlz9h56dvq7-en](http://www.oecdilibrary.org/social-issues-migration-health/the-risk-of-automation-for-jobs-in-oecd-countries_5jlz9h56dvq7-en)
- Augustine, M. A. (2012). The Roles and Responsibilities of Management and Business. *Global Journal of Management and Business Research*, 12(15).
- Becker J, K. M. (2003). *Process management: a guide for the design of business processes* (2 ed., Vol. 2). Springer-Verlag Berlin Heidelberg.
- Bostjan Aver, S. C. (2009). Management accountants' participation in strategic management processes: A cross-industry comparison. *Journal for East European Management Studies*, 14(3), 310.
- Braganza, A. (2017). Resource management in big data initiatives: Processes and dynamic capabilities. *Journal of Business Research*. 70, 328-337, 70, 328-337.
- Brown-Liburd, H. H. (2015). *Behavioral implications of Big Data's impact on audit judgment and decision making* (451–468. doi:10.2308/acch-51023 ed.). *Accounting Horizons* 29 (2).
- Brumfiel, G. (2011). High energy physics: Down the petabyte highway. *Nature*, 469(20), 282–283.
- Brynjolfsson, E. a. (2014). *The Second Machine Age: Work Progress and Prosperity in a Time of Brilliant Technologies*. New York: WW Norton.
- Chris Snijders, U. M.-D. (2012). Big Data: Big Gaps of Knowledge in the field of Internet Science. *International Journal of Internet Science*, 7(1), 1-5.
- Circa C, A. A. (2015). ERP Systems and Management Accounting - Evolutions and challenges. *Young Economist Journal*, 12(24), 160.
- Dayal, E. K. (2009). *Business Process Management* (2009932360 ed.). Germany: Springer.

- Dedić, N., & Stanier. (2017). *Towards Differentiating Business Intelligence, Big Data, Data Analytics and Knowledge Discovery*. Berlin: Heidelberg: Springer International Publishing.
- Deniz Appelbaum, A. K. (2017). Big Data and Analytics in the Modern Audit Engagement. *Auditing: A Journal of Practice & Theory*, 36(4), 16-18.
- Earl, M. J. (1995). The New and the Old of Business Process Redesign,". *Journal of Strategic Information Systems*, 12(1), 5-22.
- Earley, C. E. (2015). *Data analytics in auditing: Opportunities and challenges* (493–500. doi:10.1016/j.bushor. ed.). *Business Horizons* 58 (5).
- Erevelles, S. F. (2016). Big data consumer analytics and the transformation of marketing. *Journal of Business Research*, 69(2), 897-904.
- Farideh Heidari a, P. L. (2014). Quality evaluation framework (QEF): Modeling and evaluating quality of business processes. *International Journal of Accounting Information Systems*, 15(3), 194.
- Ford, M. (2015). *Rise of the Robots: Technology and the Threat of a Jobless Future*. New York: Basic Books.
- Frey, C. B. (2013). The Future of Employment: How Susceptible are Jobs to Computerisation? *Oxford Martin School*, 114, 254-280.
- Friedman, A. L. (2001). The beancounter stereotype: towards a general model of stereotype generation. *Critical Perspectives on Accounting*, 12(4), 423-451.
- Grayson Morison, R. &. (2015). An analysis of companies' business objectives. *Governance Directions*, 67(2), 438-447.
- Herrscher, E. G. (1979). *Contabilidad Gerencial* (1 ed.). Macchi.
- Issa, H. (2013). *Exceptional Exceptions*. The State University of New Jersey, Newark: Dissertation, Rutgers.
- J. Donald Warren, J. K. (2015). How Big Data Will Change Accounting. *Accounting Horizons*, 29(2), 400.

- Kedad Z, L. P. (2011). Considering quality factors for business processes during requirement engineering. (págs. 1-9). Gosier, France: IEEE.
- Krishnan. (2015). Management Accountant- What Ails Thee? *Journal of Management Accounting Research*, 27(1), 182-187.
- Lohr, S. (2013). *The origins of Big Data: An etymological detective story*. The New York Times.
- M. Dumas, M. L. (2013). *Fundamentals of Business Process Management*. Springer.
- Mahenthiran, S. (1998). Business Process Change and the Role of the Management Accountant. *Journal of Cost Management*.
- Mahenthiran, S. (1998). Business Process Change and the Role of the Management Accountant. *Butler University*, 39, 11.
- McAfee, A. a. (2012). Big Data: The management revolution. *Harvard Business Review*, 90(10), 59-68.
- Meg, W. (2007). Hard Numbers: BPM Drives Value. *Business Performance Management*, 5(1), 1-2.
- Melancon, B. (2012). "Big Data" presents big opportunities for firms and CFOs. *AICPA Insights*.  
Obtenido de <http://blog.aicpa.org/2012/07/big-data-presents-big-opportunities-for-firms-and-cfos.html#sthash.OgDrQ0yQ.dpbs>
- Miklos A. Vasarhelyi, A. K. (2015). Big Data in Accounting: An Overview. *Accounting Horizons*, 29(2), 383-384.
- Mircea Răducu TRIFU, M.-L. I. (2016). Big Data Components for Business Process Optimization. *Informatica Economică vol. 20, no. 1, 20(1)*, 73-74.
- Mokyr, J. C. (2015). The history of technological anxiety and the future of economic growth: Is this time. *Journal of Economic Perspectives*, 29(3), 31–50.
- Pancoast, J. (2006). Best of BPM: Visionaries Set the Tone For the Future of Performance Management. *Business Performance Management*, 4(2), 4-9.
- Peralta, J. (2009). *La gestión empresarial y los costos*. La Ley.

- Professionals, B. A. (2011). *Imanet*. Recuperado el 27 de 09 de 2011, de [http://www.imanet.org/about\\_ima/our\\_mission.aspx](http://www.imanet.org/about_ima/our_mission.aspx)
- Ramirez, L. M. (2005). *Actualizaciones para el desarrollo organizacional*. UVM.
- Rohloff, M. (2007). Advances in business process management implementation based on a maturity assessment and best practice exchange. *Information Systems & e-Business Management*, 9(3), 383-403.
- Sean Stein Smith, C. a. (2016). The CPA's Role in Business Process Management: How CPAs Can Deliver Results. *NJCPA*, 1.
- Shaw DR, H. C. (2007). Elements of a business process management system theory and practice. *Business Process Management*, 13(1), 91–107.
- Sheedy, C. (2017). *What CPAs need to do to survive the automation revolution*. Obtenido de <https://www.journalofaccountancy.com/newsletters/2017/jun/survive-automation-revolution.html>
- Sheng, J., Amankwah-Amoah, J., & Wang, X. (2017). A multidisciplinary perspective of big data in management research. *International Journal of Production Economics*, 191, 97-112.
- Siegel, G. a. (1999). *Counting More, Counting Less*. Montvale, NJ: Institute of Management Accountants: The 1999 Practice Analysis of Management.
- Silverman, D. (2001). Interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction. *Qualitative Social Research*, 2(3), 1026-1028.
- Simons, P. (2012). Management accountants must learn to speak in the language of the business to be better business partners. *Zeitschrift für Controlling und Management*, 56(1), 39–43.
- Sonnenberg, C. &. (2014). The missing link between BPM and accounting- Using event data for accounting in process-oriented organizations. *Business Process Management Journal*, 20(2), 213-246.
- Spitz-Oener, A. (2006). Technical change, job tasks, and rising educational demands: Looking outside the wage structure. *Journal of Labor Economics*, 24(2), 235-270.

- Stapleton, T. C. (2017). Big Data Analytics: Opportunity or Threat for the Accounting Profession? *Journal of Information Systems*, 31, 68.
- Tad, L. (2005). Does BPM Build Shareholder Value? *Business Finance*, 11(11), 51-54.
- Tim Huenemann, T. i. (2013). *The insider's guide to next-generation BPM*. Obtenido de <http://www.ebizq.net>
- Titera, J. P. (2015). Consequences of Big Data and Formalization on Accounting and Auditing Standards. *Accounting Horizons*, 29(2), 409-422.
- White, L. M. (2014). Can Management Accountants Influence Productivity? The Case of Production Efficiency Variances. *Journal of Corporate Accounting & Finance (Wiley)*, 25(3), 43-50.
- WMP, V. D. (June 12-16, 2007). Trends in business process analysis: from validation to process mining. Funchal, Madeira, Portugal.