

Artificial intelligence in management control as a solution to the business crisis

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Abstract

Artificial intelligence (AI) is a branch of computer science that deals with building intelligent machines that can perform tasks that typically require human intelligence. Its benefits will also occur if validly applied to management control mechanisms. It is an interdisciplinary science with multiple approaches, which are leading to a paradigm shift in every sector. It plays a fundamental role in streamlining and improving decision-making processes, increasing organizational efficiency and optimizing management control mechanisms, helping companies to prevent crises. The Italian legislator with Legislative Decree n.14/2019 introduced the New Code of Business Crisis and Insolvency considering the crisis as a physiological phenomenon of the life of the company. The purpose of this contribution is to demonstrate that the tools provided by the AI and used in the Management Control mechanisms seem to be those which, more than others currently, allow the CFO through the use of predictive models and techniques, to make forecasts future state of company assets avoiding financial crisis. Management control becomes "smart" thanks to artificial intelligence. Through these techniques it is possible to hypothesize the impact of the scenario analysis and evaluate the effects of any critical issues that lead to a business crisis. The first part discusses the state of the art. Subsequently, AI is defined as a tool that promotes digitization especially in its application to management control. The contribution focuses on the description of the "Utilius" platform, an algorithm with dashboard for financial management, dedicated to small and micro enterprises. An analysis tool, which initiates the entrepreneur to financial management control, as a "Salvazienda" method that uses digital technologies to create "a Smart control". Finally, the conclusions are presented.

Keywords: Artificial Intelligence, Management Control, Corporate Crisis.

1. Introduction

Artificial intelligence is considered one of the most promising technologies for the digital transformation of corporate governance. It is used both for the optimization of operational processes and for strategic planning, as it helps to focus more precisely on future prospects. This article focuses on the evolution of management control practices and in particular on the possible application of artificial intelligence (AI) to strategic decision making. Specifically, the benefits and advantages that the use of "AI applied to management control" could bring to corporate governance are described, in particular by improving the accuracy and efficiency of forecasts on different aspects of company performance. At the same time, however, the debate on the potential benefits of AI is dominated by doubts about the origin and use of the data. Adapting to the pace of Digital

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Transformation is essential if you want to keep up with the times and not be left behind in terms of innovation. In fact, management control supported by artificial intelligence mechanisms is a hot topic and many organizations, companies and entrepreneurs are eager to find out how to make the most of their combined use. Most businesses are looking for advice on where to start; it is suggested to start with the asset data you already have, put it in a position to share and proceed from that point relying on the accuracy of sophisticated algorithms, for the financial management of small and large companies.

Very often good data is buried in systems inaccessible to the people who need it. Today, with the use of artificial intelligence and deep learning techniques, we are able to carry out an effective predictive and preventive estimate long before the appearance of business problems and this constitutes a considerable advantage. The need to adopt adequate organizational, administrative and accounting structures (as required by the second paragraph of the amended art. 2086 of the Italian Civil Code, in force since 16 March 2019), also in order to promptly detect the crisis and any loss of business continuity, led to the inclusion of the new art. 3 ("adequacy of structures for the timely detection of business crises") in the text of the legislative decree amending the crisis code. This article recalls the appropriate provisions and structures that the entrepreneur, individual and collective, must adopt to allow: to detect any imbalances of an asset or economic-financial nature, to verify the non-sustainability of debts and the absence of prospects business continuity, get the information you need. The new Code, by asking the entrepreneur to adopt a preventive approach to corporate crisis management, makes the role of artificial intelligence tools even more central, which streamline and facilitate planning and programming, as for example in the case of the business plan and the budget.

It can be seen how IT and AI systems correctly applied to Management Control in SMEs play a central role in signaling the signs of a state of difficulty and allowing timely intervention aimed at resuming ordinary economic activity. Artificial intelligence is now a daily reality in the various contexts of the economy and markets. It is bound to significantly improve our society and among many domains the corporate world is one of the ideal fields for the application of its techniques. Information systems and artificial intelligence acquire a decisive role, helping the entrepreneur not only to predict the risk of a crisis, but also to determine the degree of reversibility. The potential offered by digitization and intelligent technologies and the first experiments, which seem to confirm the premises that allow companies to make important improvements to management and control systems, lead us to believe that one of the main evolutionary trajectories of academic research is constituted precisely by analysis of the relationship between digitization and the structural and dynamic characteristics of these systems. In this context, there are many research questions that scholars could ask themselves: how to innovate control systems to make them functional with respect to the implementation of digital strategies? How to integrate intelligent technologies into planning, performance measurement and reporting processes to improve their effectiveness? How must the CFO adapt and what characteristics must he possess? This contribution starts from the hypothesis that the digital transition, thanks to its tools, can help companies improve their strategic performance, thanks to the introduction of new management control systems supported by information systems that will ensure timely, more effective decision-making processes and efficient. One wonders about the role and ability of managers to be able to manage the change taking place without major disruptions in company operations and the strategic role played by advanced technologies which aim to replace, in some cases, the human capital present in the company, operating in perspective of effectiveness and efficiency of company processes. Adequate management control, assisted by valid digital tools, could act as a driving force to relaunch and improve the economic and financial health of companies.

Instant access to the entire data set allows you to predict the evolution of the business framework through the support of decision-making algorithms that make the entire process more efficient. All this underlining the constructivist nature of the process, aimed at bringing a significant advantage to all the stakeholders involved in the company's management and monitoring process, in particular to the CFO as he is responsible for both the financial function and corporate strategy. Thanks to "AI" the company changes and becomes an "intelligent company"; this change leads the company CFO to manage big data using newly developed technologies, applications and software. The CFO feels "ready" to welcome this "revolution", and must know how to exploit big data (i.e. data that emerges from the external context and from the monitoring of technological systems) to make a qualitative

leap both in terms of effectiveness and cost-effectiveness and rationalization, which leads to an improvement in overall performance. Furthermore, in this work we will try to outline the characteristics of the CFO in the Enterprise 4.0 field and the difference with a CFO who operates in a company that does not take into account the use of Big Data.

On the basis of the classic management control, various software have been developed, ideal for those who want to manage their company by planning its objectives and monitoring its results in the simplest and clearest way possible. Most of these software are simple and intuitive and look like real texts. The digital software currently available are designed for those who have to deal with data analysis and reporting problems on a daily basis. By applying the advanced features of these ultra-modern software, in fact, it is possible to significantly reduce the times and increase the level of depth and precision of all the analyses. Most of these applications use functions based on the use of the Excel sheet, through which the functions, pivot tables and many other tools necessary to automate the work are then thoroughly analyzed. The data can then be summarized and compressed thanks to the rational formatting method, another useful tool available to all those who use the applications. These tools are useful for enabling CFOs to test the effects of any changes before they actually occur to anticipate and correct any negative effects. In recent years there has been much discussion of these new digital approaches, both in the academic and business worlds; publications and studies are also growing in this direction and are interested in this innovative phenomenon. A growing number of works in the literature show how artificial intelligence and machine learning techniques can be successfully employed to solve problems of a different nature. In recent times, in fact, various applications of digital software in the field of control have begun to see the light, with a view to improving the quality of corporate life, and the economic-financial security of companies. Through these methods, a "Digital Ecosystem" could be created that will allow companies of any size to have a concrete and sustainable approach to technology transfer. "Investments in AI enable you to achieve your growth goals and almost everyone considers AI to be a strategic factor (Awalegaonkar, 2019).

As Gartner (2020)³ argues, the application of AI mechanisms is estimated to increase in the future because the application of AI techniques is starting to live up to its potential with companies starting to take advantage of its techniques in practice.

The interest in this innovative method is rapidly evolving to meet the different needs of the numerous case studies to which it can be applied. To date, there is no single definition of the concept of AI, but different definitions can be found, depending on the many sectors to which it can be applied.

The term Artificial Intelligence (AI) is difficult to narrow down with an exact definition, because the field of AI is very broad and different approaches to AI provide different definitions (Cetindamar D., et al, 2022). However, we know that thanks to AI it is possible to test and understand what the company's future economic and financial events will be like.

The first part of the article defines the concept of AI and its development in the literature. It is then demonstrated how it can be used in company management control processes, to make it efficient and above all to achieve the objectives of reducing costs and times. A modern definition of the new corporate CFO is given. Today, to strengthen the competitiveness of companies in Europe and in Italy, new strategies are needed to reduce costs and increase conversion efficiency with a crucial role for research, innovation and development, also through digitization and the use of Machine Learning techniques (Devito S. et al, 2020).

The conclusions define how digital techniques can favor the improvement of the entire company system if exploited in a complete and appropriate way, and what the implications of future applications could be.

2. Literature Review

In the literature, scholars and researchers have dealt with the analysis and study of the phenomena discussed in the article in different ways. The first rudiments of the study of a definition of AI can be associated with Plato in 428 BC when he describes a dialogue in which Socrates looks for an algorithm to distinguish pity from non-pity.

³ Cfr. Gartner® Hype Cycle™ for Data Management, 2022.

The twenty-year-old European directive on electronic commerce has played a fundamental role in the development of a digital economy and a single market, but is currently applied to a completely different technological, economic and social context (Loreggia A., Sartor G., 2020).

Already in the past AI was studied by analyzing the advantages and benefits of computers; "is the study of how to make computers capable of thinking in the literal sense of the term" (Haugeland J., 1989), that is, of how to make systems that think like men. AI "is the study of how to make computers do things that, right now, humans do better" (Rich and Knight, 1991), therefore how to build systems that act like humans.

Charniak E. and McDermott D., in 1985, base their studies on how to make systems that think rationally, therefore they study mental faculties through the use of computational models. Later (Schalkoff R.J., 1990) the study of AI is oriented towards understanding how to explain and emulate intelligent behavior through computational processes, i.e. create systems that act rationally.

There has been an increase in the application of Artificial Intelligence (AI) in various business processes in recent years, this has become a major driver of change in different industries (Agrawal, Gans & Goldfarb, 2018).

Today, digital transformation is establishing itself as a powerful engine of change for all companies, requiring a sudden rethinking of the way they position themselves on the market, even for small and medium-sized enterprises active in traditional sectors of the economy. "The phenomenon of making strategic decisions that go beyond the exclusively human assessment capabilities and that make use of AI systems, even with a predictive function, affect the creation of organizational models, management and control rules that can change the dialectic between the bodies internal parts of the company, and the discipline of the relative responsibility" (Agostino R.M., 2020).

Today studies focus more on the technical side of the phenomenon; for example in the field of energy efficiency (Farzaneh H., et al, 2021); scholars such as He Q., Zheng H. et al, (2022), state that "in the face of scientific and technological progress and growing expectations, it is impossible to solve such complex nonlinear problems with simple experience and mathematical models, but the L' AI is good at that."

In fields such as medicine, "in the field of medical imaging, AI-based approaches are particularly promising, with numerous applications and a strong interest in the search for new biomarkers (Sole R., Deutsch E., Fournier L., 2022) or in cardiology (Itchhaporia D., 2022), in the approaches to diagnosing MS (Aslam N., 2022). In recent years, the debate has grown in the conflict between civil rights protection and artificial intelligence (Katyal S. K., 2019). In the agricultural sector, Jha K., 2019 in his analysis shows that "automation of agricultural practices has been shown to increase the gain from the soil and has also strengthened its fertility". The analyzes on environmental sustainability are scarce "currently there are no studies to map the digital transformation in the domain of environmental sustainability" (Feroz A.K., Zo H., Chiravuri A., 2019). Studies in recent years focus on the application of AI in the manufacturing production sector "The AI management system is an organic body consisting of a data management system and an expert system" (Long G. J. Et al, 2020).

Some studies focus on the insurance field, as the application of artificial intelligence could significantly change the risk landscape by transforming some risks from low severity/high frequency to high severity/low frequency (Eling M., Nuessle D., Staubli J. , 2022).

Recent lines of research in "AI" are focused on empathy in accountability processes, "to take into account the needs of different stakeholders and thus to put accountability into practice in AI, the notion of empathy can be very effective (Srinivasan R., González B.S., 2022).

The study of artificial intelligence in the public sector is the subject of comparison in the literature, "Developments in data analytics, computing power, and machine learning techniques have prompted all branches of government to outsource authority to machines in the performance of public functions: social welfare, law enforcement and, above all, courts (Liu H.W., Lin C.F., Chen Y. J., 2019). There are few studies on the use of AI in management control (Long G.J et al, 2020). A recent study carried out by Munir S., et al, (2022) through an interview with the CFOs of companies in the pharmaceutical sector investigated the effects and implications of big data on organizations in the "AI" era that aim to achieve innovative performance . The effects of using "AI" are positive. Specifically, they evaluated the impact of big data analytics (BDAC) capabilities on organizational innovation performance through process-oriented dynamic capabilities (PODC), as a mediator, as well as the moderating roles of organizational culture (OC) and management accountants.

2.1 Artificial intelligence and business

Currently there is no single definition of AI and the interpretations can vary depending on the perspective: on the one hand, one can focus on the internal reasoning processes, on the other on the external behavior of the systems, in principle always taking as a sort of "measure of effectiveness" the similarity or proximity to human behavior.

Artificial intelligence (AI) refers to machines that perform cognitive functions typically associated with humans, including perception, reasoning, learning, interaction, etc. (Rai et al. 2019).

At the state of the art there are many definitions that have been given to "Artificial Intelligence". Its origins date back to the '30s when Alan Turing considered one of the fathers of modern computing in 1936 had laid the foundations for the concepts of computability, computability and the Turing machine.

The 1950s also represented a period of great scientific ferment on the study of the computer and its use for intelligent systems. In this period Alan Turing wrote an essay entitled "Computer Machines and Intelligence", in which he explained the "Turing test", according to which a machine could be considered intelligent if its behavior, observed by a human being, was considered indistinguishable from that of a person. Thanks to Turing, the topic of Artificial Intelligence has received strong attention from the scientific community. Subsequently to his intuitions, various approaches have been created such as mathematical logic (for the proving of theorems and the inference of new knowledge) and neural networks (in the last decade their technology has been implemented and today they are applied in Deep Learning, a branch of machine learning). Since the technology was not yet mature, two paradigms developed: strong intelligence that studies systems capable of replicating human intelligence; and weak intelligence, whose goal is not to build machines with human intelligence, but to have systems capable of performing one or more complex human functions.

The first applications of Artificial Intelligence in the industrial sector have been developed since the 1980s. In particular, the first artificial intelligence applied in the commercial field was the R1, developed in 1982 by the company Digital Equipment.

Today Artificial Intelligence represents one of the main areas of interest of the computer science, economics, etc. scientific community. The interest in this concept begins to mature, and in the literature there are some articles that deal with this topic under various aspects. "The Ai, together with the data it feeds on, on the one hand is becoming the innovative engine of the other digital technologies that characterize this phase, on the other it is transforming the ways of doing business and marketing". (Mandelli A., 2018).

The "artificial intelligence culture" must be spread among SMEs, aware that the solution to the problems revealed by the modern economy is offered by digital technology and the resulting benefits. It often happens that companies are characterized by closed and family-run corporate governance. They are rooted and attached to the territory, not very specialized and inclined to use the Internet and therefore computer systems that allow them to make the leap in quality outside their own context. If SMEs want to grow, they must look beyond their borders (Cedrola and Battaglia, 2012). Today the AI market has continued to grow steadily despite the pandemic, while still remaining a relatively small market; moreover, there is a difference in approach between large companies and small companies. Indeed, AI is more prevalent in large companies. Artificial intelligence systems process huge amounts of data to make predictions about the information being analysed. Starting from these considerations, the scientific community has found an agreement in defining two different types of artificial intelligence, the weak one and the strong one. It is not enough to embed the data, and manipulate it if necessary, but we need to look beyond that. We need to look at what the data communicates and what they can dare us. The set of data is processed and analyzed to support the company in the decision-making process.

Artificial Intelligence will be one of the factors behind the internal change of companies. This technology will make machines and robots able to interact with each other and above all to learn from the various situations that arise within the production processes of companies. A change that will mean more efficiency and lower costs. Compared to a century ago, today it is the giants that process data that have a hegemonic position in the market system. If there is organization and expertise in the company, the ground will be fertile for the introduction of AI, and thus pave the way for new methods for reaching more appropriate and rapid decisions. A subset of artificial intelligence

is Business Intelligence considered as the first and main tool useful for improving business strategies and therefore management control. It allows you to delve into “what happens to the business and why”. Over the years, following the numerous changes in the way companies are managed, as a consequence of the internationalization of markets and the development of new management systems, innovation has become a central theme for successful companies. The scenario that lies ahead is that of "Industry 4.0" which is already current practice in countries and realities such as Germany, the United States and also a large part of Italian SMEs (Fantoni G., et al, 2017), and has created excellent opportunities for SMEs in order to increase their flexibility, productivity and competitiveness (Kagermann et al. 2013; Wenking et al. 2016). Even if the use of information technology seems to be a necessary condition to be able to create a good management control system, and to lead the company to certain levels of efficiency, however it is not sufficient, if it is not linked to the increase in knowledge and skills, in the hands of the entrepreneur. The know-how and skills associated with the use of software often tend to guide the entrepreneur in making the right choices for the company's future, avoiding situations of economic-financial imbalance. Every entrepreneur should adapt the management control to the changes of the company which today is different as an "intelligent company"; this change leads the company CFO to manage big data using newly developed technologies, applications and software. The CFO feels "ready" to welcome this "revolution", and must be able to know how to exploit big data (i.e. data that emerges from the external context and from the monitoring of technological systems) in order to make a leap in quality both in terms of effectiveness and cost-effectiveness and streamlining, which leads to an improvement in overall performance. In the paragraphs of this article it is understood how the adoption and application of artificial intelligence in the corporate world, more specifically in the mechanisms of management control, has excellent repercussions on company balances and dynamics. The world of finance and business in general is called to address questions that already require concrete answers today. The existing knowledge elements already serve in the contingent scenario as useful resources and as a reference for the financial CFOs for the purpose of safe use of this technology.

The potential of AI and its benefits in business planning and control are yet to be explored, so the real positive effects in general can be observed in the coming years. Companies should rejuvenate their management model, moving towards new business dynamics, projected towards digital innovation, with greater computerization and therefore the use of "Big Data" in the management of internal and external processes, from an "IoT" perspective, i.e. to connect several things together. Technological innovation and "digital disruption" are establishing themselves as powerful drivers of change for all companies, requiring a sudden rethinking of the way they position themselves on the market even for small and medium-sized enterprises active in traditional sectors of the economy (A. Tullio, 2018). Companies need to redesign their internal organization and impose a push towards digitization in terms of coordination of resources, processes and technologies. Since artificial intelligence systems are commonly employed in consequential contexts between jurisdictions, they are technologically informed governance models are needed to identify institutional projects optimal functionalities that find a balance between the advantages and costs of the algorithm.

2.2 Artificial intelligence and management control: a problem statement

Management control is an indispensable activity for any company that must adopt advanced data management software that can be managed through AI systems. Since the current economic context in which companies operate is characterized by a severe crisis, it seems necessary to exploit the potential offered by artificial intelligence and link it to management control. The introduction of AI in the planning and control mechanisms becomes a driver and driving force for the entire SME system as it favors the expansion of its governance on other territories (internationalisation); creates a positive impact on youth employment because it forms human capital, equipped with excellent digital skills, consequently better corporate reputation in the eyes of stakeholders, as the company appears innovative and modern, rejuvenating it from the old conceptions. For SMEs, having managerial control over the company's operations is the only real possibility to improve the containment of accounts and profitability. To make this business area efficient, it is necessary to have digital software that is structured on the basis of algorithms that exploit the mechanisms of artificial intelligence. The benefits are many. Implementing the technologies offered by AI in

management control mechanisms can improve aspects related to business planning. The combination of technology (Artificial Intelligence, Machine Learning and Business Intelligence), with processes (Organization) and with skills (Know How) also allows less structured companies to make timely operational and strategic decisions, rapidly adapting business models to the changing reality. Starting from the assumption that management control is the process through which companies monitor performance and guarantee the achievement of objectives, it is important to introduce AI technologies and tools in corporate governance, because these processes help companies achieve objectives, increase efficiency and reduce risk. Events such as the Covid-19 Pandemic, the energy crisis, aspects related to environmental sustainability, have increased these risks. "In such a scenario, management control can help make decisions and coordinate actions (Bernocchi et al, 2021).

To avoid situations of economic and financial imbalance, it was decided to streamline and speed up the planning and control mechanisms, through the tools of artificial intelligence.

The debate develops on the opportunities that the use of intelligent technologies such as the Internet of Things, machine learning, cloud computing and, more generally, all technologies attributable to the concept of smart technologies, can offer to innovate strategic processes, management and control of private and public companies, improving their management effectiveness and operational efficiency. The digitization of some key functions can be the "keystone" to allow companies to make the most appropriate decisions and avoid crises and bankruptcies. Useful tool in the hands of the company CFO who, faced with a serious and uncertain situation such as the one linked to the current emergency, will have to be ready and know how to promptly manage the variability of scenarios that can change rapidly to provide immediate information to management useful for decision-making and, ultimately, to constantly evaluate the assumptions of business continuity.

Planning and using artificial intelligence means competitiveness. One of the main benefits of AI technology is the way it makes reliable and up-to-date information more widely available that would otherwise be difficult to decipher and find. The benefits can be many but they must be largely supported by programs based on algorithms capable of improving predictions.

AI systems "are widely used in several high-risk applications such as healthcare, business, government, education and justice, moving us towards a more algorithmic society (Kaur D. et al, 2022).

According to the latest studies on the development and evolution of digital systems and the Internet of Things, it is clear that the emerging trend that will accompany technological innovation in the coming years is that of "AI". A new methodology that allows us to monitor, simulate and govern reality by making correct predictions. It is used in all phases of business processes, from planning to daily management, thanks to the growing number of objects connected to the network capable of transmitting data and the development of Artificial Intelligence. The benefits are huge and allow for big savings. "These techniques that will frame big data, artificial intelligence, machine learning and the Internet of Things will be the teachers of Industry and society 5.0, representing the new strategic, social and economic challenges, promoting and preserving the cardinal principles of sustainability" (Aura C., 2021).

These transformations are implemented to innovate. Innovating means making a significant change in terms of progress, efficiency and productivity. "The potential of AI is clearly emerging and it is likely that this crisis will help increase confidence in this technology and encourage its use in the recovery phase" (Montagnani M.L., 2020).

By associating AI with Management Control, a revolutionary approach is created, which allows you to manage company processes and balances by evaluating possible alternatives and anticipating any delays.

The ability to make predictions is certainly the heart of AI, as we know it today, especially from an application point of view. To develop effective management control it is necessary to carry out various activities aimed at optimizing the use of company resources and improving company results. Management control also defined as managerial therefore has the purpose of collecting and analyzing this data, making it understandable in order to make the most appropriate decisions for the activity. Management control can therefore be managed through AI, taking advantage of digital technologies, which make it possible to reduce costs and simplify the planning, execution, reporting and evaluation processes, typical of management control.

In the context of a "digital" economy, no company will therefore be able to ignore the existence of AI, even if the use it will make of it may be very different. In fact, on closer inspection, the companies that will be able to exploit the uses of AI in the most appropriate way will probably be the ones that will be able to emerge from the crisis improved, saving on expensive physical protocols and predictive activities, anticipating anomalous behaviour, risks and errors. Decisions, which become more precise and rapid, are made on the basis of very broad information (Big Data) through the interaction between man-object-machine, using resources in the most intelligent way possible and drastically reducing waste, with in terms of energy efficiency (Rifkin, 2016). The applications are many, from automotive to management and business models, up to construction.

At the heart of the digital renewal are features such as connectivity, control and improved performance. Through these three pillars we obtain the keys to open the door to innovation and sustainability for companies that will embark on the path towards the digital transition. In this way a company is able to build its own "digital ecosystem". The introduction of AI in the company has a significant impact on human resources for which it becomes essential to acquire application techniques and skills. The obvious consequence is the growing demand for training accompanied by the search for new resources trained in the AI sector to be included in companies capable of making the most of the data flows they generate. Integrating AI methodologies with management control therefore increases the need to have highly specialized personnel such as the company CFO. It is essential to train qualified personnel in the sector. This represents a great challenge today, because it is necessary to be able to find personnel with adequate skills, or to retrain company CFOs and train them with a new set of skills more in line with digital methodologies. Through qualified personnel with good skills, carrying out a real and sustainable technology transfer, a sustainable digital ecosystem can be created.

The entry of technologies into corporate assets is no longer "just a tool to counter competition, but a matter of survival", as McKinsey & Company, leader of Digital McKinsey Europe, underlined in 2020.

Decisions, which become more precise and rapid, are made on the basis of very broad information (Big Data) through the interaction between man-object-machine, using resources in the most intelligent way possible and drastically reducing waste, with in terms of energy efficiency (Rifkin, 2016). thus the double transition takes place: energy and digital.

"Big Data" and the "Internet of Things" represent a great opportunity for business but also a real challenge for companies. The amount of data and the "governance" of the network require different levels of management.

The clear division between real variables and digital variables progressively decreases. Because of this change, it is necessary to turn towards a new model which is precisely that of the combination of "management control and Big Data", as the winning combination of all those companies that want to converge towards survival, against uncertainty, and in favor of better and competitive strategies. This new dynamic consequently has repercussions on professional skills and competences, which must necessarily adapt through constant training and updating mechanisms, requiring the adoption of interdisciplinary training models.

As anticipated, the advantages of AI in management control are therefore linked to an increase in efficiency, effectiveness and quality. The practical advantages that can be obtained in the implementation of a digital management control are many. A well-executed management control is capable not only of optimizing the management of all company resources, but also of perfecting the company's marketing and sales strategies in order to increase profits. The international literature (Papadopoulos T., Balta M. E., 2022; Deepa N., et al, 2022), shows the advantages and benefits of AI; it can be seen that it has positive effects when applied in different industries. It also increases productivity by reducing costs and integrating human labor and favoring complementary innovations; the planning, execution, reporting and evaluation processes, typical of management control, are simplified.

In the case of management control, many SMEs use management and accounting software to streamline forecasting processes and make them simpler and easier. For example, through a database of all financial information in one system, all actions can be centralized in a single dashboard for monitoring IoT activities and systems, with dashboards summarizing values and metrics for status monitoring company health, behavior prediction and application of error and malfunction prevention strategies, optimizing company performance and safety; you get the

efficiency of the forecasting and management phases: maximization of ROI and reduction of time and costs. Traceability of deeds and related responsibilities, with a view to transparency and continuous updating of activities, digitization of documentation, reduction of risk associated with the use of paper media (errors in archiving, difficulties in sharing data, etc.)

2.3 The role of the CFO in Artificial Intelligence

Big public companies may have defined the CFO role, but the chief financial officer position is becoming increasingly common in midsize and even small firms⁴. In large companies there is always a financial director who analyzes revenues and costs, and establishes whether an unexpected investment can be made. The CFO controls the price of the products and services provided, verifying that it can ensure an adequate margin; and makes sure that costs do not grow dangerously. The CFO predicts the company's future by looking at the numbers and decides to take the appropriate operations to avoid the company hitting a wall due to lack of liquidity well in advance. There is therefore a need to improve the skills of those involved in managing management control within companies; this subject in the figure of the "Cfo" is in fact responsible for collecting information deriving from the large amount of data with which he works. The top-level financial manager is the chief financial officer (CFO), or chief financial officer who often reports directly to the CEO (Berk 2015).

The CFO must obtain the knowledge he needs from the information, transforming it into knowledge in order to allow entrepreneurs and company management to make the most reasonable and balanced decisions possible.

The globalization of markets, the use of innovative technologies, the breaking down of space-time barriers, the integration of products and services have an ever greater impact on corporate decisions. It follows that the role of those who directly or indirectly deal with management control in the company is subject to a vigorous transformation, which requires transversal professional skills, the awareness of having new skills and the culture of the strategic value of data management (Tullio A., 2018). This role is entrusted to the CFO (Chief Financial Officer) who according to English doctrine corresponds to the financial director; is a managerial figure in the organization of a company and has responsibility for the management and general planning of the financial activities of a company. According to Berk (2015) the main role of a CFO is to make decisions in the three main areas under his responsibility: financing, investment and cash.

In the current context of the Covid-19 crisis, CFOs will have to know how to manage the variability of scenarios in order to provide management and top management with qualitative/quantitative information useful for decision-making purposes and to constantly evaluate the assumptions of business continuity. The process of digital change in the company must be guided by key figures in the company and the Chief Financial Officer (CFO) is invested with this role as a digital ferryman given the central function of administration, finance and management control in corporate life. The CFO has a series of IT tools and technologies of the so-called 4.0 revolution which it is useful to know because they exponentially enhance the opportunities of this corporate function.

Small and medium-sized Italian companies have never considered the help of AI in management control to support decisions as strategic, and despite the fact that the Economy and the Markets have changed, to manage their business they continue to use budget analysis and the budget/control of general ledger accounts .

When it is necessary to make some changes within companies, and decisions have to be made, basing the choices and the various options for change, solely and exclusively on these two tools, is not very profitable and not very useful.

A good CFO must make the most of new technologies, innovating their strategic and decision-making processes, with the introduction of new software and new technological tools. He must know how to "connect things", adopting the "Iot" method and making the most of the large volume of data, which is generated by these methods of analysis. The CFO is no longer just an "expert in numbers", but is becoming a link between the company and the market to create new processes that make the company increasingly competitive and innovative. In addition to financial skills and knowledge of new management software, the CFO should possess strong leadership skills and decision-making

⁴ Cfr. Chief Financial Officer (CFO) Defined: Role, Responsibilities and Skills. Fonte: Oracle Ntsuite

skills. A forward-looking and open-mindedness with excellent interpersonal skills are essential, without forgetting a good knowledge of international languages. Furthermore, the CFO should be able to communicate in an optimal way by building around him/her a motivated, solid and competent team capable of pursuing the company's strategic vision in the best possible way.

The CFO who deals with Management Control, having new digital tools and "know-how" at his disposal, can help himself better calculate the cost of products, understand profitability by market, customer, product, and establish sales strategies necessary, to saturate the production capacity, with the quantities sold. Taking advantage of new digital skills, he is able to govern his business in the best possible way.

He is the CFO 4.0, able to guide decisions relating to the company's digitization process (Licata P., 2019).

In the old and classic conception, the CFO was used to dealing exclusively with the financial sphere of the company's activity, focusing his attention on the supervision of financial information, on the preparation of the financial statements and other economic-financial reporting documents periodic. In a globalized and technologically advanced era like the current one, it is evident that the role of the CFO has changed considerably. This company figure is required to have a greater degree of flexibility and transversal skills; specifically, he must possess those particular skills that allow him to act among the leaders of corporate "governance". There are studies in the literature focused on the American context, which analyze and highlight the personal characteristics of the CFO, such as past professional experience and his/her training, which influence reporting activities, investment choices and some business decisions.

Some studies have shown that the influence of the CFO on company performance is greater than that of the CEO himself (Chava S., and Purnanandam A., 2010).

Until 10 years ago, being the CFO (head of administration, finance and control) did not require particular attention to new digital tools, innovation and change. The evolution of the external environment, of the regulations related to company management (from safety to responsibilities and the new rules for preparing financial statements) and of technologies (digital and the consequent and pervasive Industry 4.0) have made this activity increasingly functional and one of the fastest evolving.

The combination of so-called tools tech (Artificial Intelligence, Machine Learning and Business Intelligence), with processes (Organization) and with skills (Know How) that help us transform the flow of data into better and timely decisions, allows us to intercept the needs and behaviors of company management and make smart operational, tactical or strategic decisions based on the best available data.

Alongside the traditional administrative role, planning and control activities have developed in the CFO area. The role of the CFO is no longer just that of guaranteeing the accuracy of the economic-financial data, but also of "producer" of numbers in support of the corporate and business strategy. Today, in addition to the economic-financial skills and competences, the decision-making skills demonstrated outside the strictly financial sphere are a high added value to the professionalism of the CFO, who should be able to develop and implement new skill levels, Such as:

- the ability to manage risk by safeguarding the business from the risks of technological evolution;
- deepen that level of knowledge of the technologies that today are fundamental for any sector in order to optimize company times and procedures;
- be able to manage personnel with strong leadership skills, in order to become an interdepartmental point of reference to also promote the development of human resources;
- be able to analyze and understand issues of an environmental and social nature;
- develop the so-called "problem solving", "business oriented", personnel and stress management skills, communication and dialogue skills, etc...

Among the articles and studies present in the literature, Bubbio A., (2018), draws up a sort of "handbook of the new needs that the administration, finance and control manager must try to respond to in order to evolve his role in company processes". Specifically, it analyzes and recounts the changes and challenges to which the role of the financial director is subjected, in an era such

as that of digitalisation; in fact, in addition to the use of traditional tools such as the budget, other activities such as planning and control are also added.

In order to avoid a progressive loss of power and to avoid "progressive marginalization", the CFO should be able to respond to 10 needs:

- share and help to share the corporate strategy;
- move from a low willingness to change to an activator of change;
- create the organizational conditions for the implementation of the strategy;
- avoid the trap of the annual performance, focusing not only on the annual financial statements, but also on the social, environmental and sustainability financial statements, opening one's horizons, with a view to the future management of the company;
- move from the logic of cost control to that of cost management;
- not to focus only and exclusively on the creation of economic value (often economic value is the focus of attention for shareholders), but also to be concerned with generating additional value;
- stimulate a new vision, such as that of creating new myths. Do not limit yourself and waste your efforts only on achieving turnover, but shift attention to also enhance the cash register and place more attention on customer management;
- being able to select and identify those few company variables which, among a large amount of data, are strategically relevant without neglecting quality;
- implement and have an extended management of information: that relevant information that comes not only from the finance area, but from the different company areas, and which can also be generated from the external environment;
- lastly, to exploit and enhance the potential that the digital age offers us and offers us.

This decalogue makes us reflect and make a comparison between what the CFO of a company that finds itself operating in a completely digitized era should be today. The only way forward for a good CFO for simplification and application effectiveness, especially for SMEs, is the implementation of Business Intelligence tools, capable of significantly changing the strategies and business models of companies.

3. Research method: illustration of "Utilius" the only algorithm with dashboard for the financial management of SMEs

The article describes the case of the "Utilius" platform, as the only algorithm with dashboard for the financial management of SMEs. KPIs are moving from lagging indicators to leading stages, along with key driver analysis. They are key performance indicators, which represent an extraordinary method of measuring company performance. All large companies define KPIs and then go to great lengths to ensure that these results are achieved. A result can never be achieved without first planning and measuring it. They are becoming highly contextualized and collaborative: Contextualization comes from the ability to create sophisticated alerts to gain immediate insights when data changes, and is also related to artificial intelligence, which helps associate data with context and determine where to focus attention in a given moment⁵.

Technology helps to facilitate the decision-making process even in a business setting. Artificial intelligence tools help the decision-making process which must stimulate company management to define potential future scenarios, considering multiple options, from the most optimistic to the most catastrophic. To make predictions better, it is necessary to write algorithms, write them well, bring them to a high level of abstraction and then customize them as much as possible, in order to adapt the different possible scenarios to the needs and expectations of the company management. With AI, the importance and value of data increases considerably, growing exponentially day by day and, consequently, the predictive ability to provide ever more precise scenarios and strategies increases. Management applications and software have been created that help to manage data in an optimal way by exploiting artificial intelligence. Certainly in the company data management with AI facilitates

⁵ <https://www.bigdata4innovation.it/data-analytics/data-driven-insight-piu-veloci-ma-costi-piu-elevati/>

the ability to quickly and deeply understand the strategy useful for solving a problem, putting yourself in the user's shoes to understand their thoughts, behaviors and the reason for certain actions.

Today every entrepreneur needs to know in real time whether their company produces debt or wealth. Almost all SMEs conduct their business without indicators, without KPI monitoring, without financial management that renders performance month by month and indicates whether they are on the right track. This assessment can be made by constantly monitoring the 6 financial management KPIs. This evaluation is called management control. Today SMEs and entrepreneurs entrust the control of company numbers only to their accountant. With "Utilius you get information and data that the accountant does not provide.

There has been a lot of talk in recent years about the end of the dashboard." Tracking a set of static views doesn't make a difference in today's market; but there is a big difference between simple KPI monitoring and in-depth investigative analysis, supported by an advanced interactive application of augmented analysis. The dashboard is evolving into an analytic hub that catalogs insights and distributed data, a place where computers, processes and collaborative intelligence can coexist.

"Utilius" represents an automated financial management controller, providing reports that the accountant does not provide. Specifically, it is a "plug and play" that does not require modification of the tools already used in the company. It's not an invoicing software, it's an analysis tool, which initiates the entrepreneur to control financial management, which is considered the only software with the "Salvazienda" method. With the entry into force of the Business Crisis Code, the entrepreneur will necessarily have to pay more attention to the corporate financial area. This could be an important opportunity to move to an accurate and timely financial management system. Alternatively, there is a real risk that many companies could be exposed to bankruptcy proceedings. With the latest regulatory interventions of 15 July 2022⁶, the legislator provides for the provision of the alert system and makes the new suitable measures and structures even more central which allow for the timely detection of the presence of a state of crisis and to intervene using the new institution of the preventive agreement. With this system, the role of programming tools such as the industrial plan and the budget becomes even more central for the company.

Combining artificial intelligence tools, Utilius improves forecasting (by performing accurate KPI analysis) using the only financial algorithm with dashboard. Thanks to this "financial algorithm" it is possible to calculate in real time the 6 KPIs of corporate financial management: Revenues, Variable Costs, Fixed Costs, Contribution Margin, EBITDA, Break-Even Point. You can do the analysis of fixed and variable costs, check the contribution margin, know the break-even point and the gross operating margin. The platform adopts an intuitive and simple system for punctual and precise management control with the 6 most important KPIs without using Excel but making use of AI. So planning becomes easier; improve entrepreneurial ability and increase business profits.

Since the "utilius" platform is based and developed on digital technologies that improve forecasts on the company's future, the CFO is able to make forecasts by looking at the data, the numbers and deciding to undertake the appropriate operations to prevent the company being hit a wall due to lack of liquidity. In this sense it is called the "company savings" method.

Management control therefore becomes an ecosystem of devices and systems connected to each other, through non-invasive technologies: an economic solution with low impact and maximum yield in terms of performance, for which the company will be able to improve future trends.

Only a very small part of SMEs uses effective financial management control tools useful for avoiding the "enterprise crisis". Utilius in the dashboard, in a reserved area in the cloud, provides endless reports for the daily analysis of all costs, fixed and variable, together with other important Kpis.

The initial startup phase becomes quick and easy, non-invasive, indeed a pleasant discovery of the available financial reports useful for defining financial forecasts.

⁶ Source: Ipsoa.it Company crisis and insolvency code: what changes when it enters into force. With Legislative Decree no. 83/2022 the date of 15 July 2022 was confirmed as the moment of definitive entry into force of the Code of Business Crisis and Insolvency (Legislative Decree n. 14/2019). With Legislative Decree no. 83/2022, the Italian Government has also implemented EU Directive 2019/1023 and attracted the provisions of Legislative Decree no. 118/2021 on the matter of negotiated settlement of the crisis. The postponement of almost two years from the originally scheduled date (August 15, 2020) for its entry into force, mainly caused by the crisis caused by the pandemic emergency, has made it possible to align the CCII with the changes introduced during the implementation of the aforementioned Community Directive of 2019.

Utilius therefore fits into a logic of digital transformation of management control which sees, thanks to new technologies, new ways to improve forecasts and obtain exceptional results in corporate finance. Thanks to its intuitive dashboard, the financial algorithm provides the CFO with immediate and intuitive data that allows you to do business in an efficient, serious and aware way. Through the dashboard, a graph shows the evolution of the business and it is clear if the company is going into crisis or if it is achieving returns. There is the possibility of correcting any financial imbalances in advance by optimizing fixed and variable costs.

4. Conclusions

By the end of this article, we realized that artificial intelligence has the potential to offer huge benefits to SMBs in terms of management control. However, the challenges are: where to start, what are the next steps and how to accelerate digitalization in the area of corporate planning and control. We know that current political strategies, especially European ones, are pushing the productive fabric towards the implementation of digital models, in which processes reduce the environmental impact down to zero without sacrificing efficiency. The productive fabric of the future is therefore part of an intelligent and sustainable ecosystem, in which the implementation of digitization through those AI technologies that are revolutionizing the new industry model becomes fundamental. Most large companies have good document management systems in place to support regulatory processes and, often, good asset management systems to support maintenance. Much of the data, however, is inaccessible to those who need it and is often not as up-to-date as it should be.

Management control is one of the functions that has suffered the least shocks from recent technological evolutions in recent years, while most of the other company functions immediately had to deal with the adoption of innovative solutions and with the upheaval of internal processes. Today the time also seems to have come for management control to face change: the owner must be able to access the best information, accessing as much data as possible in a complete, coherent and rapid way, to support the decision-making processes of companies.

The "New Code of business crisis and insolvency", which entered into force in July 2022, intends to allow an early diagnosis of the state of difficulty of companies, avoiding that the delay in considering the signs of crisis could lead to a state of irreversibility crisis. On the basis of the new Code, early warning systems are introduced to allow for the timely emergence of the crisis, with a view to recovery. From this point of view, one of the most important innovations can be identified in the introduction of systems capable of retrieving and calculating the data necessary for the construction of corporate KPIs (Key Performance Indicators) which, with minimum effort, allow the CFO to prepare useful reports to identify financial problems.

Since the heart of corporate crisis reform is the early warning system, an early warning system aimed at intercepting the crisis early through early diagnosis is useful. In this way the management control system should dialogue closely with a system of KPIs aimed specifically at companies to try to prevent economic-financial imbalances in advance. By developing software for the management and control of economic and financial data, through the use of new technologies to support management control, such as the Utilius platform, it will be possible to pay greater attention to the corporate financial area and discover any problems in advance. This could be an important opportunity to switch to a careful and punctual financial management system that anticipates the signs of the crisis until it is averted. AI tools can be considered as the new tool to promote accurate business fact planning and forecasting.

Companies that want to resist the crisis must therefore favor the digital transition, adopting and implementing artificial intelligence technologies that are fundamental for companies, especially in the planning and management control phases. The Italian "Artificial Intelligence" ecosystem is growing and more and more companies and consumers are approaching this technology with still partially unexplored potential.

It is now clear that the relationship between management control and enterprise 4.0 in the era of the "Internet of Things" represents today more than ever the flywheel on which to base an economic recovery that has not yet been achieved, by those companies that in general would like to like to increase productivity and competitiveness but which unfortunately are rooted and anchored to those paradigms of the past that do not believe in business process innovation.

In Europe, especially as elsewhere, there is a lack of specialized figures capable of seizing these advantages on the fly. According to a research by Eurostat (2022) in the European Union only 2 out of 10 companies use AI, despite the market having great potential. Unfortunately, businesses are having a hard time keeping up with the rapid evolution of this technology. Often they do not have access to information such as the type of services and the benefits they could obtain. They are skeptical about investment and application within the company.

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