Journal of Autonomous Intelligence (2024) Volume 7 Issue 5
doi: 10.32629/jai.v7i5.1524

ORIGINAL RESEARCH ARTICLE

Management control tools for Moroccan industrial companies: Application of Target Costing and Artificial Intelligence

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ABSTRACT

Technological advances and intensified competition on world markets have led to product diversification, forcing companies to adjust their production and marketing strategies using modern management tools. However, to meet the complex challenges posed by cost management and production process optimization, an essential dimension to consider is the integration of artificial intelligence into the Target Costing process. The main objective of this article is to detail the implementation of this Japanese method in the Moroccan context, focusing in particular on Moroccan industrial companies. To achieve our goal, an extensive literature review has been undertaken. However, there is a lack of documentation concerning the understanding of this method and its impact on Moroccan industrial companies. In order to better understand this relationship, we undertook a literature review focusing on the role of this instrument within industrial companies in Morocco, adopting an analytical approach. It should be noted that Target Costing is a mechanism for adapting companies to the Moroccan environment, encouraging organizational change in response to the needs of the Moroccan market while ensuring its sustainability. It also fosters collaboration between stakeholders, as well as compliance with Moroccan regulations and standards, helping to preserve the competitive edge of Moroccan industrial companies. In the Moroccan context, the adoption of artificial intelligence as part of Target Costing could bring significant benefits to industrial companies. These include a better understanding of local market needs, optimization of production processes to meet changing demands, and more informed decision-making when defining product selling prices. This study presents contributions from both academic and managerial perspectives, although it does raise certain limitations linked to the scarcity of articles and publications in the Moroccan context.

Keywords: Target Costing; management control; management control tools; artificial intelligence; Moroccan context; Moroccan industrial companies

ARTICLE INFO

Received: 3 January 2024
Accepted: 24 January 2024
Available online: 6 March 2024

1. Introduction

For many years, even decades, the field of management control has undergone a substantial evolution, transforming itself to go beyond the simple assessment of corporate performance. This evolution has been particularly noticeable within large Moroccan industrial companies, which have had to adapt their management control functions to remain competitive on national and international markets. This adaptation has been stimulated by the integration of technological advances, notably artificial intelligence (AI), which has begun to play a crucial role in improving this field.

Management control is seen as "the process by which managers obtain assurance that resources are obtained and used effectively and efficiently to achieve the organization's objectives"[1]. Whereas AI is

perceived as a technology characterized by the ability to learn from data and solve specific tasks[2]. AI's ability to learn and adapt opens up new opportunities for optimizing management control processes.

The management control function has attracted considerable interest in management literature. It is widely recognized as an essential asset for guiding the company towards the achievement of all its objectives, whether operational or strategic, defined in particular by top management. On the other hand, this literature has often underestimated the potential impact of AI on management control, and in particular on specific methods such as Target Costing. However, the integration of AI into management control can significantly transform the way companies approach cost management, particularly in strategically sensitive sectors such as industry and services.

In an environment characterized by intense competition and constant change, the management controller is forced to opt for new management approaches, and to integrate information and communication technologies (ICT). These approaches and technologies, in line with corporate aspirations for profitability, effectiveness and efficiency, are essential to the smooth running of the management control function. A competent management controller who has mastered these advanced technologies can make a significant contribution to the company, substantially improving its competitiveness in the marketplace[3].

The incorporation of artificial intelligence into the practice of management control offers a strategic opportunity for companies. Indeed, a management controller who masters new technologies can play a crucial role in the creation of value and the long-term success of the company.

The Moroccan economy is developing and growing. As a result, large Moroccan industrial companies, in parallel with those worldwide, are still trying to discover management control tools suitable for the Moroccan environment, despite the major difficulties.

Confronted with environmental changes and competition, industrial larges companies in Morocco are faced with the need to integrate the management control function in order to guarantee their survival in the market. However, despite these pressures, the development of this function has been relatively slow or even non-existent within Moroccan companies.

And among the technologies developed to imitate and surpass human mental capacities, such as comprehension, reasoning and knowledge, AI stands out in particular[4]. AI systems bring a multitude of benefits, improving decision-making processes, increasing efficiency and enabling the management of complex datasets. AI's ability to process and analyze large volumes of data far exceeds that of humans, facilitating deeper understanding and more informed decisions in a variety of fields. What's more, AI's predictive capabilities are crucial in scenarios where fast, accurate forecasts are essential, such as market trend analysis, risk assessment and strategic planning.

Nevertheless, the way companies are run is influenced by the unclear economic, social and political environment that surrounds them. An in-depth analysis of these environmental realities, particularly in Morocco, offers the opportunity to introduce Target Costing and AI. This helps to reinforce its relevance and value from both an operational and strategic point of view within large Moroccan industrial companies.

To date, no management control study conducted in Morocco has explicitly addressed Target Costing and AI among Moroccan industrial companies, even though they are becoming increasingly effective and essential worldwide. So, the aim of this article is to enrich the literature around this instrument and the Moroccan context via answers to the overarching question: "How can we effectively adjust AI-assisted Target Costing to the realities and specificities of the Moroccan market while maintaining the competitiveness of Moroccan industrial companies?"

The present research question leads to the formation of the central hypothesis of the study, namely:

Adapting artificial intelligence to Target Costing can align with the Moroccan context while preserving the competitive edge of Moroccan industrial companies.

Based on the central hypothesis, 5 sub-hypotheses are put forward and are advantageous to this paper:

H1: Target Costing is flexible enough to meet the specific needs of the Moroccan market without compromising competitiveness;

H2: Target Costing has cost constraints that would contribute to the continuity of Moroccan industrial companies;

H3: The Target Costing method would enable players in Moroccan industrial companies to work together;

H4: Moroccan regulations and standards could influence the introduction of Target Costing;

H5: Artificial intelligence would be optimally integrated into the target costing process to improve cost management and boost competitiveness.

In this study, the aim is to offer a rigorous analysis and interconnection of Target Costing, one of the tools of management control, with the Moroccan economic environment.

The present article is structured in five sections, based on the hypotheses formulated and the research question discussed above. In the first section, we provide a brief summary of the concept of management control and the Target Costing tool, as well as the importance of AI in this tool, and outline our methodological approach. The second section examines the theories that can be mobilized to shed light on the subject of this study. The third section provides the theoretical underpinnings of the Hypotheses mentioned above. The fourth section highlights the results obtained and the ensuing discussions. Finally, in the last section, we review the managerial, academic and socio-economic contributions, while highlighting the limits and prospects of this research.

2. Conceptual framework for Target Costing

The aim of this first section is to briefly present one of the contemporary tools of management control, "Target Costing", and then to discuss the characteristics of Moroccan GEs and the reasons for choosing the industrial fabric. Before defining the core of our article "Target Costing", we need to point out the concept of management control.

2.1. Management control

The existence of the progression of management control has been expounded by numerous authors, including the father of this discipline, Robert Anthony, the founder of the concept of management control.

After this initial definition, management control spread over time, with significant progressions. Many management researchers have suggested various definitions (See **Table 1**).

Table 1. Progressions of the concept of management control.

Concept	Definition
Management control	"Management control put into practice its activities between the strategy captured by management and that developed as well as the realization of the entailed missions[3]."
	"Control does not only seek to conquer resources, but also to generate organizational components, in other words, to consolidate the managerial state of management control[1,5]."
	"Management control is the process implemented within an economic entity to ensure that energies and resources are mobilized efficiently and continuously to achieve the entity's objectives[6]."
	"The information-based processes and procedures that managers use to maintain or modify certain configurations of the organization's activities[7]."
	With regard to theory, the state of the art of management control proves that its generations have been estimated in order to present new conditions for performance management[8].

Source: Developed by the authors based on literature review.

The objectives of management tools:

- Adjusting costs to management decisions;
- Improving the efficient use of company resources to support management decisions at all levels;
- The priority of reducing costs during the design phase while guaranteeing product quality, in order to remain competitive in the market and generate profits;
- Minimizing inventory levels and anticipating problems before they require management intervention;
- Lower costs at every stage of the value chain, which has a positive impact on the company's overall profitability;
- And achieving higher levels of quality for systems, processes and products, with the aim of gaining a greater share of the market.

2.2. Target Costing

2.2.1. Definitions of Target Costing

The role of Target Costing is the evolution of management control methods. This method appeared in Japan in 1965 and was first used at Toyota. The Japanese then innovated and incorporated this method into their companies, and in 1970 it became more widespread in Japan.

Target Costing has several nominations:

- Target Cost;
- Objective cost;
- A cost ceiling;
- And the target cost.

For this purpose, Target Costing has several definitions (See **Table 2**);

Table 2. Developments in *Target Costing* concepts.

Concept	Definitions
Target Costing	The target cost method was first developed in the 1960s in Japan in the automotive industry—it is known as Genga kikaku, literally planned or projected cost. Target cost is mainly applied to existing offerings that are modified to a greater or lesser extent with each new generation, but it can also be used to design a radically new offering[7].
	The "target cost" is a method used in management control which takes into account all the company's stakeholders in order to arrive at a desired cost to guarantee the company's profitability, persistence and competitiveness on the market[8].
	"The cost of the future product, called target cost, is determined a priori and is the result of the selling price imposed by the market and the profit level imposed by the company's long-term strategy[5].

Source: Developed by the authors based on literature review.

One of the objectives of the Target Costing method is to reduce the gap between estimated and target cost, as shown in **Figure 1**, where the company's skills are forced to show an estimated cost higher than the target cost.

The first step is to identify the selling price and the profit margin based on the life cycle of the new product. The target cost is then determined by subtracting the profit margin from the pre-tax selling price. The target production cost is then obtained by deducting distribution costs.

In the second stage, on the other hand, the equation has only three elements, involving a complex process of calculating the target cost by analysing the product's components and functions. The third stage is then crucial, involving the distribution of the target cost over the components and functions. This process, carried out by the Marketing department after the product value analysis, enables the product to be examined in detail. For the fourth stage, the estimated cost is calculated using one of the three methods available: the parametric method, the analogue method or the analytical method. In addition, the fifth step involves distributing the

estimated cost over the product's components and functions. In the sixth step, the importance index per value is calculated, representing the ratio between the percentage of the target cost and the percentage of the estimated cost.

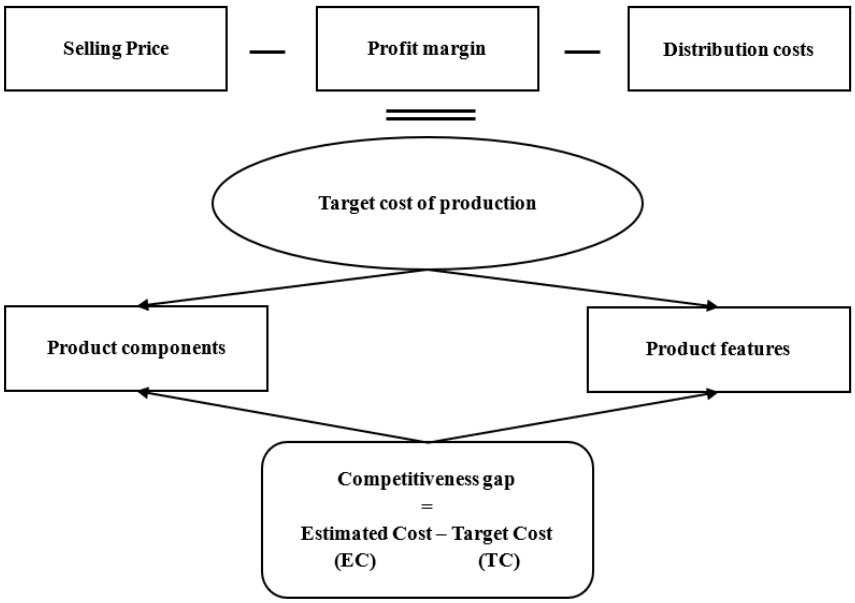

Figure 1. Target Costing approach.

Finally, the seventh step aims to reduce the Competitiveness Gap, which is the difference between the estimated cost and the target cost.

By assessing the relative importance of the component in relation to its estimated cost, a "value index" is determined. An optimum value for this index, close to "1", indicates consistency between the estimated cost of a component and its contribution to the value perceived by the customer. When this index deviates significantly from "1", a lower value suggests that the component is detrimental to the product's competitiveness because its cost is too high in relation to its contribution to customer satisfaction. Conversely, a higher value raises the question of the attention given to this component in view of its contribution to customer satisfaction.

2.2.2. Target Costing objectives

Target Costing has important objectives that must be met:

The main objectives of Target Costing are[9]:

- Market orientation of the company as a whole, and of its cost management in particular;
- A strategic link thanks to market-oriented research & development;
- support for cost management in the early stages of product design;
- dynamic cost management, since target costs are constantly reassessed ;
- improvements in motivation, as behavior is directly influenced by market constraints, rather than by abstract company-wide objectives.

To cover this wide variety of objectives, we suggest a fairly broad definition of Target Costing: Target Costing is built on a broad set of cost forecasting, management and control tools, applied first and foremost to the early stages of product and process design, to enable product cost structures to evolve as a result of constraints deduced from the market. The use of Target Costing requires the coordination, from a cost perspective, of all product-related functions.

The aim of the Target Costing method is for each component to generate an appropriate monetary cost

value, and to reduce product life-cycle costs to the benefit of both the producer and the consumer.

2.2.3. Characteristics of Target Costing

Target Costing has six features[10]:

- Deployment during the planning and design phases;
- Cost-cutting tool;
- Target cost defined by the external environment;
- Strategic profit planning;
- Its application strengthens cooperation between departments;
- Relevant for low-volume productions with a large number of variants.

Having examined "Target Costing" as a key instrument of management control, it becomes essential to consider how artificial intelligence (AI) is transforming this method. Target Costing requires detailed study and strategic planning of costs to guarantee profitability and product competitiveness. Integrating AI into this framework opens up new prospects for refining the accuracy of cost estimates and boosting management efficiency.

2.3. Artificial intelligence and management control

Artificial intelligence refers to the simulation of human intelligence processes by machines, mainly computers, with the aim of developing systems capable of performing tasks that generally require human intelligence, such as understanding natural language, solving complex problems, learning, visual perception and decision-making.

Also, each product development requires a deep study, a process to guarantee it success. Management control and specially, cost management, remain one of the most important tasks during this process. However, due to the higher complexity and uncertainty in new product development[11,12]. It's important to integrate new technologies into the process. Chou et al.[13], Fosso Wamba et al.[14] , and Stadtherr and Wouters[15] confirm that tools and methods that integrate IA technologies during new product development yield considerable benefits to cost management, and lead to a new product development performance.

Common methods used in artificial intelligence include machine learning, where systems learn from data, and deep learning. Artificial intelligence is used in a wide range of fields, including healthcare, finance, automotive, information technology, robotics, gaming and many others. In the context of product cost estimation, the more complex the model used, the more accurate the cost prediction[16–18]). Thus, the predictive accuracy of deep learning models generally increases with larger training samples, provided that the quality of the data is sufficient[15,17], in general, the use of a large volume of data and a large number of input features leads to a substantial increase in the accuracy of cost estimation[19].

However, AI can be used to select and quantify cost drivers for product costing and activity-based costing systems. It can reliably capture the most important cost drivers. On the other hand, AI evaluation can in some cases produce misleading results[19], hence the need for the human factor and expert judgment[20].

The integration of AI into management control offers significant benefits, such as the automation of repetitive tasks, predictive analysis to anticipate financial trends, the creation of dynamic dashboards, cost optimization and risk management. AI is also helping to prevent fraud and improve the accuracy of financial forecasts through machine learning techniques. However, a thorough understanding of the data and collaboration betweencontrolling professionals are essential if these technologies are to be used effectively to serve the company's strategic objectives.

Indeed, to put it plainly, management control in large Moroccan industrial companies represents a crucial strategic area, especially in the current context marked by the emergence of artificial intelligence. With its

advanced data processing and analysis capabilities, it offers unprecedented opportunities to revolutionize management control in these companies.

2.4. Moroccan industrial companies

Although all companies have in common the aim of producing goods and services for a market, as well as the use of production factor, namely capital and labor. In reality, however, they take a wide variety of forms to accomplish this mission. In fact, an enterprise can take the form of a commercial or industrial company, a travel agency, a private hospital, a café, a farm, and many others.

In order to group these companies into relevant categories, we use various criteria, whether legal, size-related or related to their economic activity. These criteria enable us to better understand the variety of companies and to make meaningful comparisons between them.

Because of the wide variety of companies, it is essential to create classifications that serve to:

- Simplify the representation of this diversity;
- Facilitate comparisons between companies;
- And evaluate a company's performance by comparing it with similar companies.

They can be classified according to three criteria:

- The economic criterion;
- The dimensional criterion;
- And the legal criterion.

In this paper paper, we will focus on dimensional and economic criteria.

2.4.1. The economic criterion

Companies vary in size, and the dimensional criterion aims to categorize them according to whether they are small, medium or large. Several indicators are used to differentiate between companies, including:

- Company resources (human, financial, material, etc.);
- Company performance (sales, added value, production, etc.).

Companies are evaluated according to two key parameters: sales and number of employees.

Sales are the volume of sales made by a company, excluding taxes. It corresponds to the total value of production sold in a given market over a given period of time. This measurement provides a means of assessing a company's progress, notably by facilitating comparison of its market share with other players in the sector, and enabling strategic decisions to be taken.

The other criterion is the number of employees, which can determine the size of the company. Each country is distinguished from the next by this criterion (See **Table 3**).

Table 3. Classification of companies by workforce in selected countries[21].

Country	Small Companies	Medium-Sized Companies	Large Companies
Belgium	1–50	51–200	> 201
Denmark	1–50	51–200	> 201
United States	1–250	251–500	> 501
Finland	1–50	51–200	> 201
Great Britain	1–50	51–200	> 201
Japan	1–49	50–500	> 501
Switzerland	1–20	21–100	> 101

Morocco, according to a national survey in 2019, the HCP High Commissariat for Planning[22] concluded: "Targeted companies were classified according to the double criterion of sales and number of employees by reference to the legal texts that set the limits in our country. In this survey, small and medium-sized enterprises (SMEs) are defined as those with sales of less than 75 million DH and fewer than 200 employees. Very small business (VSB) are defined as units with sales of less than 3 million DH and a workforce of fewer than 10 employees. Large enterprises are those with sales of over 75 million DH or a workforce of over 200.

However, the number of employees in a company is conditioned by its activity, including the use of machines and manpower. It is important to note that the number of employees is not an indicator of a company's profitability.

2.4.2. The dimensional criterion

The production system is divided into three main sectors of activity[23]:

- Primary sector: includes companies that exploit the natural environment (agriculture, fishing, mining).
- Secondary sector: this sector groups together industrial companies (transformation of raw materials into goods for production or consumption).
- Tertiary sector: this sector includes service companies (banks, insurance companies, transport companies, etc.).

According to this classification, we're trying to highlight a new concept: "The law of three sectors". This law stipulates that economic development is linked to the evolution of the respective share of each of the 3 sectors in economic activity. A fourth sector is distinguished[24,25], the quaternary sector, which concerns intellectual services, and so, ICT.

Companies can therefore also be classified by sector of activity, by branch or by industry.

2.4.3. The specific features of large industrial companies

Nevertheless, Moroccan large companies have the following characteristics:

- Large size: Large companies can invest in automated systems, such as computer-aided manufacturing (CAM), to replace labor, reduce labor costs and improve operational efficiency;
- Hierarchical structure: In a large company, subordinates receive orders from just one person, which not only justifies a clear, easy-to-implement structure, but also the absence of conflicts of authority and a clear division of responsibilities, while promoting discipline. This hierarchical structure facilitates the division of tasks and the management of the company;
- Formalizing the information system : The internal information system in large companies is simple, fast and well-organized. It emphasizes formal relationships established through structured communication channels.

As a result, management control plays a crucial role in large Moroccan industrial companies, as an essential mechanism for ensuring the performance, competitiveness and sustainability of these organizations.

In an increasingly globalized and competitive environment, management control in large Moroccan companies is becoming a strategic tool for navigating through economic, technological and market challenges. Integrating AI into these processes can bring a new dimension to management by enabling deeper and faster analysis of performance data, market trends, and consumer behavior.

AI can help these companies identify hidden patterns and correlations in vast data sets, facilitating more accurate predictions and more informed decisions. As part of "Target Costing", AI can be used to model cost scenarios, optimize the supply chain, and forecast fluctuations in demand and raw material prices.

In addition, AI can improve operational efficiency by automating repetitive tasks and providing real-time insights, enabling managers to focus on higher value-added activities. This includes optimizing inventory management, forecasting equipment maintenance requirements, and improving product quality.

The combination of controlling and AI in large Moroccan industrial companies represents a major step forward. It not only enhances performance and competitiveness, but also enables them to adapt more nimbly to the changing dynamics of a globalized market.

3. Objective and methodology

All scientific research inevitably requires the adoption of a conception based on an epistemological stance. Roure[26] makes clear, "the fundamental aim of epistemology is to characterize the existing sciences, with a view to judging their value and, in particular, deciding whether they can claim to approach the ideal of certain and authentically justified knowledge".

Numerous conceptual works have provided the literature in the field of management control, beginning with Target Costing. However, we help to clarify the Moroccan context and Target Costing as a contemporary tool. So to fill this gap, we seek via the present article to better understand the Target Costing method within Moroccan industrial companies, and the integration of AI in Target Costing within the same companies. To clarify this relationship, we conducted a rigorous literature review. Our aim is to use an analytical approach to show how this method can be applied in the developing country of Morocco. To meet our hypotheses, we follow the positivist paradigm. Epistemological and methodological choices play an essential role in the conduct of research, directly influencing the nature and rigour of the knowledge produced.

Positivism it recognizes as scientific only a method based on deductive logic, considering it to be the only logic, since the positivist refuses to consider inductive logic as scientific[27]. Deduction is first and foremost a means of demonstration[28].

So, we've embarked on a methodological process whose main aim is to grasp the reality of "the importance of artificial intelligence in Target Costing adapted to Morocco".

The researcher's first aim is to write about a complex phenomenon using a "comprehensive approach" (in the sense of Schütz and Weber). Secondly, he or she aims to buildupagrid for interpreting conflict situations[29].

And so, *"deduction is therefore the reasoning that underpins the hypothetico-deductive approach. This approach consists in developing one ormorehypotheses and then confronting them with reality. The aim is then to make a judgement the relevance of the hypothesis initially formulated*[30]*"*.

This study is carried out in two stages, namely data collection and analysis. In the data collection stage, we began searching the following databases: Scopus, Web of Science (WOS), Elsevier, ProQuest (using keyword: "Target Costing" AND "Artificial Intelligence", "Target Costing" AND "Big Data", "Target Costing" AND "Deep learning", "Target Costing" AND "Machine learning", "Cost Management" AND "Artificial Intelligence", "Cost Management" AND "Big Data", "Cost Management" AND "Deep learning", "Cost Management" AND "Machine learning", "Control Management" AND "Artificial Intelligence", "Control Management" AND "Big Data", "Control Management" AND "Deep learning", "Control Management" AND "Machine learning"). We limit the search to published journal articles, conference proceedings and book chapters. We also limit our search to articles written in the English language within the subject area of business, management and accounting, computer science, publisher before 2023. Our initial search returned 128 articles, then after analyzing Title and the Abstract, we returned to 23 Articles.

The objectives defined for our research include, on the one hand, understanding Target Costing in the Moroccan context, i.e. Moroccan industrial companies. To do this, we adopt a deductive stance, pursuing a

hypothetico-deductive approach that consists in developing hypotheses and then confronting them with a reality[30].

4. Theoretical foundations

In order to gain a better understanding of the application of Target Costing in the Moroccan economic environment and at the heart of Moroccan companies, we reveal the reasons for the choice of the industrial sector and those of large companies, and at the same time, we discuss the theories: Kurt Lewin's theory of organizational change management (1947) and the contingency theory advocated by Lawrence and Lorsh (1967).

Fo this purpose, Target Costing is a management control tool used by many large firms to achieve specific objectives, namely profitability and competitiveness, for several reasons which can be summed up as the complication of operations, i.e. large industries produce a variety of productsor services, using Target Costing to help manage costs effectively in these diversified environments by setting precise cost targets for each product or service. As such, they generally operate in highly competitive sectors. And to remain competitive, integrating AI technology with advanced data processing and predictive analytics capabilities can transform the way companies approach Target Costing.

Also, these firms may be subject to pressure on their profit margins due to various factors, such as competition, fluctuations in raw material costs and demand, allowing them to manage these pressures through a prior study of the appropriate costs for each product or service. In the field of organizational change, the adoption of new technologies is a key element in facilitating change within organizations[31]. The application of AI in Target Costing, and through faster and more accurate data collection and analysis, offers a flexible approach to adjusting costs in line with changing customer needs and market trends.

In addition, every organization is faced with rapid changes in its environment, requiring it to undertake an increasing number of transformation projects, which implies the theory of organizational change management.

Initiated in 1940 by Kurt Lewin, the theory of organizational change management has been clarified by three authors, firstly by Guilhon[32] as "*A process that moves an organization from a current state to a future state. It punctuates the evolution of organizations by a marginal or radical transformation of structures and skills*". Secondly by Collerette et al. [33] who defined organizational change management as "*The passage from one state to another, which is observed in the environment, and which has a relatively lasting character*". And finally for Belanger and Jacques [34] as"*The passage from a current state to a desired state, from a current original situation, judged to be inadequate, to another considered to be more suitable, which better meets the requirements of the environment or the new aspirations of the people concerned*". For this author, change represents a disruption of the existing equilibrium, potentially leading to an uncomfortable situation, but it can also mean the quest for a new equilibrium.

We can see that change management can be defined as a path of brutal and continuous change to improve and evolve the organization according to the economic situation, in order to help manage the changes generated by the introduction of transformation tools. It can influence the entity, the group or the individual.

Demers[35] summarized the history of organizational change during three periods: the end of the second world war, the late seventies and the late eighties up to the present.

In the present research, Target Costing is a method connected with change management theory, so that change management theory refers to the set of principles and methods aimed at managing and facilitating change processes within an organization. This can include the implementation of new strategies, new processes, new technologies, or any other significant change. Change management aims to minimize employee resistance

to change. In particular, when implementing AI technology at the Target Costing level, which requires a significant change in the way it manages its costs and operations. Setting cost targets often requires adjustments right from the development and design phase of a new product, right through to its industrialization. To this end, change management becomes paramount to ensure that employees understand the objectives of AI and Target Costing, which requires training, effective communication and appropriate planning.

Integrating AI into Target Costing requires an elaboration of organizational change management theory to create a meaningful link between advanced technology and cost management practices, and to better manage and identify potential resistance to change.

For this reason, these two notions go hand in hand with change management theory. Adopting new technologies as represents a strategic change that requires alignment with organizational goals[36]and successful organizational change requires a thorough understanding of the tools and methods involved[37]. When the company implements major changes to achieve specific cost objectives. Change management then becomes a key tool to ensure the successful integration of AI into Target Costing.

In the sameaspect, this research correlates with contingency theory, which "shows that structure must be adapted to the constraints of the environment, and that structural determinants and organizational variables must be made coherent"[38].

From the 1960s onwards, technology and the environment were key variables for an organization, according to Burns and Stalker[39] and the founders of the theory in 1967. Also, Horngren[40] stated that to set up a management control system, it is necessary to analyze the structure of the organization. Several factors can lead to the implementation of such a system, including the influence of the environment, the adoption of new technologies, corporate strategy, training, the size of the organization and the distribution of power.

5. Research hypotheses and proposals

Table 4 summarizes all the hypotheses derived from the literature review. On the one hand, they will be detailed, and on the other, they will be tested in our next studies:

Table 4. Research hypotheses.

Hypotheses	Institutional theoretical framework
H1: Target costing is flexible enough to meet the specific needs of the Moroccan market without compromising competitiveness;	Sakurai[3]; Guilding et al.[41]; Cinquini and Tenucci[42]; Kato[43].
H2: Target costing has cost constraints that would contribute to the continuity of Moroccan industrial companies;	Kato[43]; Cooper and Slagmulder[44]; Hibbets et al.[45]; Feil et al.[46].
H3: The target costing method would enable players in Moroccan industrial companies to work together;	Feil et al.[46]; Guilding et al.[41]; Langfield-Smith[47].
H4: Moroccan regulations and standards could influence the introduction of target costing.	Abdel-Kader and Luther[48]; Hoque[49]; Drury[50].
H5: Artificial intelligence would be optimally integrated into the target costing process to improve cost management and boost competitiveness.	Davenport and Ronanki[51]; Bhimani and Willcocks[52]; Agrawal et al.[53].

Source: Developed by the authors.

H1: Target Costing is a strategic management method that stands out for its flexibility, particularly in response to the specific requirements of local markets such as Morocco. This approach, initially developed in Japan, has proved its effectiveness in various economic contexts, enabling companies to actively manage their costs while remaining competitive[3,13].

It also encourages cross-functional collaboration, involving departments such as design, production and marketing. This multi-disciplinary approach is essential for an understanding of costs and customer-perceived value, offering companies an opportunity to adjust their products in a more targeted way: an aspect particularly relevant in the Moroccan context[42,43].

Target Costing is therefore a flexible and effective tool enabling companies to respond to the specificities of the Moroccan market while preserving their competitiveness, which explains our first hypothesis.

H2: This second hypothesis is based on the following arguments: Target Costing enables companies to align their production costs with market conditions and customer expectations, an essential step in ensuring their sustainability[44]. The method also encourages companies to innovate to meet their cost targets without compromising quality, thus fostering a culture of continuous improvement and adaptability[45].

Moreover, Target Costing is not limited to cost reduction; it also involves in-depth analysis of market needs and customer requirements[43]. This market orientation ensures that the products developed are not only economically viable, but also effectively meet customer needs. This match between production costs and market expectations is essential for the long-term survival of Moroccan industrial companies.

In addition, Target Costing is also an effective tool for proactively managing costs in a constantly changing market environment, enabling companies to remain competitive and viable over the long term[46].

H3: The third hypothesis is based on arguments indicating that the Target Costing method, recognized for its ability to integrate, encourage and harmonize the efforts of different departments within companies, plays a role in facilitating collaboration within industrial companies[46,47], particularly in the Moroccan context. This cost management method, which involves defining target costs at the earliest stages of product design, requires close coordination between the functions of research and development (R&D), production, marketing and finance.

Thus, by actively involving the various departments in the cost-setting process, companies can ensure that their decisions are aligned with market expectations and the company's strategic objectives[48]. This collaborative approach enables companies not only to meet customer needs, but also to anticipate future changes, which is particularly relevant in a constantly evolving market such as Morocco.

Target Costing is proving to be an essential strategic tool for Moroccan industrial companies, encouraging interdepartmental collaboration, stimulating innovation and improving strategic decision-making.

H4: The fourth hypothesis is justified by several researchers[48–50].cost management systems are strongly influenced by the regulatory context in which a company operates[48]. In the Moroccan context, where commercial and financial regulations are evolving, Target Costing must be adapted to comply with these standards. This implies a thorough understanding of local regulations and an ability to integrate these requirements into the company's cost management strategy.

In addition, other works[49] highlights the importance of aligning cost management practices with local accounting and financial standards, which can influence the way target costs are calculated and managed.

The regulatory environment can also affect strategic pricing and cost management decisions[50]. In the context of Moroccan standards, this could imply that Target Costing is used not only to control internal costs, but also to ensure that the company's products and services remain competitive and in line with local regulatory expectations.

H5: The final hypothesis is based on research indicating that integrating AI into the Target Costing process represents a significant step forward in improving cost management and boosting business competitiveness. AI, with its advanced data analysis and predictive modeling capabilities, can provide valuable insights for more accurate target cost setting and more informed decision-making.

What's more, AI can automate and optimize many of the processes involved in Target Costing[51], as well as providing in-depth analysis of market trends and consumer behavior, making it easier to align target costs with market realities[52].

Again, the use of AI in Target Costing enables companies to respond more quickly and effectively to market changes, by adapting their cost and pricing strategies in real time[53].

Thanks to its analytical and automation capabilities, integrating AI into Target Costing offers companies significant benefits in terms of improved cost management and enhanced competitiveness.

6. Research results and discussion

We seek in this section to lay the foundations for research into Target Costing in Morocco, by delving into the case studies related to the said method, especially in the Moroccan context in order to highlight the elements specific to the said context. With this in mind, we aim to understand the implementation of Target Costing in large companies, and then explain how this management tool can be applied in different contexts in order to provide answers to the hypotheses initially put forward.

The development of the management control function has been studied mainly at the level large companies[54].

The Target Costing method is one of the tools of management control. To better understand it in the Moroccan context, it is crucial to analyze the various management tools used by economic entities, in particular the Activity Based Costing (ABC) method. To reconcile Target Costing with estimated cost, estimation methods are used. According to Margotteau's study, "there is the analytical method, which is based on a detailed technical analysis of the new product, the technical study characterized by the drivers of the ABC method, which is a full-cost method, but which is also more refined, better adapted in general to reality, and which gives precision in the allocation of indirect expenses to determine the forecast cost"[55].

Over time, "numerous surveys have shown that the size of companies implementing the Activity Based Costing (ABC) management control tool is greater than that of companies that do not adopt it[56,57]. In the USA, Krumwiede[58] found that three contextual variables were associated with ABC adoption, with size occupying a central position among these factors. Dahlgren et al.[59] tested the influence of a large number of variables on the propensity to adopt the ABC method in Sweden. The authors demonstrated that only three were significant in explaining ABC adoption, including the "size" factor. In the same vein, following an empirical study of 75 companies in Norway, Bjørnenak[60] demonstrated that the size of an organization, measured by the number of its employees, is correlated with its propensity to learn about and adopt ABC". Quoted in the same article.

According to Elhamma[56], 12.9% of companies surveyed use the ABC method. This is a surprisingly high rate for a developing country like Morocco. The results obtained show that the ABC method is most widely adopted by large, decentralized companies and those operating in an uncertain environment.

According to Chafi et al.[61], management accounting is an integral part of a company's management information system. It provides information for decision-making, with the aim of making the company's actions more profitable. The design of a management accounting system requires in advance: a definition of objectives, an analytical coding of accounts and the choice of a costingmethod which will subsequently determine the approach to be adopted. Once a company has adopted ABC management accounting, the choice of approach depends on the organization of the company concerned.

In the French context, in his doctoral thesis[62] on "*The implementation of activity-based costing in French companies: characteristics and factors of adoption and success*", concluded from his empirical findings on the activated sector that there is significant interest in the ABC method among industrial companies. However,

although it first appeared in industry, the latter has not kept the privilege, since today more and more service companies are adopting it.

30.2% of service companies use activity-based accounting, compared with 39.1% of industrial companies. According to Hamood et al.[63], several studies have shown that management control implementations are the result of numerous environmental and organizational factors, such as competition, strategy and industry. To successfully adopt Target Costing, companies need to pay close attention to influential factors linked to product development strategy and customer expectations throughout the market research process. It is all about finding the product characteristics in terms of price, quality, functionality and speed that form the fundamental elements of the Target Costing approach.

According to Swenson et al.[64], in order to develop Target Costing, firms need to examine three key areas: culture, organizational infrastructure and the underlying principles of Target Costing, as well as the procedures and tools required to support its implementation. Recently, a large body of research has sought to identify the factors likely to influence the adoption of Target Costing. These factors generally fall into two categories: environmental factors such as the intensity of competition and perceived uncertainty in the environment, and organizational factors such as company size, national culture and competitive environment and strategy.

Taking into consideration what has been mentioned above, the Target Costing method can be adopted with a primary focus on reducing costs and satisfying customer needs. However, the low level of adoption of new management control techniques such as Target Costing in the Moroccan context is linked to reluctance to change, lack of familiarity, lack of evidence of success, priority given to other areas, lack of understanding of the benefits and dependence on traditional methods.

Namely, that companies often have established systems and processes in place, including traditional management control methods. Adopting new techniques can be perceived as a major change, which can lead to resistance within the organization. Secondly, new management control techniques can be complex and require specific training: if staff are unfamiliar with these methods, they may be reluctant to adopt them for fear of not knowing how to implement them correctly. Thirdly, if companies don't see examples of success in their sector, or convincing evidence that these methods will improve their performance, they may be reluctant to implement them. Moreover, in some companies, technological innovation may be prioritized over new management control techniques. Financial and human resources may be allocated to technological initiatives rather than to improvements in management practices. And the potential benefits of new management control techniques, such as improved operationalefficiency, reduced costs and increased profitability, may not be clearly understood by the company's decision-makers. They may not perceive the added value of these methods. Finally, companies that have used traditional management control methods for many years may be reluctant to abandon them in favor of new approaches. They may feel that traditional methods have worked well in the past, and prefer to retain them.

In the same vein, Morocco has a growing economy and has become a hub for various sectors, notably automotive, aeronautics, agri-food... Without doubt, Target Costing is particularly useful for Moroccan industrial companies operating in competitive sectors, helping them to maintain their competitiveness on the global market.

In this respect, many Moroccan companies are competing on world markets. Target Costing can help them achieve competitive costs while maintaining quality and innovation. Similarly, this method is often used to guarantee the competitiveness of products on the market, while maintaining flexibility in the Moroccan market. Furthermore, business continuity refers to a company's ability to operate stably and profitably over the long term. By setting target costs based on market prices and desired profit margins, the company can aim to maintain sustainable profitability. This ensures the company's financial stability over the long term. Adapting Target Costing to market changes by encouraging companies to stay attuned to market needs and

adjust their costs accordingly. This enables the company to adapt more quickly to changes in consumer demand, which is essential for continuity.

Target Costing is not only concerned with the flexibility and continuity of Moroccan industrial companies, it also takes into account the collaboration of all the company's players involved in the implementation of this tool. The latter involves the identification of stakeholders, notably the design, production, marketing, sales and accounting teams. Collaboration between these different functions is necessary to gather information on market requirements, product specifications and potential costs. Also, company employees must work collectively to break down costs into specific elements, thus identifying areas where savings can be made. Collaboration is essential to evaluate cost reduction options without compromising product quality. Thus, design, production and marketing teams need to work together to implement corrective measures aimed at achieving the target cost. This may include design improvements, production process changes or marketing adjustments.

The key role of company staff is to monitor progress and make adjustments along the way. If actual costs deviate from target, further corrective action may be required.

In the same vein, in Morocco, as in many other countries, companies are subject to specific accounting, cost management and financial transparency standards and regulations. Moroccan standards and regulations relevant to Target Costing include : Moroccan tax laws can have an impact on cost management, as they define the tax rules and rates that apply to companies. Companies need to ensure that their cost management practices comply with current tax provisions. And the internal control and auditing standards, whose aim is to set up internal control procedures and have the accounts of Moroccan organizations audited. In other words, cost management methods, including Target Costing, must be documented and justified to satisfy audit requirements.

In order to take full advantage of the benefits while reducing the risks, it is essential to harmonize the principles of Target Costing with the capabilities of AI within Moroccan industrial companies.

In fact, the digital advances initiated over the last decades and driven by an increased desire for innovation are now gaining in importance by penetrating all areas. In this respect, digitization at the heart of the financial sphere, particularly in the area of management control, holds immense potential for boosting performance. It is therefore up to Moroccan companies to immerse themselves in the innovative range of innovations and reap the rewards[65]. In this respect, Artificial intelligence acts as a catalyst, optimizing the allocation of financial resources towards investments combining profitability and sustainability. In this same vein, the current environment is conducive to development, innovation and change[66]. The intensification of competition, the current crises, digitalization, economic and technological developments, environmental challenges and social transformations have led to a major renewal in the financial activity of companies.

AI currently occupies a central position in our daily lives, and seeks to reproduce the brain's decision-making process. This concept encompasses the knowledge and principles used to invent machines capable of simulating intelligence.

It can make a number of important contributions to the Target Costing process, clearly improving the implementation of the latter by providing accurate, real-time information, facilitating process optimization, and enabling more agile adaptation to market changes, thus helping to achieve target cost objectives more effectively.

Indeed, companies can have realistic and achievable target costs, by using advanced predictive models to anticipate future costs based on historical data, market trends and raw material fluctuations. As a result, AI can help to reduce production costs and achieve cost targets by optimizing manufacturing processes, identifying inefficiencies and suggesting improvements through anomaly detection. It also facilitates market analysis via machine learning algorithms by analyzing large quantities of market data, including consumer behaviors,

market trends, and competitors' actions. Next, this intelligence contributes to supply chain management through planning, minimizing delays and shortages, and identifying alternative sources of supply. Then, it can help analyze the profitability of individual products, taking various parameters into account.

And as confirmed in an in-depth case study at an automotive manufacturing company[19], artificial intelligence can be used for cost management during new product development. Specifically, machine learning and big data technology can lead to more accurate cost estimates, and are capable of identifying the most important cost drivers, as well as helping to reliably determine average costs for product features. The company's cost experts found the results encouraging, and felt that machine learning could improve the efficiency of their cost management process. On the other hand, artificial intelligence tools cannot and should not be described as replacing expert judgement[20]; they remain decision-making tools.

In the end, and reflecting on all this and the source of the theories mobilized, the results obtained and the interpretation that follows from this research, the conceptual model is set out in **Figure 2** as follows:

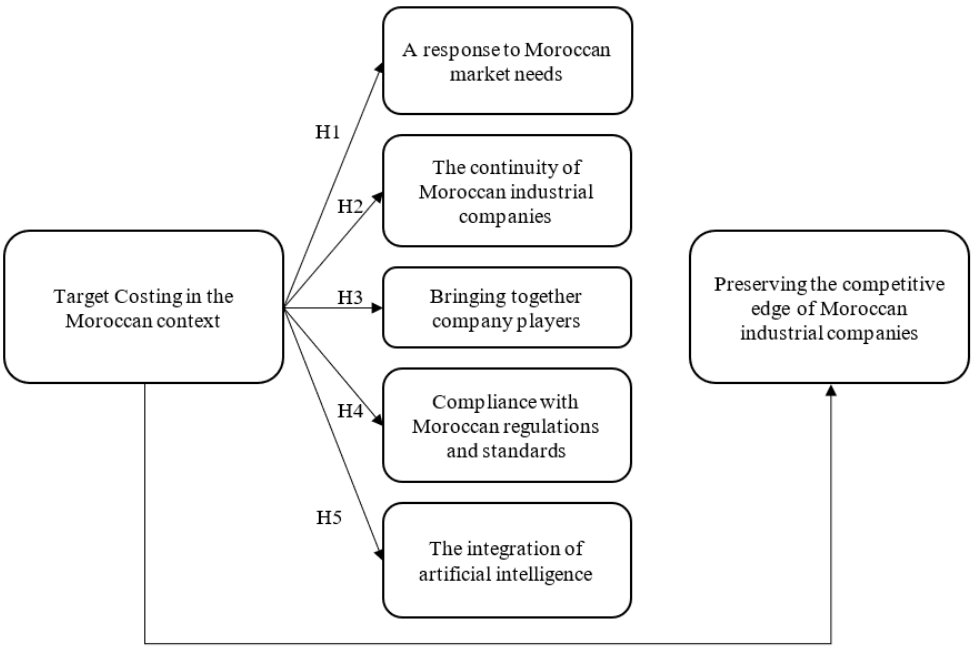

Figure 2. Theoretical model.

In the light of the theoretical model presented, the application of Target Costing in the Moroccan environment emerges as a potentially transformative strategy, capable of catalysing organisational change within local companies. This adaptation is crucial if we are to meet the specific needs of the Moroccan market and guarantee the sustainability of companies in this dynamic environment. Adapting Target Costing to the Moroccan context requires an in-depth understanding of the particularities of the local market. By adapting the parameters of the model, companies can take into account the preferences of Moroccan consumers, their purchasing habits, and the cultural factors that influence their choices. This adaptation makes it possible to create products and services that are not only financially competitive, but also in tune with the specific expectations of the Moroccan market. A crucial dimension of this adaptation lies in working with local players. By meeting stakeholders such as suppliers, distributors and regulatory bodies, companies can better understand the dynamics of the Moroccan market and adjust their strategies accordingly. This interaction also fosters alignment with local regulations and standards, which are essential for maintaining the competitive edge of industrial companies in Morocco. Adapting Target Costing to the Moroccan context is not just a question of modifying the technical aspects of the model, but also of creating an organisational culture conducive to change. This involves making teams aware of the new objectives, investing in training to develop the necessary skills,

and creating an environment that encourages innovation and continuous improvement. The integration of AI within the Target Costing framework offers Moroccan industrial companies a strategic way of optimising costs, promoting positive organisational change and strengthening their competitiveness on the local market. It is a holistic approach that takes into account both economic imperatives and Morocco's specific cultural and regulatory characteristics. Adapting Target Costing to the Moroccan environment represents a strategic opportunity for local companies. By responding proactively to the needs of the local market and adjusting to current regulations and standards, companies can not only maintain their competitiveness, but also drive significant organisational change, thereby strengthening their position in the Moroccan market.

6. Conclusion

The ultimate objective of our research was to understand how Target Costing enhanced by AI can be effectively adjusted to the realities and specificities of the Moroccan market while maintaining the competitiveness of Moroccan industrial companies.

In order to provide an answer to our central question, we delved into the existing literature on the application of Target Costing in the Moroccan context. However, based on theoretical grounds, we formulated the hypotheses for developing the research model, taking into account both the conceptual framework of Target Costing in industrial companies and in a number of countries, in order to draw the following conclusion: the modern tool known as Target Costing is compatible with the realities and specificities of the Moroccan market.

As a result, the main motivations for adopting Target Costing are often linked to the environment in which the company operates, including strong competition, short product life cycles and complicated manufacturing processes. It is essential to recognize that Target Costing, like many other management control tools, has become a means of reducing costs and ensuring the persistence of Moroccan industrial companies.

Hence, AI can improve the application of Target Costing by providing accurate, real-time information, facilitating process optimization, and enabling more agile adaptation to market changes, thus helping to achieve target cost objectives more effectively.

To this end, the management tool, Target Costing, is a beneficial instrument for Moroccan companies that manufacture products intended directly for end consumers and which have several functions, rather than intermediate products, such as the agri-food, health, automotive and aeronautical sectors. On the other hand, it may be less suitable for sectors with few product models or unique products.

The benefits of this study can be seen in its academic, managerial and socio-economic contributions. In academic terms, Target Costing is a management control method that emerged in the 1960s in Japan. However, there is a lack of articles and publications dealing with this subject in the Moroccan context. This research is also helping to enrich scientific production in this little-explored area, namely the Target Costing method.

In managerial terms, the adoption of Target Costing encourages the use of the Target Costing method to capture a share of the market and improve company performance by seeking to reduce production costs beforehand.

In addition, on a socio-economic level, as already mentioned and detailed above, the application of Target Costing helps Moroccan industrial companies to cope with their economic environment in order to remain competitive.

This article highlights the obstacles related to the complexity of implementing Target Costing, which requires in-depth cost analysis and close collaboration between the design, production and management departments. Some Moroccan companies, particularly smaller ones, may find it difficult to implement this process, as well as financial constraints, which explains why the initial investment required to implement it, such as the acquisition of new technologies or staff training, can be a financial challenge for some Moroccan

companies. Although the integration of artificial intelligence in the context of Target Costing has its benefits, it is not without its drawbacks: technological dependency, high initial costs, operational complexity, ethical issues, cultural resistance and predictive limitations all need to be taken into account. A balanced approach, taking these aspects into account, is crucial to maximize its benefits while mitigating the risks associated with its use in the Target Costing process.

Our research encountered challenges mainly due to the lack of existing literature on the application of Target Costing in the Moroccan context. Although we did not find any specific references, we managed to adapt this tool by combining it with activity-based costing. A second difficulty is that small and medium-sized enterprises have not yet widely adopted this method, although it can bring benefits to all companies, regardless of their size.

Future research is needed to explore in depth the application of Target Costing within Moroccan industrial companies, namely through the implementation of the perspectives already addressed, in order to have a very effective tool likely to be extended on a large scale across all organizations.

Author contributions

Conceptualization, SM, MF and KT; methodology, SM; validation, SM, KT and MF; formal analysis, SM; resources, SM and MK; writing—original, draft preparation, SM; writing—review and editing, SM, MK and CT; supervision, KT and MF. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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