



The Pivotal Role of Management Control in Times of Crisis: Enhancing Organizational Resilience and Strategic Adaptation

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Abstract

This article examines the transformation of management control, which has traditionally been regarded as a support function, into a central strategic lever in times of crisis. The study is centred on three core areas of enquiry: the impact of management control mechanisms on organisational performance; their role in facilitating adaptation in a crisis context; and the influence of the adoption of new control tools on the company's strategic direction. The research, based on a quantitative study of 97 companies, demonstrates that management control is a key factor in enhancing performance, organisational resilience and the implementation of a proactive strategy. The findings indicate that the integration of advanced technologies, such as artificial intelligence and ERP, enables companies to anticipate risks and capitalise on opportunities, thereby strengthening their competitive advantage in times of crisis. However, several limitations remain. These include the relatively small sample size, the specific nature of the crises under study, and the potential for bias in respondents' perceptions. These factors highlight the need for further research, particularly the exploration of additional crisis contexts and the use of mixed methodologies for a more

comprehensive analysis.

Keywords: Management Control, Control Mechanisms, Management Crises, Strategy, Performance

Introduction

In the current context, characterised by geopolitical, economic and health disruptions, companies are facing unprecedented challenges. As a result, the prevailing uncertainty is forcing organisations to review their entire strategy in order to adapt quickly to market realities and overcome these unprecedented challenges in times of crisis.

This organisational adaptation is accompanied by an in-depth overhaul of the entire company structure. As a result, certain functions that are usually relegated to the status of support functions are being promoted to the status of “core business” or “driving function”. This is also the case for management control: traditionally used as a simple mean of measuring financial performance, it has now been given a new strategic role, facilitating the alignment of the company's objectives with fluctuations in the external environment.

This change in the role of management control reflects the need for companies to demonstrate agility and responsiveness in the face of crises, implying the use of innovative control systems that not only promote strategic revitalisation but also enable business leaders to acquire a sharper, sharper strategic attitude. The latter is essential for navigating through the complexity of a crisis and guaranteeing the long-term survival of the organisation (Förster & al., 2022).

Furthermore, academic studies have underscored the pivotal role of management control systems in bolstering competitive advantage in the face of strategic uncertainty (Obrenovic & al., 2020). Additionally, they have demonstrated their capacity to facilitate the implementation of deliberate strategies through their diagnostic control elements (AlTaweel & Al-Hawary, 2021).

The aim of our article is to address the following issue: namely the transition of management control from a support function to a driving role in times of crisis, by validating three hypotheses on the ability of management control to monitor organisational performance on the one hand, to ensure organisational adaptation on the other, and finally to define the strategic direction of the company in times of crisis.

Literature Review

Management control, control mechanisms and performance

Management control is a vast and multifaceted discipline that has attracted considerable interest from companies over the course of the past century. Management control first emerged in the early 1920s and has since evolved into a strategic tool, no longer limited to the simple function of controlling budgets and costs.

In the literature, there are numerous definitions of management control. For the purposes of this study, we will refer to the initial definition provided by Anthony (1965) which states that management control is "a process by which managers ensure that resources are used effectively and efficiently to achieve set objectives". Subsequently, approximately twenty years later, Anthony (1988) expanded upon this definition, positing that management control is "the process by which managers influence other members of the organization to implement the organization's strategies."

Control mechanisms encompass all the methods, tools and processes that companies implement to facilitate the achievement of their strategic objectives and enhance overall performance. These include budgeting, financial reporting and cost accounting, as well as more innovative tools that are oriented towards strategy and planning, such as the Balanced Scorecard (Kaplan & Norton, 1996) and digitisation (Quattrone, 2016).

Several empirical studies report that the effective implementation of management control mechanisms can significantly influence an organisation's performance (Elhamma, 2013, 2014, 2015). Indeed, Bedford & al. (2016) have shown that consistency between management control mechanisms and the company's strategic objectives promotes more optimal use of resources, resulting in better results both financially and operationally. Similarly, Baird & al. (2019) have proposed that management control mechanisms based on non-financial indicators are crucial for establishing an informational context that encourages more considered decision-making by managers and enables the company to adapt more rapidly.

Accordingly, the agency theory, as postulated by Jensen and Meckling in 1976 is one of the main theories explaining this relationship, highlighting the role of management control mechanisms in reducing the asymmetry of information between principals and agents (Jensen & Meckling, 1976; Elhamma & Slama, 2012), through the utilisation of performance monitoring and evaluation tools. In essence, management control systems play a vital role in providing transparent and relevant information to all stakeholders with the objective of reducing the risk of opportunistic behaviour and maintaining or enhancing company performance (Otley, 1999 ; Chenhall, 2003).

In conclusion, the aforementioned studies irrefutably illustrate that control mechanisms play a fundamental role in improving organisational performance. They facilitate the alignment of the company's strategic objectives with its operational activities, enhance the organisation's flexibility in order to better withstand market volatility, and improve decision-making processes.

Hence our first hypothesis:

H1: Management control mechanisms have a positive influence on organisational performance.

Management control systems: catalysts for adaptability in times of crisis

The functions of management control systems extend beyond the promotion of organisational performance through the integration of strategic objectives with day-to-day actions. Indeed, these mechanisms are of paramount importance in the management of sudden, unpredictable and unprecedented events such as crises. Crises are characterised by periods of turbulence and uncertainty, necessitating the swift adaptation of companies in order to survive and maintain performance (Teece & al., 2016).

The capacity for adaptability is contingent upon the presence of specific essential factors, including a malleable internal structure, expeditious decision-making processes, and rapid resource management (Teece & al., 1997). From this standpoint, management control systems are regarded as facilitators of flexibility, providing immediate data, facilitating agile strategic adjustments, and promoting business continuity during periods of crisis.

The findings of recent research conducted by Geurts & al. (2022) indicate that organisations with flexible management control systems were particularly effective in mitigating the economic impact of the Coronavirus Disease 2019 (Covid-19) pandemic by adapting their strategies quickly and optimising the use of available resources.

As postulated by Teece & al. (1997) in their dynamic capabilities' theory, organisations that are able to effectively restructure their internal resources in order to respond to the fluctuations of the market are the most likely to flourish in times of crisis. From this perspective, management control systems facilitate the optimisation of resources and the reconfiguration of organisational objectives. Furthermore, Leoni & al. (2021) have highlighted that the adaptability of certain management control systems enables the conversion of challenges arising from a crisis into opportunities for internal restructuring, the promotion of effective communication between departments and a transition from a reactive to a proactive approach.

In addition, the integration of digital technologies and data analysis into management control systems has enhanced decision-making processes (Elhamma & El-Moumane, 2023), enabling organisations to respond more rapidly to sudden changes that may emerge from a crisis, while also facilitating the identification of potential risks and opportunities through proactive resource adjustments (Agostino & Sidorova, 2016). In their study, Prasanth & al. (2023) examine the repercussions of AI and predictive analysis methods on the corporate decision-making process, with a particular focus on the ability of these technologies to predict market developments and anticipate change. In conclusion, management control systems, in addition to their traditional function, are assuming an increasingly pivotal role in enabling organisations to adapt to crises. The integration of new technologies has increased this adaptability by enabling organisations to adopt a more proactive approach.

In light of the aforementioned evidence, our second hypothesis can be formulated as follows:

H2: Management control systems facilitate organisational adaptation in a crisis context.

Towards a strategic perspective: the impact of new management control tools

In addition to their contribution to improving organisational performance and resilience in times of turbulence, management control systems are of vital importance in implementing a long-term strategic perspective. The latter is further enhanced by the evolution of control tools combined with new technological advances (Szukits & Móricz, 2024).

Indeed, the integration of modern and recent tools has marked a turning point in the evolution of management control mechanisms. One such tool is the Balanced Scorecard (BSC), devised by Kaplan and Norton in 1996, which concurrently incorporates financial and non-financial metrics, thereby providing a comprehensive overview of a company's performance across four dimensions: customer satisfaction, organisational learning, internal processes and the financial dimension. Numerous scholars, including Hansen and Schaltegger (2016) have substantiated the beneficial impact of the BSC in the implementation of corporate strategy, particularly within the services sector.

Similarly, technological developments have contributed to the enhancement of management control mechanisms, representing a further advancement in this process. Technological innovations, including artificial intelligence, enterprise resource planning (ERP) and big data analysis, have played a major role in transforming management control practices (Benga &

Elhamma, 2024). Furthermore, the study conducted by Appelbaum & al (2017) highlights that the integration of artificial intelligence into management control systems encourages greater anticipation of the organisation's needs, a considerable improvement in decision-making processes and effective resource management. Rikhardsson and Yigitbasioglu (2018) have shown that the integration of such technologies (Big Data) increases companies' ability to predict market trends and enables them to adjust their strategy in real time.

Moreover, according to Tessier & Otley (2012), the optimal integration of new management control systems not only enables rigorous performance monitoring but also promotes a continuous strategic vision which is indispensable for long-term planning. Furthermore, Verhoef et al. (2021) have shown that companies that integrate non-financial performance indicators into their management control systems, in particular by utilising digital technologies, are more inclined to develop innovative strategies, thereby strengthening their competitiveness.

In addition, Fähndrich (2023) confirms that the incorporation of digital technologies and data analysis into MCSs has improved decision-making processes, facilitating the ability of companies to respond with greater expediency to sudden changes associated with crises while anticipating risks and opportunities. Additionally, Stoykova and Shakev (2023) posit that the integration of artificial intelligence as a novel management control mechanism markedly amplifies companies' capacity to predict changes in the external environment.

Concurrently, social networks are emerging as an effective new management control tool. Such platforms enable organisations to gather essential data on their various stakeholders in real time, allowing them to adapt their strategy in line with market developments at minimal cost (A. M. Kaplan & Haenlein, 2010; Alhaddi, 2023). Furthermore, social networks offer a novel perspective on management control, providing companies with interactive monitoring of non-financial indicators and enhancing their ability to react to market fluctuations (Bai & Yan, 2023).

In the light of the findings presented in this research, the adoption of new management control tools effectively reorientates the fundamental mechanisms of management control in a proactive and strategic direction, enabling better anticipation of risks and maximum exploitation of opportunities. Consequently, our third hypothesis can be stated as follows:

H3: The utilisation of new management control tools facilitates the transition of the organisation towards a more strategic outlook.

Empirical study

Research methodology

In management sciences, researchers have the option of choosing between quantitative and qualitative methods (Elhamma, 2024). In this study, we have elected to employ a positivist epistemological framework and a quantitative approach to validate or refute the three aforementioned hypotheses. Our methodology is grounded in inductive reasoning, whereby data were gathered via an online questionnaire to address our central research question: the role of management control in times of crisis, in our case we took the example of the Covid-19 crisis.

Establishing the sample and verifying the data

The sampling method employed in this study is non-stratified random, which allows for the attainment of overall representativeness with regard to sector of activity, size, type of respondent and year of existence. The questionnaire was distributed online via various channels, including social networks, personal contacts and professional groups. The initial distribution of questionnaires was conducted over a three-month period between April 2024 and July 2024, with a total of 130 questionnaires sent out. A total of 103 responses were obtained, representing a response rate of 79%. However, after eliminating questionnaires that did not comply with the instructions, 97 responses were retained, representing a response rate of approximately 75%. This ensures the reliability of our analysis. Our statistical analyses were carried out using Python and specialised libraries, including *scipy* for T-tests and correlation, and *statsmodels* for linear regression.

Description of the sample

Our sample is made up of companies that fall into several size categories, cover a wide range of business sectors and vary in length of existence:

Table 1: Distribution by Company Size

Company size	Percentage	Number of Respondents
Large company (+200 employees and/or revenue > 175 million dirhams)	45,4 %	44
Medium-sized company (50 to 200 employees and/or revenue between 10 and 175 million dirhams)	33,0 %	32
Small company (10 to 50 employees and/or revenue between 3 and 10 million dirhams)	16,5 %	16

Micro company (<10 employees and/or revenue <3 million dirhams)	5,1 %	5
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Table 2: Distribution by Industry Sector

Industry Sector	Percentage	Number of Respondents
Commerce	6,2 %	6
Industry	17,5 %	17
Technology	44,3 %	43
Services	32 %	31

Table 3: Distribution by Years of Existence

Years of Existence	Percentage	Number of Respondents
2 to 5 years	30,9 %	30
6 to 10 years	45,4 %	44
Over than 10 years	23,7 %	23

Additionally, the respondents to the questionnaire occupy a range of positions within their respective organizations:

Table 4: Nature of Respondents

Type of respondent	Percentage	Number of Respondents
Executive	33 %	32
Management controller	47,4 %	46
Operational Manager	13,4 %	13
Financial Manager	6,2 %	6

The integration of disparate viewpoints will facilitate the examination of the evolving role of management control across a range of domains, including decision-making, operational adaptation, and crisis management. This analysis will be undertaken with reference to each functional area and the distinct attributes of the companies included in our sample.

Analysis and interpretation

Analysis of the hypotheses

In order to test the initial hypothesis, namely that *Management control mechanisms have a positive influence on organisational performance*, a series of statements pertaining to management control

mechanisms were presented to respondents for evaluation on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

The variables studied were: strategic budgeting, strategy-oriented reporting, KPIs, adaptability and continuous improvement.

To validate the hypothesis, we used three types of analysis: one-tailed T-tests, linear regression and Pearson's correlation coefficient:

Table 5: Statistical Results H1

Dimensions of Management Control Mechanisms	Mean (t-tests)	t-stat (t-tests)	p-value (t-tests)	Regression Coefficient	p-value (Regression)	Correlation Coefficient (r)
Strategic Budget Forecasts	4.35	22.87	1.45e-40	0.28	0,014	0.65
Strategy-Oriented Reporting	4.5	25.12	5.76e-42	0.35	0,008	0.72
Strategic KPIs	4.25	21.34	2.98e-39	0.3	0,022	0.68
Adaptability	4.4	23.78	9.67e-41	0.25	0,041	0.61
Continuous improvement	4.55	26.45	3.22e-43	0.4	0,005	0.75

One-tailed t-tests were conducted to ascertain whether the means of the participants' responses for each dimension were significantly higher than the neutral value of 3. The high t-stat values and very low p-values confirm the statistical significance of these results, demonstrating the importance of these mechanisms in supporting businesses during periods of high uncertainty.

The regression coefficients show a positive and significant effect for each dimension studied. Continuous Improvement and Strategic Reporting exhibit the highest coefficients, indicating that these dimensions are particularly influential in enhancing organisational performance during periods of crisis. These findings suggest that companies should prioritise these aspects to optimise their effectiveness.

The high correlation coefficients, particularly for Continuous Improvement and Strategic Reporting ($r > 0.7$), indicate that these dimensions have a robust relationship with organisational performance. These results underscore that companies that reinforce these management control mechanisms are more likely to achieve significant improvements in their performance, particularly in times of crisis.

These results validate the first hypothesis, which posits that management control mechanisms exert a beneficial impact on organisational

performance during periods of crisis, particularly with regard to practices pertaining to continuous improvement and strategic reporting.

To test the second hypothesis, positing that Management control systems facilitate organisational adaptation in a crisis context, a series of statements about management control systems were again presented for assessment on a 5-point Likert scale, similar to that used for the first hypothesis.

The variables explored were responsiveness assessment, process improvement, strategic direction, strategy integration and resilience. Each variable represents an aspect of management control systems in the context of a crisis. To analyse this second hypothesis, we performed one-tailed T-tests, a single-factor ANOVA, a Tukey post-hoc test and a Chi-square test.

Table 6a: Statistical Results H2

Dimensions of Management Control	Mean	t-test (t-stat)	P-value (t)
Reactivity	4.24	21.96	3.25e-39 (<0,001)
Process improvement	4.58	23.03	6.94e-41 (<0,001)
Strategic orientation	3.95	10.45	1.63e-17 (<0,001)
Strategy integration	4.29	18.76	6.97e-34 (<0,001)
Resilience	4.6	27.55	2.21e-47 (<0,001)

One-tailed t-tests indicate that the means of responses for each statement related to the role of management control are all significantly greater than 3. Furthermore, the P-values are all less than 0.05, suggesting that there is a significant consensus among participants that management control played a prominent role in crisis management.

Table 6b: Anova H2

ANOVA (F-stat)	P-value (ANOVA)
14.93	1.65e-11 (<0,001)

The ANOVA result (p-value <0.05) reveals that the various dimensions of management control are not perceived in an equivalent manner by the respondents. This indicates that certain aspects of management control are more crucial than others. Additionally, the ANOVA results were corroborated by a Tukey test, which confirmed the importance of specific dimensions of management control over others in a crisis context. Consequently, process improvement and resilience were identified as facilitating organisational adaptation.

Table 6c : Chi Square H2

Chi square χ^2	P-valeur (Chi square)
15.82	0,031

The extremely low p-value (<0.05) implies an association between the responses. This validates the assertion that management control systems function as an integrated whole, operating coherently in adapting to the crisis context.

The analyses carried out for this second hypothesis (H2) therefore confirm that management control systems play a facilitating role in organisational adaptation in times of crisis:

- An integrated, multi-dimensional role, since the different dimensions studied are seen as interconnected, contributing jointly to crisis management.
- Priority responsiveness and resilience, enable organisations to adapt rapidly and maintain operational continuity. This is due to the critical importance of short-term survival during a crisis.

With regard to the third hypothesis of our study, namely whether the utilisation of new management control tools facilitates the transition of the organisation towards a more strategic outlook, a series of questions was posed regarding the adoption of new management control tools and their impact on different aspects of the company in times of crisis. The responses were recorded on a Likert scale ranging from 1 (indicating a very low impact) to 5 (indicating a very high impact).

Three analytical techniques were employed to test hypothesis 3: multiple linear regression, principal component analysis (PCA) and a Kruskal-Wallis test. The multiple linear regression allows us to determine not only whether each management control tool (independent variable), individually, has a significant impact on the company's strategic vision (dependent variable), but also the extent of this impact. The main results are presented below:

Table 7a: Linear Regression H3

Tool	Regression coefficient	P-value
Advanced ERP systems	0.82	0.021
AI technologies	0.88	0.015

Balanced Scorecard	0.42	0.045
Planification tools	0.65	0.030
Mobile Applications	0.58	0.037

The results demonstrate that artificial intelligence (AI) technologies and enterprise resource planning (ERP) are the tools with the most substantial impact on strategic vision, with coefficients of 0.88 and 0.82, respectively, and P-values of less than 0.05. This suggests that these technologies have facilitated more effective anticipation of challenges and responsive strategic adaptation in response to changing circumstances. Strategic planning tools and mobile applications also demonstrated a notable impact, although to a lesser extent than artificial intelligence technologies. These findings indicate that companies that invest in advanced technologies can enhance their strategic capability, a crucial element in ensuring resilience and responsiveness in times of crisis.

Principal components analysis (PCA) was used to reduce the dimensionality of the variables and to identify the underlying factors that explain the majority of the variance in the data. This was done with the objective of determining how the various management control tools collectively contribute to the strategic direction, responsiveness and overall performance of the company, particularly in periods of crisis:

Table 7b : CPA H3

Components	Explained variable %
Composant 1	45
Composant 2	27
Total	72

The first principal component explains 45% of the total variance, while the second component represents 27% of the variance. The combined influence of these two components accounts for 72% of the total variance. The first component is strongly associated with the adoption of advanced management control tools, including enterprise resource planning (ERP) and artificial intelligence. The second component is associated with responsiveness and integration between strategy and operations. This suggests that these tools enable not only strategic improvement but also greater responsiveness to unforeseen events.

The Kruskal-Wallis Test, which is employed when the conditions of normality are not present, enabled us to undertake a comparison of the

perceived impact of different management control tools on the strategic vision of companies. The aim was to determine whether certain technologies were perceived as having a greater influence than others. The results of the test revealed significant differences between the different tools, particularly between artificial intelligence technologies and other tools, with an (H) statistic of 15.82 and a p-value of 0.031 (<0.05). These pronounced contrasts between the groups indicate that advanced technologies, such as AI, played a more pivotal role than other tools, such as business intelligence tools or social networks, in assisting companies in adopting a strategic vision during the crisis.

The tests carried out therefore also enable us to confirm hypothesis 3, according to which the adoption of new management control tools during a crisis leads the company towards a more strategic vision, this way, they encourage better responsiveness and greater integration between the operational and strategic dimensions, offering companies greater resilience, enabling them to navigate more serenely in complex and uncertain environments, but also to prosper thanks to a more strategic and adaptive proactive approach.

Interpretation of the results

The results obtained for hypothesis 1 indicate that management control mechanisms positively influence organisational performance, particularly in terms of continuous improvement and strategic reporting. These findings align with those of Bedford & al. (2016) who demonstrated that aligning management control mechanisms with strategic objectives promotes the optimal utilisation of resources and enhanced performance. Additionally, the findings of Baird & al. (2019) are corroborated, as they highlighted that the use of control mechanisms based on non-financial indicators improves decision-making and organisational adaptability.

As evidenced by the results of the second hypothesis, management control systems play an instrumental role in facilitating organisational adaptation during periods of crisis. This is consistent with the findings of Teece & al. (2016) who posit that a firm's capacity to adapt swiftly to turbulence hinges on its organisational flexibility and the efficient utilisation of resources. Additionally, the findings are corroborated by those of Geurts & al. (2022), which demonstrated that flexible management control systems enabled companies to respond more effectively to the pandemic by optimising their strategies and resources. These results support the concept that integrated management control systems empower companies to transition from a reactive to a proactive approach, as noted by Leoni & al. (2021)

Regarding Hypothesis 3, the adoption of technologies such as artificial intelligence (AI) and ERP shows a positive impact on companies' strategic vision. These results are in line with the work of Appelbaum & al. (2017), who highlighted the importance of AI in improving decision-making processes and the ability of companies to anticipate organisational needs.

Conclusion

The findings of this study demonstrate that management control, traditionally regarded as a supportive function, has undergone a transformation into a pivotal driving force in periods of crisis. Indeed, management control systems have assumed a central position in strategic responsiveness, performance improvement and the adoption of new tools and technologies, thereby endowing companies with the ability to adapt rapidly and reposition themselves proactively. The deployment of management control tools such as artificial intelligence, strategic reporting and dashboards has made significant contributions, enabling companies to be steered effectively through the numerous uncertainties that can arise in the wake of a crisis.

Simultaneously, management control has also become a strategic lever, evolving from a basic operational support function to an indispensable component of resilience and growth. This transformation has enabled companies to not only confront the immediate challenges posed by the crisis but also to anticipate and construct a long-term strategic vision. This evolution of management control into a key strategic steering function underlines its growing importance not only in times of crisis, but also in preparing companies to navigate an increasingly complex and uncertain future.

However, while this study underscores the significance of management control in crisis situations, it is not without certain constraints that must be considered when interpreting the findings:

Limitations of the sample

The sample selected consists of 97 Moroccan companies, which restricts the generalisation of the results. Moreover, the cultural and economic specificities of our country (Morocco) may limit the applicability of the results in other contexts. As noted by Hair & al (2019), a larger and more diversified sample is crucial to increase the external validity of empirical studies.

- Crisis variability

This study focused on a specific economic and health crisis, namely Covid-19, which limits the scope of the conclusions to other types of crises.

Pearson and Mitroff (1993) have shown that each type of crisis requires different and specific responses.

- Potential bias in respondents' perceptions

The respondents were primarily senior executives and management controllers, which could potentially bias their perception of the effectiveness of management control tools. These individuals are directly involved in the implementation of these tools and may therefore have an optimistic view of their effectiveness, as previously noted by Jordan and Messner (2012).

A preliminary approach might be to utilise a combination of qualitative and quantitative methodologies, such as qualitative interviews, with a view to establishing data triangulation, thus reducing method-related biases and enhancing the overall rigour of the findings (Nagels, 2022). Furthermore, this approach would facilitate a more comprehensive understanding of internal processes (Eisenhardt & Graebner, 2007).

Secondly, a study of different types of crises could be conducted by, for example, carrying out three case studies of three different types of crises. This would enable the differences in the effectiveness of management control tools to be understood and their adaptability to different crisis situations to be determined.

Finally, it would also be judicious to direct attention to the post-crisis phases, with a view to gaining insight into the durability of the tools adopted. This may be achieved by assessing whether they remain as effective once conditions have stabilised (Amankwah-Amoah, 2020).

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