

The digitalization movements are causing profound changes affecting organizational structures and managerial practices in companies, particularly following the collapse of the performance control paradigm and the emergence of its piloting through various tools, with dashboards being the most commonly used. The aim of this study is to identify the determinants of the performant use of dashboards by managers throughout the performance piloting process, in order to overcome the challenges imposed by the digitalization of their economic and social environment. The results reveal that some companies succeed in their digital transition and in maximizing the value of digital dashboards, while others face delays hindering this goal. This leads to the identification of three key determinants for the performant use of dashboards. These are, the necessity of adopting information technologies that integrate all processes which is highly correlated ($r > 0.62$) with the degree of total integration and complete automation of dashboards, the obligation to develop a favorable behavior towards the use of information technologies which presents a high correlation ($r = 0.764146$) with managers' excessive use of digitized dashboards, and the importance of adopting flexible structures to reduce decision-making constraints for managers with an important correlation ($r = 0.673879$) with the large use of digitized dashboards. A distinctive feature of these results is that they show a comparison between highly digitized companies and those in the initial phase of digitization. This would enable the latter to manage their digital transition well, by making it easier for their managers to pilot their activities, with a view to obtaining organizational and competitive advantages, provided that throughout the digitalization process they adopt restructuring policies based on the modernization of their structures and the integration of informatics culture into their strategies, in order to develop the piloting competencies of their managers and to deal with unfavorable attitudes towards the use of digital technologies

Keywords: dashboards, digitalization, performance management, user behavior, information technologies

IDENTIFYING THE DETERMINANTS OF THE PERFORMANT USE OF DASHBOARDS IN MOROCCAN COMPANIES FACING THE DIGITIZATION CHALLENGES

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1. Introduction

The digitalization movements that are reshaping the economic and social environments of companies have made current markets unstable and in constant evolution, especially with the opening of economies and the rapid development of information technology (IT) markets. This has compelled companies to undergo functional and organizational changes, where the use of digitalization technologies has become the backbone of developing competences and organizational performance [1]. Such a situation has been accompanied by the ascent of the performance piloting paradigm, following the broadening of performance dimensions to include not only financial aspects but also environmental and societal dimensions [1].

The performance piloting paradigm is conceptualized as an action-based model driven by collective learning, which ensures the performance of this action [1]. This paradigm, now recognized as the pathway to achieving sustainable organizational and competitive advantages that are hard to replicate [1], relies on various tools, with dashboards remaining the most popular in management sciences [2]. These dashboards, which have undergone significant evolution with the widespread use of IT, to the point where it has become difficult to separate the two concepts, have become the

instrument most used by managers throughout the process of piloting the performance of their companies.

With the increasing digitalization of companies, identifying the determinants of the performance use of dashboards has become a central preoccupation for professionals and academics in organizational management. The study of the impact of digitalization on the use of dashboards reveals their crucial importance in the conduct of today's companies in an environment characterized by increased instability and turbulence. Dashboards are no longer simple information and communication tools, but are becoming instruments for the surveillance of organizational performance and sources of organizational and competitive advantage, provided they are used performance.

Therefore, studies that are devoted to researching the determinants of the effective use of digital technologies that enable the performance use of dashboards to improve the performance piloting of companies are scientific relevance.

2. Literature review and problem statement

The paper [3] have defined dashboards as performance piloting tools which include a set of indicators to ensure that

information is legible, interpretable, periodic and regular, and adapted to organizational needs. This definition distinguishes between the view of software publishers, who see dashboards as graphical user interfaces designed to present business performance indicators to facilitate managerial decision-making, and that of researchers, who see them as interactive performance piloting tools that enable users to identify, explore and communicate problem areas requiring corrective action. Among the aspects not covered by this definition are the qualitative dimensions of performance, in particular the environmental and societal dimensions, which make it reductive and include a quantitative conception focused on indicators. Similarly, the publishers' definition reveals a domination of IT to the detriment of human analysis and interpretation. One way of extending this definition is to identify measures dedicated to evaluating the performance of these dimensions. This approach was proposed by [4], who defined, in their famous Balanced Scorecard (BSC), non-financial indicators – such as learning and growth, processes and customer satisfaction – alongside traditional accounting measures and which offers, according to [5], an overall view of organizational performance. According to [6], BSC includes measures that align with the organization's key success factors, and are characterized by:

- clarity and translation: ensuring the vision and strategy are clearly defined and articulated;
- communication and alignment: aligning objectives and strategic measures effectively;
- planning and target setting: establishing goals and aligning initiatives with strategy;
- strategic learning: continuously improving outcomes through feedback and learning.

Despite the popularity of BSC throughout the management control literature, it presents several problems. The problem of information surcharges due to the sheer number of indicators it covers, which can complicate its implementation, and the coexistence of different perspectives (financial, customer, process and learning), which can lead to contradictory objectives. One way of overcoming these problems is to integrate the BSC into all the organizational processes in order to have a global view enabling optimized performance piloting. This approach was proposed by [6], which shows that the effectiveness of BSC depends on their ability to integrate harmoniously into the organization's environment. Nevertheless, several factors hinder the achievement of this objective, in particular the cost and complexity of this integration for some companies, especially small and medium-sized companies. An option for overcoming the difficulties of harmonization has emerged with the widespread use of IT that has contributed to the automation of dashboards and facilitated the integration of organizational processes into IT systems, making these dashboards the most famous performance piloting tools. According to [7], an automated dashboard is a graphical interface that consolidates key performance indicators (KPIs) to help managers make decisions. According to [8], it integrates a range of concepts and applications, such as strategy maps, performance maps and Business Intelligence (BI), into a coherent and manageable system.

The paper [8] shows that the use of digital dashboards has developed considerably. This is generating increased interest throughout the decision-making process. According to [8], dashboards are one of the most effective BI tools that help managers improve cash-flow by optimizing accounts receivable management. The objective of integrating dashboards

into IT is faced with the challenge of the complexity and diversity of business processes, which makes this integration difficult. One approach to dealing with this problem has emerged with the innovation of ERP (Enterprise Resource Planning) systems, which are designed to integrate all business processes and therefore automate dashboards. Nevertheless, the effectiveness of dashboards lies not only in their integration with IT, but depends on their effective use, which requires an attitude of acceptance towards the use of IT. One option for identifying the determinants of effective use is the complementarity of dashboards with other organizational resources, in addition to digital technology resources, particularly human resources.

Within the same framework, various theories put forward variables identifying this complementarity between digitized dashboards and their effective uses, principally resource-based theory, behavioral theories and contingency theory. The paper [9] reports that organizations must possess resources that enable them to obtain competitive advantages, such as tangible and intangible assets, hardware, software, data, human resources and managerial competences. The paper [10] considers that the effective use of IT, and consequently of digital dashboards, depends on the quality of the system adopted, the quality of the information obtained and the quality of the service provided. Despite its wide use in management science, the mobilization of the theory of resources in information systems faces challenges relating to the rapid evolution of characterizing IT innovation, which provokes enormous imitation movements and rapid technological diffusion, reducing the capacity of organizations to achieve a sustainable competitive advantage based on these digital technologies, not to mention the inability of small and medium-sized enterprises to access technological resources. One way of addressing this problem is to consider IT usage behavior as a determinant of the success of technology resources. This approach is in line with the work of [11] who have identified, within the framework of behavioral theories, behavioral intention, attitude and perceived usefulness as determinants of acceptance behavior towards the use of IT and consequently digitized dashboards. However, the contribution of these theories to explaining IT use behavior runs the risk of failing to take contextual factors into account, and of being unable to keep up with the continuous evolution and dynamics that characterize IT. One option for overcoming this problem of acceptance is to build an IT culture into corporate strategies by adopting modern and effective training systems such as learning from experience and training courses.

The work [12] shows that despite the existence of a complementarity between the technological and behavioral characteristics of the use of digitized dashboards, contextual factors must be taken into account for this complementarity to be successful. However, these factors influence the use of digital technologies, in particular size, structure and environment, which are put forward by contingency theory to provide a framework for understanding how internal and external contextual factors influence the use of IT. Despite the success of this theory, its implementation is often confronted by the problem of the rapid evolution characterizing IT, which provokes changes in the internal and external environment of organizations, not forgetting the risk of their dependence on the external environment marginalizing their ability to promote internal IT innovation. One option for overcoming this problem and achieving successful complementarity is to integrate these factors into the deployment of IT strategies

throughout the digital technology implementation process. A contingency approach has been developed and shows [12] that there is a relationship between organizational structures and IT service structures and structure and that the size of organizations often leads to decentralized structures facilitating the automation of dashboards.

To resume, the unresolved problems identified in the above works require modelling of the relationship between the adoption of digital technologies and the use of dashboards for performance management. In a context where digitalization continues to pose a challenge to business competitiveness, should be explore the variables that explain the performance of the technologies implemented and the favorable behavior of users, as well as the determinants of a modern and efficient structure.

3. The aim and objectives of the study

The aim of the study is to improve performance piloting through the effective use of dashboards in a context where digital transformation continues to be a challenge for companies, particularly SMEs, which have dominated the country's economy. This will make it possible to make effective use of dashboards throughout the process of piloting their activities in order to give their companies sustainable organizational and competitive advantages.

To achieve this aim, aim, the following objectives need to be resolved:

- to adapt ERP systems that integrate all the company's processes and automate dashboards;
- to adapt a learning approach that encourages acceptance of the use of IT for the performance use of dashboards by managers;
- to adapt the evolution of contextual factors for performance use of digital dashboards.

4. Materials and methods

The object of the study is the relationship between the use of dashboards by managers and digitalization. It is necessary to determine the factors that enable effective use of digitized dashboards throughout the performance piloting process. The main premise of this research is that the level of digitalization influences managers' use of dashboards for decision-making and, consequently, the management of their activities. The problem, then, is to identify the determinants of this effective use, whether in terms of the characteristics of the technologies adopted, or in terms of the competences of the users of these technologies. This qualitative study uses a multiple-case study methodology [13], which follows the following stages:

- development of a semi-structured interview guide: an interview guide is developed on the basis of the results of the literature review and includes closed questions, designed to identify the different characteristics of the companies and individuals selected, and open questions, designed to help explore the variables that explain the use of digital dashboards. These questions relate to the characteristics of the companies selected, the profile of the managers, the digital technologies and their characteristics, the extent to which managers use dashboards, the effectiveness of piloting decisions, and the degree of autonomy of managers in decision-making'

- sample composition: a sample of 8 companies was selected on the basis of the criteria of ease of access and availability of information [13]. This sample includes companies presented in Fig. 1 according to their sector of activity, and in Fig. 2 according to their size, ranging from SMEs to large companies. In these companies 20 managers were selected for the interviews, presented in Fig. 3 according to their status in the company and in Fig. 4 according to their level of training;

- data collection: data was collected by means of semi-structured interviews, most of which were conducted face-to-face, with telephone calls where necessary, particularly where additional information was required. The interviews lasted between 2 and 2.5 hours;

- data processing and analysis: at this stage, all the data was carefully transcribed before being processed using NVIVO version 14 software. The texts thus transcribed were coded on the basis of thematic content analysis, which consists of segmenting the transcribed texts into units of meaning, which may be words or sentences. These units, which reflect the themes, are initially assigned to sub-categories and then grouped into categories;

- data presentation: the information produced can take the form of clusters of nodes, which are associated with the Pearson correlation coefficient 'r', to study the nature of the link between the variables studied, or graphs.

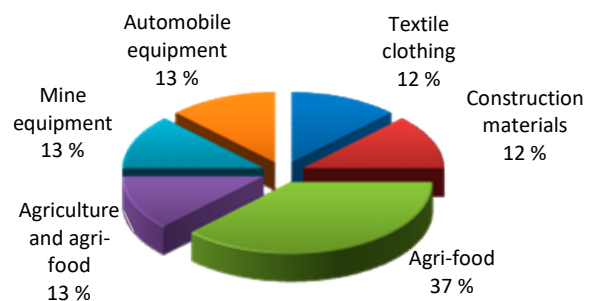


Fig. 1. Distribution of cases by sectors of activity



Fig. 2. Distribution of cases according to their legal forms



Fig. 3. Distribution according to the status of the company

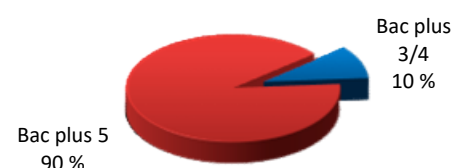


Fig. 4. Distribution according to the level of training

5. Results of use of dashboards for performance piloting following the rise of digitalization

5.1. Determining the degree of integration of business processes in ERP systems for dashboard automation

The aim of implementing IT in companies is to integrate all business and strategic processes so that information is available in real time, thereby improving decision-making efficiency [14]. This objective often encounters technical difficulties, that prevent full integration from being achieved, thereby weakening decision-making effectiveness, and which depends mainly on the type of system adopted and the degree of integration of all the company's processes.

Concerning the type of system, our field survey enabled to identify three types presented in Fig. 5 and which are implemented in the companies surveyed:

- standard IT solutions: solutions developed by a vendor and sold to a large number of customers [15]. This type characterizes small companies and some SMEs, such as the company in our sample Planchers Bab Mansour-Sarl, specializing in the manufacture of building materials;

- specific IT solutions: solutions developed to order for a given customer [15], as in the case of SALIDOR-Sarl, the company in the sample, which specializes in the manufacture of bedding and foam;

- enterprise resource planning (ERP): according to the Grand Dictionnaire Terminologique, an ERP package is “software that makes it possible to manage all of the company's processes by integrating all of the company's functions”[16]. ERP systems have become popular both internationally and nationally. On an international scale, there are huge companies adopting ERP systems, including the multinational company Danone (which is also included in our sample under the local designation: Centrale Danone Meknès, SA), specializing in the production and distribution of dairy products. Before the adoption of ERP, Danone suffered from several difficulties in data management. In addition, each Groupe Danone entity in each country managed its own processes separately from the others, which influenced decision-making at the central level. This problem has been solved with the adoption of the SAP brand of ERP, allowing the management of all internal processes to be monitored efficiently and in real time. In addition to Danone Meknès-SA, other companies in our sample that have adopted ERP include EPIROC-SA, which specializes in the supply of mining and public works machinery, LafargeHolcim-SA, which specializes in the manufacture of cement, plaster and lime, and Domaines Zniber-SA, which specializes in the production of agricultural products.

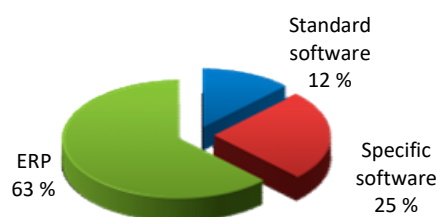


Fig. 5. Distribution of information technology solutions adopted

These results show the efforts made by Moroccan companies to update their IT structures by adopting ERP-type solu-

tions (63 % of companies surveyed). This situation explains the desire of these companies to integrate all their processes. This is supported by the high correlation (0.623612) between the automation of dashboards and the implementation of ERP-type solutions presented in Fig. 6.

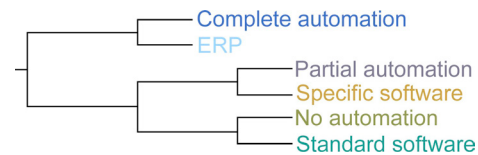


Fig. 6. Correlation between information technology solution types and dashboard automation

These results also show a high correlation (0.821021) between standard solutions and the absence of dashboard automation (case of the company Planchers Bab Mansour-Sarl), while specific solutions show a medium correlation (0.468801). This is due to the lack of linkage between standard software modules and the partial integration of company processes in the case of specific solutions.

Regarding the degree of integration, which is defined according to [17] as the number of functions integrated into a single application or management software package, three situations were observed during the course of the survey: no integration, partial integration, and total integration. The correlation between this variable and dashboard automation is presented in Fig. 7.

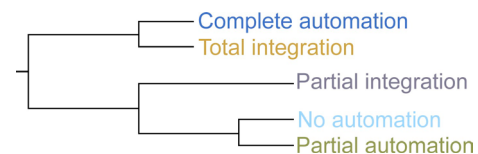


Fig. 7. Automation of dashboards and degree of integration

In the cluster of nodes in Fig. 7, let's observe a high correlation (0.823177) between total integration and complete dashboard automation (cases of companies Centrale Danone, EPIROC and LafargeHolcim), compared with a low correlation (0.216034) in the case of partial integration. This explains the importance of the degree of integration as an explanatory variable for dashboard automation. This observation is further reinforced by analyzing the correlation between the type of IT solution and the degree of integration, which is presented in Fig. 8.

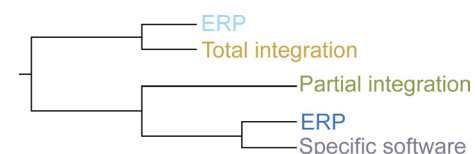


Fig. 8. Degree of integration and types of information technology solutions

A high correlation (0.62462) was found between ERP solutions and total integration, and a medium correlation (0.498074) between medium integration and both ERP and specific solutions. The correlation found between ERP solutions and partial integration is due to the fact that some companies (case of the company Domaines Zniber) adopt integrated ERP solutions without achieving full integration.

5. 2. Analysis of the impact of user behavior on managers' use of digital dashboards

Regardless of the type of IT solution adopted or the degree of integration achieved by companies, behavior towards the use of IT solutions remains an explanatory variable for the use of digitized dashboards. In this context, an examination of behavior reveals that all of the people interviewed accept the use of digital dashboards and have managerial roles. Managers stated that there were three types of behavior observed in their staff that influenced their use of digitized dashboards, due to their staff's role in producing dashboard indicators. These behaviors are resistance followed by acceptance, acceptance, and lack of rigor in use.

For the study of employee behavior, according to the statements of the people interviewed, the existence of 70 individuals, whose behavioral situation is presented in Fig. 9.



Fig. 9. Employee behavior

Based on the statements of the managers interviewed, let's present in Fig. 10 the relationship between the three types of behavior of their employees and their use of dashboards for decision-making and, consequently, for piloting their activities.

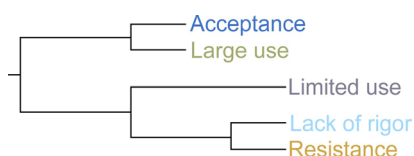


Fig. 10. Employee behavior and use of dashboards

The high correlation (0.764146) between acceptance and extensive use of dashboards, presented in Fig. 10, shows that such behavior is a source of confidence and quality of information produced by the system, unlike the other two behaviors, which are moderately correlated with limited use and remain the cause of many anomalies reported by the managers interviewed, including the non-availability of information in real time and handling errors. This situation reduces their use of dashboards to piloting their activities, particularly for decision-making.

5. 3. Examining the impact of contextual factors on the use of digitized dashboards

Contingency factors are often considered independent or mediating variables in the use of IT, and consequently in the use of digitized dashboards [18]. During the course of the field survey, it is possible to note the absence of a relationship between the use of digitized dashboards and the contingency variable "environment", unlike "structure" and "size", which revealed the existence of correlations.

Relating to the nature of the structure, two types characterize the companies selected and are associated with two categories of management methods implemented. The first type, the centralized structure, is characterized by the existence of multiple hierarchical restrictions on the devel-

opment of managers' competence (case of the companies SALIDOR and Planchers Bab Mansour-Sarl). This type is often associated with a family management style where decisions are centralized at senior management level, and any use of dashboards is limited to routine, day-to-day operations.

The Fig. 11 shows a low correlation (0.285768) between the use of digitized dashboards and the type of centralized structure, compared with a high relationship (0.673879) with the type of decentralized structure.

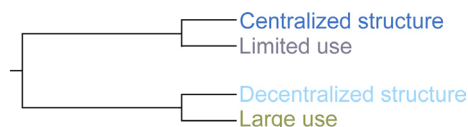


Fig. 11. Type of structure and the use of digitized dashboards

From these results, it is possible to see that centralized structures include hierarchical barriers to the development of managerial competence. This situation renders dashboards mere internal communication tools and reduces their contribution to organizational performance piloting.

Concerning the study of the impact of size on the use of digital dashboards, it is possible to classify the companies in our sample in the Fig. 12 into three categories based on the size of employees as a criterion for measuring their size. These categories are small companies, medium-sized companies, and large companies.

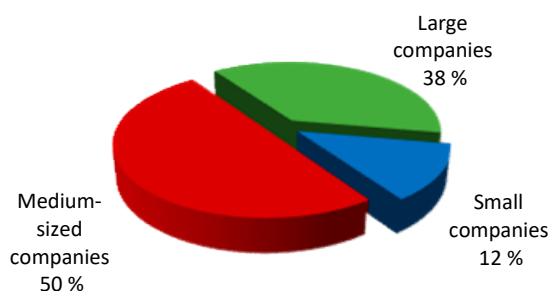


Fig. 12. Distribution of cases according to their sizes

This presentation shows the domination of medium-sized companies, which make up 50 % of the sample studied, compared with a low presence of small companies. This situation corresponds to the structure of Moroccan companies, which is dominated by SMEs, in addition to the lag in digitalization that has characterized small companies. The correlation between the two variables is presented in Fig. 13.

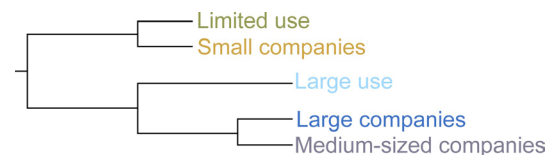


Fig. 13. Company size and use of digital dashboards

These results confirm our finding concerning the correlation between the two variables, which remains high (0.631956) between medium-sized companies and the use of digitized dashboards, compared with a low correlation (0.181219) in the case of small companies, and a medium correlation (0.561782) with large companies.

6. Discussions of the results based on the study of the impact of digitalization on the use of dashboards for performance piloting

One of the main results of our research is the role played by ERP systems, as a digital technology, in piloting company performance (Fig. 5). Through the integration of all the processes they offer, these systems enable the collection, circulation and availability of information in real time [19]. This will help managers to steer their activities on the basis of relevant indicators (KPIs) derived from well-constructed dashboards. To be effective, ERP systems need to be implemented under certain conditions, and all those involved in the performance piloting process need to be competent in their use. The pre-requisites for the success of ERP systems include:

- matching systems to business needs: this requires the involvement of the managers of each activity in the implementation process;
- monitoring changes in business needs throughout the implementation process;
- choosing editors capable of meeting and following the company's needs.

The success factor in the adoption of ERP systems is the degree of integration (Fig. 7), which reflects the level of digitalization achieved by the company. A total degree of integration means a high level of digitalization and performance in the use of dashboards to pilot and achieve sustainable organizational and competitive advantages [10]. In contrast, a degree of partial integration (Fig. 7), where part of the process is not included in the system, limits the contribution of dashboards to performance piloting due to the lack of total automation and availability of indicators in real time.

Competent use of ERP systems depends on both user training and the learning system set up by the company. Well-maintained managers have superior training (Fig. 4), enabling them to quickly familiarize themselves with the systems implemented and also to develop a high level of IT expertise. As for the other users, in particular the employees, well-organized training enables them to handle the ERP systems well without any unfavorable behavior towards the use of IT.

Another important finding in the results is the question of user behavior, which takes the form of acceptance, resistance and lack of rigor (Fig. 9). Acceptance, which is often characterized by well-trained IT users, is an important determinant of the use of dashboards throughout the performance piloting process. They contribute to the availability of information and to the confident use of this information by managers. The results show that this variable is strongly correlated (0.764146) with managers' use of dashboards to manage their activities. The introduction of this behavior requires the introduction of an IT culture in company strategies and the adoption of a high-performance ERP system.

Resistance and lack of rigor (Fig. 9, 10) depend on a number of variables, including the age of users, IT competence and experience [20], and failure to align IT strategies with the company's business needs. This explains the weak correlation between these two behaviors and managers' use of digitized dashboards throughout the performance piloting process.

The adoption of a digitized system enabling the effective use of dashboards for performance piloting involves multiple and complementary changes affecting the IT structure, IT

competence as well as the behavior of users and the organizational structure, as follows:

- the IT structure must be modern and capable of supporting information flows and covering all business and strategic processes. The aim is to reduce malfunctions caused by poor IT implementation, as well as resistance due to the complexity of IT solution interfaces;
- with regard to the competence and behavior of users, companies need to modernize internal training systems, encourage learning based on return on experience (REX) and integrate an IT culture into corporate strategies, in order to develop the IT competence of their users and deal with resistance and lack of rigor.

As far as organizational structure is concerned, Moroccan companies need flexible structures to enable their managers to derive maximum value from piloting tools, in particular dashboards, by reducing hierarchical constraints and allowing managers a degree of autonomy in decision-making.

This study has a certain limitation, mainly related to the selection of the sample and the conduct of the semi-structured interviews. The constitution of the sample encountered difficulties in terms of access to certain companies and the lack of availability of certain managers who put forward excuses on several occasions. Similarly, during the interviews, biases were noted with regard to the behavior of managers, who tended to restrict the question of behavior towards the use of IT to that of their subordinates, which constituted a remarkable shortcoming. For this reason, when developing this study, it is important to study the behavior of employees towards the use of IT by interviewing them to explore the variables explaining their acceptance and resistance behavior. It is also necessary to further examine the relationship between contextual factors and the use of digitized dashboards, particularly structure and size, in order to model their use even in small and medium-sized enterprises adopting non-ERP solutions.

7. Conclusions

1. The automation of dashboards is conditional on the adoption of ERP systems that integrate all the company's processes. This automation facilitates decision-making and increases efficiency throughout the performance piloting process. The results obtained show that although 63% of companies adopt ERP systems, only a minority manage to achieve the degree of total integration of their processes. As a result, it is possible to see that the successful implementation of ERP systems makes a significant contribution to achieving full integration and dashboard automation.

2. Acceptance behavior towards the use of digital technologies is a crucial determinant of the performance of dashboard use. The results confirm this importance through the high correlation (0.764146) between managers' use of dashboards and unresisting acceptance of IT use. To achieve this objective, companies are obliged to incorporate an IT culture into their strategies, by means of in-organization training and by promoting learning through return on experience, as part of their overall strategies.

3. The rigidity of company structures hinders the development of managers' competencies in piloting their activities. The results, which show that 50 % of companies are of average size, show a high correlation (0.673879) between

decentralized structures and managers' use of dashboards to pilot performance. To achieve this, Moroccan companies, particularly medium-sized and small companies, need to modernize their structures by allowing their managers a degree of autonomy, so that they can approve their piloting competences.

Conflict of interest

The author declare that he has no conflicts of interest in relation to the current study, including financial, personal, authorship, or any other, that could affect the study, as well as the results reported in this paper.

Financing

The study was conducted without financial support.

Data availability

The data will be provided upon reasonable request.

Use of artificial intelligence

The author confirms that he did not use artificial intelligence technologies when creating the current work.

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