The Impact of Dashboard Characteristics on the Utilization and Usefulness of Dashboards in Moroccan Companies

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Abstract
The objective of this research is to determine the impact of dashboard characteristics on the use and usefulness of dashboards of Moroccan companies. In this paper, we will first present the theoretical foundations of our research. Then, following a hypothetico-deductive approach and a positivist positioning, an explanatory model of our two variables was proposed; "Characteristics of dashboards" and "Uses and usefulness of dashboards". In this perspective, we adopted a quantitative methodology based on a questionnaire administered online to management controllers of Moroccan companies. And finally, we tested our model with 117 Moroccan companies. The collected data is analyzed by structural equation methods (PLS) on SMARTPLS. The results of this research work made it possible to validate the hypotheses which stipulate that there is an impact of the characteristics of the dashboards on the use and usefulness of the dashboards of Moroccan companies. This work enriches previous work on dashboards.

Keywords: Dashboard characteristics; Uses and usefulness of dashboards; Moroccan companies; Management control.

Introduction
Over the past two decades, performance management has become a significant topic in both literature and practice. Several authors have suggested that companies develop new performance evaluation models that combine financial and non-financial measures. Performance defined in financial terms is no longer sufficient (Kaplan and Norton, 1996).

In an era of increasing environmental uncertainty and complexity, business success no longer translates strictly into increased profits or ROI. Performance is no longer limited to a strictly financial vision, it is gradually replaced by a more global vision.

The work of Kaplan and Norton (1992) proposed a performance management model that takes into account financial dimensions and dimensions related to the company's growth opportunities, such as customers, internal processes, learning and innovation. A number of authors (Chiapello and Delmond , 1994; Lebas, 1995) assert that dashboards have intrinsic characteristics to play a major role in business performance management.

In this article, we will answer the following question: **"Do the characteristics of dashboards impact the use and usefulness of dashboards of Moroccan companies? ".** To do this, we will start with a literature review explaining the key concepts of this research. Next, we will present the research methodology and the testing of our hypothesis.

1. Dashboard: conceptualization and literature review
This first section aims to define the balanced scorecard and present organizational performance and its different approaches.

1.1.   balanced scorecard

At the beginning of the 1990s, the expression "balanced scorecard" appeared from the pens of the two authors; R. Kaplan and D. Norton . They discussed the validity and relevance part of management control since it was only focused on financial performance (Kaplan and Norton, 1992, 1996). Empirical studies between 1984 and 1992 were carried out in this direction by Kaplan and Norton, they developed a tool which integrated both financial and non-financial dimensions.

The prospective dashboard must ensure consistency between four main axes: the **"finance" axis** measuring the level of financial performance of the company, the **"customer" axis** , measuring the present or future satisfaction of the customer, the **"internal process" axis** measures the capacity of the company to provide a competitive advantage and finally the **"organizational learning" axis** measuring the management of human resources and knowledge with a view to achieving strategic objectives.

Kaplan and Norton present the balanced scorecard as a tool that formulates the strategy, communicates it, sets objectives and aligns the initiatives of the actors to achieve a common objective and control the strategy. According to Kaplan and Norton (2003), four questions allow us to understand the overall performance of an organization:

   • **What should we bring to shareholders?**

The financial dimension of performance is the answer to this first question. The goal is to highlight the interactions between financial results and the achievement of the strategy.

   • **What should we bring to customers?**

The answer to this second question corresponds to customer satisfaction often considered as an important variable of strategic success.

   • **What processes are essential to shareholder and customer satisfaction?**

The answer to this question corresponds to the internal issues of performance; shareholder profitability on the one hand and customer loyalty and satisfaction on the other.

   • **How to manage change and improvement?**

The answer is generally associated with the human resources dimension. The company seeks to analyze its long-term organizational learning capabilities by observing 3 elements: People, systems and procedures.

The contribution of the balanced scorecard is to show that there is an interdependence between all the indicators and that it is appropriate to balance short-term financial performance with the vectors of long-term growth opportunities for their financial performance future (R. Kaplan and D. Norton, 1998, 1999).

1.2.   The diversity of Balanced indicators scorecard

Generally, in a context characterized by increasingly rapid technological development and the increasing role given to knowledge and other intangible assets, future financial performance is increasingly often measured by non-financial indicators that by financial indicators (Cauvin and Neunreuther , 2009; Cauvin and Bescos , 2004).

The use of non-financial indicators should therefore be complementary to dashboard's financial indicators. Some research has observed that the relationships between non-financial performance indicators and financial performance inevitably pass through customer-related indicators (Ittner et al., 2003, 1998; Banker et al., 2000). These performance measures are linked by a cause and effect relationship (Lorino P., 2003; Clarke, 2008, Bughin , 2006; Deloitte Touche Tohmatsu International 1994; Kaplan and Norton 1996; Cauvin and Bescos , 2005).

One of the advantages of dashboards lies in the fact that the indicators they provide to the decision maker can be of varied nature: financial or non-financial indicators. As a result, the dashboards and particularly the Balanced scorecard , take into account the importance of intangible assets in the economic valuation process (Kaplan and Norton, 1996), and the breakdown of strategic objectives into operational objectives (Nanni et al., 1992).

A well-organized performance measurement system may be the most powerful mechanism available to management to improve the likelihood of successful strategy implementation (Lynch and Cross, 1991, p. 37; Fitzgerald et al. , 1991, p. 3). When financial and non-financial measures are incorporated into the same performance model, managers can seek performance in multiple areas simultaneously to enable effective

and strategic decision-making (Malina and Selto , 2001; Ittneretal , 2003; Nanni, Dixon and Vollman , 1992, p. 9).

This characteristic of covering several dimensions of performance is implicit in the case of the dashboard. However, it is very visible in that of Balanced Scorecard since it organizes the tool by directing it a priori towards the four dimensions of analysis.

In addition, a balance is established between external indicators, intended for shareholders and customers, and internal indicators which focus on internal processes, innovation and skills development. Thus, the Balanced Scorecard ensures a balance between objective and quantified indicators, which reflect "past performance" results, and more subjective indicators, the determinants of "future performance" (Lorino , 2003).

2. Hypothesis and measurements of variables

The objective of this section is to present our conceptual research model, a model explaining the impact of dashboard characteristics on the use and usefulness of dashboards of Moroccan companies. To do this, we will pose the hypothesis of this research based on previous studies and we will present our conceptual model. Next, we will present our measurement scales.

2.1. Definition of the hypothesis

Kaplan and Norton's balanced dashboards are invaluable because they allow you to formalize the company's vision of the future by taking into account the customer vision, the accounting and financial vision and the organizational and strategic vision. . Their use is very diverse and they play an important role in performance management.

It becomes important to study the relationship between the nature, characteristics, content of dashboards and their uses and usefulness in business performance management.

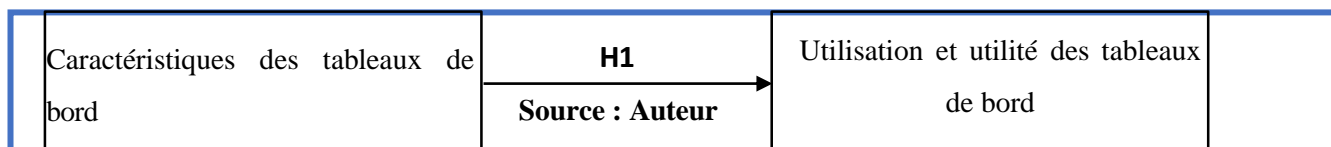**H1: The more sophisticated the dashboard, the more useful it becomes and its use diversified.**

Caractéristiques des tableaux de bord	**H1** **Source : Auteur** →	Utilisation et utilité des tableaux de bord	

Figure 1: Conceptual model of the relationship between dashboard characteristics and dashboard use and usefulness

2.2. Measurement of variables
2.2.1. Measurements of dashboard characteristics

Four variables allow the determination of dashboard sophistication indices: the degree of responsiveness, the

diversity of the field of application, the diversity of performance indicators and the degree of decentralization of dashboards.

The degree of reactivity: This concept is linked to the methods of developing the tool as well as to the typology of the indicators that compose them. In this research, we will measure the degree of responsiveness of dashboards using the following dimensions:

• The frequency of production of dashboards

• THE help production of paintings of edge

• THE degree integration of the indicators of follow up In THE paintings of edge

• THE degree integration of the indicators forecast In THE paintings on board.

The diversity of the field of application: The dashboard is characterized by the diversity of data that he provides At decision maker ; financial, quantitative, qualitative, external, etc. He allows us to take into account the role of intangible assets in the economic valuation process (Kaplan And Norton,

1996), of translate THE strategic targets in indicators operational, and finally to extend the scope of control to performance elements which emerge from both the internal and external environment of the company (Govindarajan , 1988). In this work, scope diversity is measured through the following dimensions:

- THE degree integration of data financial In THE tables of edge
- THE degree integration of data quantitative No financial In THE paintings on board
- THE degree integration of data qualitative In THE tables of edge
- THE degree integration external data In THE paintings of edge

The diversity of performance indicators: Measuring the diversity of performance indicators consists to be determined there nature of the data Who are provided by THE Dashboards. In a way, this involves identifying the type of performance indicators of the controlled objects. The diversity of performance indicators is evaluated in this study by:

- The degree of integration into dashboards of indicators relating to financial performance;
- The degree of integration of customer performance indicators into dashboards;
- The degree of integration into the dashboards of performance indicators of management variables linked to strategic objectives;
- The degree of integration into dashboards of indicators relating to the management of intangible elements.

The degree of decentralization of dashboards: The recognition of dashboards as tool of change of control of management East in part linked At do that THE piloting instruments can be, thanks to their specific characteristics, the preferred instrumental supports of the fashions of management decentralized Who assert themselves Today In THE companies as a structural necessity to which management control must adapt (Bouquin, 1994). He has summer request has there person questioned to indicate which are THE) recipient(s) dashboards in the company.

2.2.2. Utility metrics and the use of dashboards

The measurements of this variable were presented, in this work, in three blocks: the degree of use of dashboards, the diversity of use and the degree of usefulness.

The degree of use of dashboards: The degree of use of dashboards is measured through the following dimensions:
- Frequency of use of dashboards
- The intensity of use of dashboard data

The diversity of use of dashboards: This involves identifying the roles that managers assign to dashboards through the way in which they use them:
- Inform you of the company's results over a given period (level of sales, activity, financial results, etc.);
- Forecast and anticipate situations in the weeks and months to come (forecast of turnover, cash flow, etc.);
- Track and monitor business performance (costs, quality, etc.) that have a direct link to strategic objectives, and take timely corrective measures, if necessary.

The degree of usefulness of dashboards: Measuring the degree of usefulness of dashboards consists of determining to what extent the management instrument meets the needs of the business manager. Its measurement is carried out using the following dimensions:
- The degree of reliability of the data produced by the dashboards;
- The degree of intelligibility of the data produced by the dashboards;
- The degree of significance of the data that is produced by the dashboards;
- The degree of profitability of dashboards.

3. Methodology and hypothesis testing

3.1. Collection of data

Using a questionnaire that we administered online to 590 Moroccan companies with 117 usable responses, we were able to conduct a survey on the impact of dashboard characteristics on the organizational performance of Moroccan companies.

Before beginning field research, it is essential to choose the exact population to which the survey is aimed. For this, we have created a database (Directory of Moroccan companies) bringing together Moroccan companies located in the different regions of Morocco. Then, we ensured that the companies have at least one management controller. Two criteria were therefore retained:

  • **Presence of a management control system**
  • **The study covers the 12 regions of Morocco**

Once the two criteria of our study have been determined, we use the sampling method to select a sample from the companies present in our list. This technique is based on two methods: **The empirical method** which allowed us to construct a list of companies which have a management control system and which are distributed in the different Moroccan regions. As for **the probabilistic method** , it allowed us to randomly draw the sample to be studied.

3.2. Sample characteristics :

We will describe our sample according to four aspects, the size, the sector of activity, the age of the company and the training of its manager. (RHERIB.N & al. 2021)

The size of the sample companies:

For our research, we decided to use the number of permanent employees (Germain,2003) and the turnover of companies to measure the size of companies.

Table No. 1: Distribution of companies according to the number of employees

	Number of companies	Percentage	% Cumulative
< 10 employees	2	1.7	1.7
Between 10 And 49 employees	4	3.4	5.1
Between 50and 200 employees	19	16.2	21.4
> 200 employees	92	78.6	100
Total	117	100	

Source: SPSS output

The table above shows that there is a predominance of the last class, 78.6% of companies employ more than 200 employees. (Table 1)

Table No. 2: Distribution of companies according to turnover

	Number of companies	Percentage	% Cumulative
< 3 MDH	4	3.4	3.4
Between 3 And 10 MDH	5	4.3	7.7
Between 10 And 75 MDH	22	18.8	26.5
> 75 MDH	86	73.5	100

Total	117	100

73.5% of companies have a turnover above 75 MDH. Large companies dominate our sample. (Table 2)

Age of companies:

Four types of companies were distinguished: companies less than 2 years old, companies 2 to 5 years old, companies 5 to 10 years old and finally companies more than 10 years old.

Table No. 3: Distribution of companies by age

	Number of companies	Percentage	% Cumulative
< 2 years	4	3.4	3.4
Between 2 And 5 years	10	8.5	12
Between 5 And 10 years	9	7.7	19.7
> 10 years	94	80.3	100
Total	117	100	

Source: SPSS output

This table shows that companies older than 10 years represent 80.3% of all companies in our sample. Companies less than 2 years old represent barely 3% of the sample. (Table 3)

The sector of activity of the companies:

The sector of business activity is represented by the industrial sector, commercial sector, service provision sector and others.

Table 4: Distribution of companies according to sector of activity

	Number of companies	Percentage	% Cumulative
Sector industrial	71	60.7	60.7
Sector commercial	13	11.1	71.8
Sector of services of services	20	17.1	88.9
Others	13	11.1	100
Total	117	100	

Source: SPSS output

Companies with an activity belonging to the industrial sector represent 60.7% of our sample. Then 17.1% of companies are engaged in the provision of services. (Table 4)

Manager training:

Two types of training have been distinguished, the managerial type and the non-managerial type.

Table 5: Distribution of companies according to manager training

	Number of companies	Percentage	% Cumulative
Administrator	100	85.5	85.5
No Administrator	17	14.5	100
Total	117	100	

Source: SPSS output

85.5% of the sample, or 100 companies, have a manager with a managerial background and 17 managers have a non-managerial background. (Table 5)

3.3.   Testing the hypothesis

In this part, we present the results of testing our research hypothesis, using the structural equation method using the PLS approach. This analysis will allow us to verify the reliability and convergent and discriminant validity of the latent variables of our model. We will end with a presentation of the results obtained.

3.3.1. Testing the reliability of measurement scales

A first analysis was carried out on each item by examining the loadings . Then, the general reliability of the constructs was assessed. Traditionally, the reliability of measurement scales is assessed using Cronbach's Alpha. The threshold accepted by researchers to conclude that a scale is reliable or not is 0.60. From this perspective, structural equation methods develop another coefficient which has the advantage of taking into account measurement errors. This is the Composite Reliability index which resembles the Jöreskog rho calculated in the LISREL approach.

Table 6: Reliability of measurement scales

Variables	Items	Loadings	Cronbach 's Alpha	CR
Degree of reactivity	Degree_reactivityTB3	0.903	0.784	0.902
	Degree_reactivityTB4	0.910		
Diversity of scope	Div_applicationTB2	0.678	0.728	0.845
	Div_applicationTB3	0.885		
	Div_applicationTB4	0.837		
Diversity of the performance indicators	Div_ind_perform2	0.793	0.774	0.869
	Div_ind_perform3	0.856		
	Div_ind_perform4	0.839		
Diversity of use dashboard data	Div_usageTB1	0.794	0.752	0.858
	Div_usageTB3	0.812		
	Div_usageTB5	0.846		
Level of usefulness of dashboards	Deg_utilityTB1	0.691	0.744	0.839
	Deg_utilityTB2	0.808		
	Deg_utilityTB3	0.763		
	Deg_utilityTB4	0.742		

Source: Author

The properties of the measurement model are detailed in the table above. All factor loadings are greater than 0.70 except for two items but have a loading very close to 0.7. The Composite Reliability index is well above the threshold of 0.70. In short, the factorial contributions of the measurement indicators show satisfactory values of the " loadings ".

3.3.2. Testing the validity of measurement scales

The reliability of the measurement scales is used alongside the AVE (*Average Variance Extracted*) to assess the convergent validity of the constructs. The AVE is the squared average of the factor contributions of a block of indicators taken separately. It measures the value of variance captured by the construct and its indicators in relation to measurement errors. The generally accepted threshold is 0.5 .

Table 7: Convergent validity (AVE)

Variables	Average Variance Excerpted (AVE)
Degree of reactivity	0.822
Degree of utility of the paintings of edge	0.566
Diversity of use of the data of the paintings of edge	0.668
Diversity of field application	0.648
Diversity of the indicators of performance	0.689

Source: Author

The convergent validity of the manifest variables is given by the table above. All AVEs are greater than 0.5. The AVE is also designed to be used as a tool for assessing discriminant validity. In this sense, the square root of the AVE must be greater than the correlations of the construct with the others. This situation indicates that the variance shared between the construct and its indicators is greater than that shared with the other constructs.

Table 8: Discriminant validity

	1	2	3	4	5
1.Degree of reactivity	**0.907**				
2.Degree of utility dashboards	0.318	**0.753**			
3.Diversity of use data from tables edge	0.585	0.435	**0.818**		
4.Diversity of scope	0.544	0.481	0.412	**0.805**	
5.Diversity of the performance indicators	0.563	0.229	0.441	0.659	**0.830**

Source: Author

The table above gives the results relating to the discriminant validity of each construct. This situation indicates that the variance shared between the construct and its indicators is greater than that shared with the other constructs.

Analysis of the tables allows us to see that the conditions required to ensure the validity of the nine constructs are ensured: the homogeneity of the scales is sufficient, the convergent validity (evaluated by the factorial contributions, and the average variance extracted) as well as the discriminant validity (assessed by examining correlations between constructs and by cross-contributions) are acceptable.

3.3.3. Testing hypotheses

The causality analysis is based on the structural equation model. The analysis was conducted using SMARTPLS software. The PLS approach allows several relationships between variables to be studied simultaneously. The body of hypotheses provides a structural model built around hypothetical causal relationships between variables. Causality analysis uses the method of calculating path coefficients (regression coefficients) between variables. A bootstrap type simulation is carried out for this purpose. The minimum number of iterations must be greater than 200 (Tenenhaus et al, 2005) with a number of observations close to the sample size (Marcoulides and Saunders, 2006). However, in order to obtain a stable statistical result, it is preferable to set the number of sampling replications to more than 500.

Following the recommendations of Chin (1998), the bootstrapping technique (with 500 samples) was used to test the statistical significance of each coefficient. The objective at this level is the maximization of the explained variance of the latent variables. The significance of the structural links which connect the latent variables will make it possible to validate or not the hypotheses. To do this, we must examine the direction of the causal coefficients "Path coefficient" (original sample), and the level of significance of the causal relationships (T- Student >1.96)

Testing the hypothesis relating to the impact of dashboard characteristics on the use and usefulness of dashboards

This hypothesis proposes to test the influence of the variable "Characteristics of dashboards" on the variable "Use and usefulness of dashboards". The Student 's T test value is 4.097. Therefore, **this hypothesis is validated.**
This result shows that the more sophisticated the dashboard, the more useful it becomes and its use diversified. The result confirms the conclusions of previous theoretical and empirical work (Gray and Pesqueux , 1993; Kaplan and Norton, 2001).

Table 9: Results of testing the hypothesis relating to the impact of dashboard characteristics on the use and usefulness of dashboards

Hypotheses of research	T student	P value	
H1. Characteristics of dashboards -- > Use and usefulness of dashboards	**4,097**	**0.000**	**Validated**

Source: Author

Conclusion
This paper is a survey of 117 Moroccan companies, to answer our research question: "Do the characteristics of dashboards impact the use and usefulness of dashboards of Moroccan companies? ". The results of this research work made it possible to validate the hypothesis which states that there is an impact of the characteristics of the dashboards on the use and usefulness of the dashboards of Moroccan companies. This work thus makes it possible to enrich previous work on dashboards but also to open numerous future avenues of research by taking into consideration other facets of performance.

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