The Impact of the Balanced Scorecard on the Organizational Performance of Public Academic Institutions in Morocco

Mr. Fouad OUAD[1] Mrs. Imane ASRAOUI[2] and Mrs. Lalla Zhor OMARI ALAOUI[3]

[1-2]Doctoral Scholar, 3Teacher-Researcher

Management Research Laboratory - Finance and Accounting (MRLFA)

Faculty of Legal, Economic and Social Sciences

Ibn Tofail University - Kenitra, Morocco

ABSTRACT

This paper assessed the relationships between the different variables in the search model using simple and multiple regression analyses. Hypothesis testing of the 41-observation sample of managers produced quite different results.

Indeed, from a first reading of the field (exploratory and qualitative phase), we found that the relationship between the axes of the Balanced Scorecard and organizational performance is important.

Keywords: *Public University Institutions, Reliability, Morocco, Performance, Balanced Scorecard.*

1. INTRODUCTION

This article is devoted to the assessment of the axes of organizational performance. Indeed, after verifying the validity and reliability of the measurement scales, this article sets itself the objective of studying the relationships between the different variables of the research model. At this stage of the research, we are particularly interested in the influence of the explanatory variables on organizational performance. Our ambition is to verify this effect with all the observations collected (41 questions).

1.1 Estimation and interpretation of the regression model

Before discussing the testing of research hypotheses, a presentation of the method adopted is necessary, particularly in the case of a quantitative study. The statistical technique we adopt is multiple regression, which is derived from regression models and which is gaining increasing attention in the literature. Indeed, the multiple regression technique, which requires a minimum of 5 observations per independent variable in the model, is suitable for our study with 41 observations.

Multiple regression is a widely used technique and an extension of simple linear regression. Several independent variables are used, rather than just one as in simple regression, to account for the dependent variable (Honag, 2009). As a result, this allows a more complete characterization of the reality that the researcher is interested in, since phenomena or constructs are frequently impacted by multiple other phenomena or constructs. The multiple regression equation is of the form :

The relationship between the variable to be explained Y and the p explanatory variables (Xp) is expressed as follows (Meyers et al., 2006) :

$$Yi = a0 + a1\,Xi1 + a2\,Xi2 + a3\,Xi3 + \ldots + ap\,Xip + \varepsilon i, \qquad i = 1, 2, 3, \ldots, n$$

In this equation:

Predicted value of the dependent variable

X1... Xn: Independent variables

a1...an: Regression coefficients of the independent variables, representing the specific effect of the respective independent variable on the dependent variable.

a0: Constant that represents the value of the dependent variable when all independent variables are equal to zero.

For multiple regression, there are generally three predominantly used methods (Meyers et al., 2006 cited by Honag, 2009; p 268) :

The overall quality of the regression is judged using various indices such as the single or multiple correlation coefficient, the coefficient of determination, the Fisher test and the standard error of the regression.

To assess the contribution of each independent variable in the overall explanation and decide which variables to include in the regression, three indicators are used (abbad, 2008): Student's t-tests, regression coefficients and standard errors.

Regression coefficients are necessary indicators to estimate the relative weight of the independent variables in the overall explanation. They therefore allow us to identify the explanatory power of each variable in the prediction of the dependent variable. Examination of these coefficients is essential because it leads to the identification of the most parsimonious regression model, i.e. one with the smallest number of explanatory variables (Evrard et al., 2003). It should be noted that when the measurement scales of the independent variables and the dependent variable are different, it is recommended to use the absolute value of the "Beta" coefficients, i.e. the standardised or normalised regression coefficients (or the standardised lambda). These make it possible to compare the contributions of the independent variables in explaining the phenomenon under study.

The interpretation of the results of a regression model is done at the level of each explanatory variable by asking about its contribution to the overall prediction. It can also be done by studying the value of the residuals to ensure that they are independent of the explanatory variable.

1.2 .Testing the hypotheses of the research model :

The objective is to test our research hypotheses on all the relationships between programmes, TBP axes and performance, i.e. on the 41 observations collected in the quantitative study (the testing of hypotheses on all the collected observations).

A hypothesis is confirmed only if the following conditions are met (Abbad, 2008) :

- The explanatory variable has an influence on the variable to be explained in the direction initially assumed (positive or negative) ;

- If the explanatory variable is composed of more than one dimension, at least one dimension exerts a significant influence in the intended direction.

The influence of the explanatory variables on the variable to be explained "Performance" is examined using multiple regression. Thus, regressions are conducted on all variables to test the hypotheses presented in the box below.

Table 1: Research Hypotheses

H1	The internal process focus has a positive impact on the performance of the establishment
H2	The customer focus has a positive impact on the institution's performance
H3	The organizational learning axis has a positive impact on the performance of the institution.
H4	The financial focus has a positive impact on the institution's performance

H5	The indicators of the Ministry's performance project have a direct impact on performance
	as defined in the organic law of the finance law.
H6	The use of the Balanced Scorecard has a positive effect on the performance of academic institutions.

Before conducting a multiple regression analysis, it is essential to ensure that the explanatory variables must be independent of each other (Evrard et *al.* , 2003; Hair *et al.* , 2006 cited by Abbad, 2008).

To check for the absence of multicollinearity between the explanatory variables, we examine the matrix of simple correlations. The simple correlation matrix does not reveal any significant correlations, since the different correlation coefficients do not exceed the threshold limit of 0.70. The correlation coefficients of the simple correlation matrix are not significant.

Hair *et al.* (2006) estimate that the risk of collinearity is problematic in analyses based on a simple correlation coefficient of 0.80 or even 0.90 between two independent variables. We continue this diagnosis of the collinearity phenomenon by studying the multiple correlation between the independent variables. To do so, three measures are used (Abbad, 2008): (tolerance, Variance Inflation Factor, or VIF (*Variance Inflation Factor)* is the reciprocal of tolerance, and the conditioning index).

We can therefore perform regression analysis and test through relationships.

Fisher's test rejects the null hypothesis that there is no relationship between the variables in the model and collaboration at the 5% threshold (see table below).

The overall precision of the model, measured by the adjusted coefficient of determination (adjusted R^2), shows that 98% of the variation in the dependent variable, "Performance", is explained by the independent variables included in the regression model.

1.2.The statistical significance of each regression coefficient :

The significance of the regression coefficient estimators can be tested using a Student's *t-test* at (n-p-1) degrees of freedom. The Student t-test analysis (*Critical Ratio* or *C.R.*) in SPSS 25 thus allows us to identify the explanatory variables that have a significant influence on the variable to be explained, i.e. those where the calculated value of *t* is high. Consequently, it is possible to exclude variables whose weight is not significant, as their removal from the regression equation does not significantly change the quality of the overall fit. This leads to a simpler model (Evrard et al. 2003).

The strength of the relationship between the explanatory variable (or predictor) and the variable to be explained is measured by the "standardized" *beta* coefficient β. This indicates that it is possible to compare the variables with each other, although different units of measurement have been used (Field, 2005). The *β* coefficients for the explanation of the dependent variable are presented in this paper in a regression model-like format (Model1, 2).

The significance of Student1's t's reads as follows: *** $p < 0.01$; ** $p \leq 0.05$; *0,05 < p ≤ 0,10.

Table 2: Thresholds and Choices in Multiple Linear Regression Analysis

		Axes of analysis			Thresholds and choices selected			
		The analysis of			Correlations between			
		multicolinearity					*R*	<
					Xp			
							0,7	
Checking	the				Tolerance		0,7	

conditions of use of multiple linear	VIF < 10
Homoscedasticity or constant variance of errors	The variance of the error terms is constant.
Independence from error	1 < Durbin-Watson statistic < 3
The normality of the distribution of error terms	The distribution of residual values follows a normal curve
Choice of regression model	Simultaneous regression and hierarchical regression
Diagnosis of extreme observations ("outliers")	Distance to Cook > 1 Or 3.29 < Standardised residual value < 3.29
.Overall quality of the regression	- Fisher's F Test: calculated > Theoretical - Or if p-value < α The regression is statistically significant (the overall null hypothesis *H0* is rejected).
The statistical significance of each regression Coefficient	Student's *t-value* reads as follows: *** p < 0.01; ** p ≤ 0.05; *0.05 < p ≤ 0.10.

Table 3: Performance Attributes

	1	**2**	**3**	**4**	**5**
APIO1: Streamlining the "Training" process	0	4	6	15	16
APIO2: Fluidify the process " Search "	0	3	9	18	11
ACO1: Improving the quality of training	1	6	7	19	8
ACO2: Becoming competitive in the context of commercial services	2	0	5	18	16
AAOO1: Maintaining an environment conducive to action as part of the transition to autonomy	1	5	5	12	18
To develop skills and improve the technical modalities of internal operations.	0	4	5	24	8
AFO1: Rationalize the use of the institution's assets.	0	6	4	14	17
AFO2.diversify the institution's sources of revenue	3	5	8	10	15

Table 4: Internal process axis

	1	**2**	**3**	**4**	**5**
API1. Indicators of the efficiency of the claims handling processes (Students, Teachers...)	0	11	3	10	17
API2: Indicators of the Effectiveness of Enrolment Processes	1	5	5	13	17
API3: Indicators measuring the quality of the university's services	3	6	11	10	11
API4.global indicator on the quality of training (Students, staff, ...)	0	3	5	14	19
API5: Indicators of process efficiency are compared with other facilities.	0	3	7	19	12
API6 Leadership Capability Indicators	0	5	6	11	19

Table 5: Client axis

	1	2	3	4	5
AC1 Student Behavioural Indicators	0	4	5	23	9
AC2. Indicators of Student Views of the Institution	1	7	7	19	7
AC3: Student Satisfaction Indicators	1	1	5	20	14
AC4 Insertion rate	2	2	6	16	15
AC5 Retention rate	6	5	10	14	6
AC6 Average length of study	4	2	6	13	16

Table 6: Organizational Learning Axis

	1	2	3	4	5
AAO1 Retirement rate of retired teacher-researchers for a given period of time	3	4	11	14	9
AAO2 Retirement rate of administrative and technical staff over the next 3 years	4	4	8	16	9
AAO3: Recruitment forecasts for administrative and technical officials	0	1	10	12	18
AAO4: Advances in rank of teacher-researchers /year	1	3	5	14	18
AAO5.Percentage of positions held by administrative officers for more than five years by the same person	1	3	9	14	14
AAO6 Number of in-service training courses for teachers and administrators per year	2	2	4	11	22

Table 7: Funding focus

	1	2	3	4	5
FY1 Revenue Reports by Budget/Budget Overall	0	2	6	14	19
FY2 Budget implementation rate	1	2	6	15	17
FY3: Evolution of annual budgets	2	4	9	13	13
AF4. Supplier payment terms	2	2	6	19	12
FY5 Share of expenditure types/Budgets	1	4	11	11	14
FY6: Ratio of revenues from research projects to budget.	2	3	4	12	20

2.1.Hypothesis and Research Model Testing :

Through this point, our objective is to highlight the possible correlations between the independent variables (Programmes and TBP axes) and the dependent variable (Organizational Performance). To do this, we will use linear regression, which is a widely used tool in hypothesis testing and

which will serve us either to confirm or to invalidate our research hypotheses.

2.2.Hypothesis Testing: Correlation and Linear Regression :

The following correlational analyses and multiple linear regressions will allow us to adequately answer the research question. But before we do this, we will briefly introduce correlation and linear regression.

Bi-variate correlation: this aims to verify the exercise of significant associations between the independent variables and the dependent variable of the research model. These associations provide indications of the strength and direction of the correlations, represented by the correlation coefficient "r". The sign of the coefficient indicates the direction of the correlation: direct (+) or inverse (-).

These correlations will be posed between each of the independent variables and the selected dependent variable. These correlations are an intermediate step in the regression analysis.

Linear regression: this aims to explain a dependent variable by one or a set of quantitative independent variables. The indicators produced by these analyses are the R, which represents the degree of explanation obtained by the model, the Beta, which illustrates the weight of each variable included in the model, and Student's "t", which indicates the degree of likelihood of the effect estimated by the model. The ^{R2,} called the coefficient of determination, measures the explanatory power of the model. Within this study. It will be the adjusted R2 coefficient that will be used, insofar as it allows to correct the R2 coefficient which can decrease when the independent variables do not add enough value and to take into account the size of the sample in relation to the number of variables.

Once these two notions have been explained, we will move on to testing hypotheses.

2.2.1. Test of hypothesis H1: The internal process axis has a positive impact on the performance of the institution.

Summary of Models

Model	R	R-two	Adjusted R-two	Standard error of estimate	Change statistics: Change in R-two	Change in F	ddl1	ddl2	Sig. Change in F	Durbin-Watson
1	0,876a	0,767	0,761	,31413	0,767	128,493	1	39	0,000	1,844

a. Predictors : (Constant), INTERNAL PROCESS AXIS

b. Dependent variable : PERFORMANCE

Based on the regression test, we find that adjusted R^2 is equal to 76.1%, which means that the internal process variable explains 76.1% of organizational performance. This is confirmed by interpreting the analysis of variance table.

			ANOVA	TEST		
				Medium		
Model		Sum of squares	ddl	Square	F	Sig.
1	Regression	12,679	1	12,679	128,493	,000b
	de Student	3,848	39	,099		
	Total	16,527	40			

a. Dependent variable : PERFORMANCE

b. Predictors : (Constant), INTERNAL PROCESS AXIS

The ANOVA table confirms the result of the previous table with a significant F test (F= 128.679)

as P test less than 0.05

2.2.2. Hypothesis test H2: The customer focus has a positive impact on the performance of the establishment.

				Summary of Models						
						Change statistics				
				Standard					Sig.	
		R-	Adjusted	error of	Change	Change			Change	Durbin-
Model	R	Two	R-two	estimate	in R-two	in F	ddl1	ddl2	in F	Watson
1	0,851 a	0,725	0,717	0,341	0,725	102,568	1	39	0,000	1,508

a. Predictors : (Constant), CUSTOMER AXIS

b. Dependent variable : PERFORMANCE

Based on the regression test, we find that adjusted R^2 is equal to 71.7%, which means that the customer variable explains 71.7% of organizational performance. This is confirmed by interpreting the analysis of variance table.

ANOVA

					Medium		
Model		Sum of squares	ddl		Square	F	Sig.
1	Regression	11,974		1	11,974	102,568	,000b
	de Student	4,553		39	,117		
	Total	16,527		40			

a. Dependent variable : PERFORMANCE

b. Predictors : (Constant), CUSTOMER AXIS

2.2.3. Hypothesis Test H3: The organizational learning axis has a positive impact on institutional performance.

				Summary of Models						
						Change statistics				
				Standard					Sig.	
		R-	Adjusted	error of	Change	Change			Change	Durbin-
Model	R	two	R-two	estimate	in R-two	in F	ddl1	ddl2	in F	Watson
1	0,766a	0,587	0,576	0,418	0,587	55,411	1	39	0,000	1,628

a. Predictors : (Constant), ORGANIZATIONAL LEARNING AXIS

b. Dependent variable : PERFORMANCE

Based on the regression test, we find that R^2 adjusted and equal to 57.6% which means that the customer variable explains 71.7% of organizational performance. This is confirmed by interpreting the analysis of variance table.

			ANOVA			
				Medium		
Model		Sum of squares	ddl	Square	F	Sig.
1	Regression	9,700	1	9,700	55,411	,000b
	de Student	6,827	39	,175		
	Total	16,527	40			

a. Dependent variable : PERFORMANCE

b. Predictors : (Constant), ORGANIZATIONAL LEARNING AXIS

2.2.4. Hypothesis test H4: The financial axis has a positive impact on the institution's performance.

Summary of Models

Mod	R	R-Two	Adjusted R-two	Standard error of estimate	Change statistics: Change in R-two	Change in F	ddl1	ddl2	Sig. Change in F	Durbin-Watson
1	0,633 a	0,400	0,385	0,504	0,400	26,051	1	39	0,000	1,475

b. Dependent variable : PERFORMANCE

Based on the regression test, we find that adjusted R^2 is equal to 0.40 which means that the customer variable explains 40% of organizational performance. This is confirmed by interpreting the analysis of variance table.

			ANOVA			
				Medium		
Model		Sum of squares	ddl	Square	F	Sig.
1	Regression	6,619	1	6,619	26,051	,000b
	de Student	9,909	39	,254		
	Total	16,527	40			

a. Dependent variable : PERFORMANCE

b. Predictors : (Constant), FINANCIAL AXIS

2.2.5. Hypothesis test H5 :

				Summary of Models						
						Change statistics				
				Standard					Sig.	
Mod		R-	Adjusted	error of	Change	Change			Change	Durbin-
el	R	two	R-two	estimate	in R-two	in F	ddl1	ddl2	in F	Watson
1	0,952 a	0,906	0,896	0,207	00,906	87,040	4	36	0,000	1,817

a. Predictors : (Constant), FINANCIAL AXIS, INTERNAL PROCESS AXIS, ORGANIZATIONAL LEARNING AXIS, CUSTOMER AXIS b. Dependent variable : PERFORMANCE

Based on the regression test, we find that adjusted R^2 is equal to 89.6, meaning that the Balanced Scorecard variable explains 89.6% of organizational performance. This is confirmed by interpreting the analysis of variance table.

			ANOVA			
				Medium		
Model		Sum of squares	ddl	square	F	Sig.
1	Regression	14,979	4	3,745	87,040	,000b
	de Student	1,549	36	,043		
	Total	16,527	40			
a. Dependent variable : PERFORMANCE						
b. Predictors : (Constant), FINANCIAL AXIS, INTERNAL PROCESS AXIS,						
ORGANIZATIONAL LEARNING AXIS, CUSTOMER AXIS						

Coefficients

Model		Non-standardized coefficients		Standardized coefficients			Correlations		
		B	Standard Error	Beta	T	Sig.	Simple Correlation	Partial	Partial
1	(Constantly)	,312	,201		1,547	,131			
	INTERNAL PROCESS AXIS	0,498	,064	,541	7,790	,000	,876	,792	,397
	CUSTOMER AXIS	0,327	,084	,399	3,897	,000	,851	,545	,199
	ORGANIZATIONAL LEARNING AXIS	0,004	,080	,005	,046	,964	,766	,008	,002
	FINANCIAL AXIS	0,103	,050	,142	2,081	,045	,633	,328	,106

a. Dependent variable : PERFORMANCE

The model is of satisfactory quality. It can be considered as an explanation of the concept of organizational performance. In fact, 89.6% of the variance of the concept is represented by four explanatory variables, the internal process axis (IPA), the client axis (CA), the organizational learning axis (OLA) and the financial axis (FA). The Durbin-Watson index is 1.817.

Student's t-test confirms the significant contribution of the selected variables.

Based on the results obtained (see table on the estimation results of the coefficients of the organizational performance regression equation), the final regression equation, including the significant variables, can be written as follows:

Performance = 0.498 API + 0.327 AC+ 0.004 AAO + 0.103 AF+e

CONCLUSION

This research contributes to the development of quantitative research methodology in the context of Morocco. Most scientific research in Morocco is merely descriptions of phenomena based on a few theoretical and practical analyses.

The methodological inputs relate to data collection methods, qualitative survey and quantitative study. They concern three essential points: the adaptation and construction of measurement scales, the evaluation of the constructs for the sample in a dyadic approach and the carrying out of a double qualitative and quantitative study in the field of investigation studied.

In our research on performance, we used unobservable variables from the mobilized literature review. In order to make these variables observable, we had to carry out an operationalization work, i.e. an empirical translation of the conceptual definitions into indicators essential for testing hypotheses. Given that Anglo-Saxon measurement instruments are developed and validated in the context of their use, we verified for each variable the conceptual equivalence and adaptation to our field of investigation, to a Moroccan context with its own socio-cultural specificities. Thus, the examination of the validity and reliability tests of these scales made it possible to verify the possibility of their reuse in the specific Moroccan context.

BIBLIOGRAPHIES

1. Agchariou, Nassim, Takfarinas Madaoui, and Zoubir Cadreur Arab. 2018. Le tableau de bord: outil du contrôle de gestion', University A. Mira, Béjaia/Aboudaou.
2. AMRANI Ferhane, Inchaallah. 2018. Balanced scored card - measuring performance and driving strategy.
3. Bouamama, Mohamed. 2015. New Challenges for Performance Measurement Systems: The Case of Dashboards'.
4. Boudjadja, Zahira, Amal Bouharrat, and Moussa Framing Maameri. 2018. Le tableau de bord et la performance financière d'une entreprise', University A. Mira, Béjaia/Aboudaou
5. Brewer, Peter C. 2001. The Balanced Scorecard as a Tool for Aligning Supply Chain Performance Measures: The Dell Example', Logistics & Management, 9: 55-62.
6. Singer, Anne, and Wilfried Niessen. 2015. Dashboards and business plan: Managing your company's accounting (EdiPro).
7. Collective. 2018. Become an effective manager (Manager's library: Cork).
8. DEGOS, Jean Guy, and ZIAN Houda. Le tableau de bord: outil de pilotage de la performance dans les petites et moyennes entreprises', La Revue Marocaine de Contrôle de Gestion.
9. Goos, Isabelle. 2016. Daring the strategy of success for your association: A handbook for small and medium-sized associations (EdiPro: Cork).
10. Lambert, Delphine, and Karine Cerrada Cristia. The design of the management dashboard of a food distribution cooperative. Case study: The BEES coop' project.
11. Laurent, VILAIN. 2003. Le pilotage de l'entreprise: l'utilisation d'un tableau de bord prospectif', Editionécole des mines de Paris, promotion.
12. Ouad, Fouad, Chaouch Abdelaziz, and Fadli Anas. 2015. IMPROVING THE QUALITY OF UNIVERSITY EDUCATION IN MOROCCO; CASE OF THE FACULTY OF KENITRA SCIENCES', European Scientific Journal, 11.
13. Sanna, Alice. 2014. The Balanced Scorecard and the 4 Pillars of an Organization: What Signals to Consider for Effective Management? (50 Minutes: Cork).
14. Wegmann, Gregory. 2000. Les tableaux de bord stratégiques: Analyse comparative d'un modèle nord-américain et d'un modèle suédois (Recherches et publications en management.