Abstract

This paper examines the relationship between structural equation modeling and the balanced scorecard in a banking institution. Using financial and non-financial data taken from the banking establishment, the paper propose a rational construction of Balanced Scorecard by choosing the right indicators for the right axes. This choice is made by implementing the Partial Least Squares (PLS) in our model. In addition, the scheme gives us the cause-and-effect chain, the one described by Kaplan and Norton as: measures of organizational learning and growth; measures of internal business processes; measures of the customer perspective; financial measures. We will observe that the Kaplan and Norton's model of BSC is nothing but a particular case of our findings. Following this we propose a general approach to build step-by-step a rational Balanced Scorecard and we will apply this modeling to a special case in the banking sector.

Reference

QUASI-ANALYTICAL DEFINITION OF A PRACTICAL BALANCED SCORECARD: A BUILDING PROCESS APPROACH

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ABSTRACT

This paper examines the relationship between structural equation modeling and the balanced scorecard in a banking institution. Using financial and non-financial data taken from the banking establishment, the paper proposes a rational construction of Balanced Scorecard by choosing the right indicators for the right axes. This choice is made by implementing the Partial Least Squares (PLS) in our model. In addition, the scheme gives us the cause-and-effect chain, the one described by Kaplan and Norton as: measures of organizational learning and growth -> measures of internal business processes -> measures of the customer perspective -> financial measures. We will observe that the Kaplan and Norton’s model of BSC is nothing but a particular case of our findings. Following this we propose a general approach to build step-by-step a rational Balanced Scorecard and we will apply this modeling to a special case in the banking sector.

INTRODUCTION

A new concept of strategic management was developed in the early 1990's by Drs. Robert Kaplan from Harvard Business School and David Norton. They named this system the 'Balanced Scorecard'. Distinguishing some of the weaknesses and ambiguity of previous management approaches, the balanced scorecard approach provides a clear direction as to what companies should measure in order to 'balance' the financial point of view.

The Balanced Scorecard embodies a set of measures that gives top managers a quick but comprehensive image of the business. The balanced scorecard contains financial measures that tell the consequences of actions already taken. And it complements the financial measures with operational measures on customer satisfaction, internal processes, and the organization's innovation and improvement activities – "operational measures that are the drivers of future financial performance” (Kaplan & Norton 1992).
One criticism of the Balanced Scorecard is the construction of it. Even if the authors give us some leading points and tell us the paces in the realization of the BSC, the concept are quite ambiguous and very hard to apply in the enterprises environment. A modeling of the system is demanded and also an approach of the theory to applicability.

There are three objectives underlying this paper. The first objective is to combine above concepts together and try to pose several assumptions for a rational construction of a BSC using PLS methodology. This is demonstrated with a bank institution case where we have 108 indicators and 24 monthly periods for each. We will take the indicators that can be used for each axis, and we give a rational explication for this choice. We will also generate the cause-and-effect chain and observe which latent variable (axis) are influencing and which are to be influenced. Our second objective is to do a comparison between our method and Kaplan and Norton’s BSC. We will observe that Kaplan and Norton’s model of BSC is nothing but a particular case of our findings. The final objective is to try creating a pragmatic model that can be implemented in the enterprises environment, thus modeling the theory of Balanced Scorecard.

The paper is structured as follows. In the following session we will introduce the BSC concepts. We will empathize the unrealistic process of 4-axes construction and we will suggest a logical scheme allowing us to define the number of axes as well as the number of indicators related to each perspective. This is followed by an example of bank establishment in which we will implement the PLS method to create a rational Balanced Scorecard. Finally, we will post a tentative modeling of Balanced Scorecard that can be implemented in enterprise environment.

THE NEED FOR A NEW VALIDATION METHODOLOGY

According to Kaplan and Norton, the balanced scorecard (BSC) is a management scheme (not only a measurement system) that enables organizations to clarify their vision and strategy and turn them into action. Thus the BSC provides executives with a comprehensive framework that translates a company's strategic objectives into a coherent set of performance measures. It provides feedback around the internal company processes as well as external outcomes in order to constantly improve strategic performance and results. When fully set up, the BSC transforms strategic planning from an academic exercise into the nerve center of an enterprise. According to Fielden (1999), corporations across the world have begun leveraging the power of balanced scorecards for converting vision and strategy into measurable targets.

The balanced scorecard can serve as the focal point for the organization's efforts, defining and communicating priorities to managers, employees, investors, even customers (Kaplan & Norton 1993). With the four perspectives, the balanced scorecard minimizes information overload by limiting the number of measures used and forces managers to focus on the handful of measures that are most critical. It therefore enabled companies to track financial results while simultaneously monitoring progress in building the capabilities and acquiring the intangible assets they would need for future growth (Kaplan & Norton 1996). Balanced Scorecards provide executives with the ability to develop measures that could accurately forecast the health and wealth of an organization. By providing the ability to translate strategy into action rapidly, measurably, and knowledgeably, a balanced scorecard aligns that strategy within an organizational
structure to tap into hidden assets and knowledge. Moreover, by connecting both internal and external people with these strategies, continual learning and growth can be achieved (Pineo C. 2002).

However, the balanced scorecard has problems with some of its key assumptions and relationships. First, there is not a causal but rather a logical relationship among the areas analyzed. Customer satisfaction does not necessarily yield good financial results. Assessing the financial consequences of increased customer satisfaction or quality improvements requires a financial calculus. Chains of action which yield a high level of customer value at low costs lead to good financial results. This is not a question of causality; it is logic since it is inherent in the concepts. Therefore, the balanced scorecard makes invalid assumptions, which may lead to the anticipation of performance indicators which are faulty, resulting in sub-optimal performance. Second, the balanced scorecard is not a valid strategic management tool; mainly because it does not ensure any organizational rooting, but also because it has problems ensuring environmental rooting. Consequently, a gap must be expected between the strategy expressed in the actions actually undertaken and the strategy planned (Nørreklit H., 2000).

Within this general environment of criticism and uncertainty, some writers (Shields 1997, Shields and Shields 1998) have called on management accounting researchers to make greater use of structural equation modeling (SEM). SEM is a statistical technique that allows the simultaneous analysis of a series of structural equations and it may be regarded as a family of techniques (encompassing path analysis, partial least squares models, and latent variable SEM). However, there appears to be some agreement that all SEM models involve two aspects: first, the estimation of multiple interrelated dependent relations between variables, and second the ability to represent latent variables in these relations while accounting for estimated measurement error associated with the imperfect measurement of variables. This method is particularly useful when a dependent variable in one equation becomes an independent variable in another equation (Hair et al. 1998).

An important issue to remark is that of sample size. A suggested rule of thumb for SEM is a minimum sample size of 100 (Medsker et al. 1994). However, it has also been suggested that a sample size of 200 may be required to generate valid fit measures and to avoid drawing inaccurate inferences (Marsh et al. 1988, James and James 1989, Boomsma 1982, Medsker et al. 1994).

Despite these cautions, Smith and Langfield-Smith find out in one of their articles that only eleven of the 20 studies (55%) surveyed had samples smaller than 200. Even if the recommended sample size of 100 is considered the lower bound of acceptability, three of the 20 studies (Magner et al. 1996, Chalos and Poon 2000, Abernethy and Lillis 2001) fall below this benchmark, meaning that the inferences drawn from these studies could be challenged.

Some management accounting researchers may be discouraged from using covariance based methods due to the large sample size requirements, and the assertion that the technique is only appropriate in areas where theory is relatively strong. While these limitations are true of latent variable SEM techniques, Partial Least Squares (PLS) modeling provides an alternative.

Partial Least Squares (PLS) regression is a recent technique that generalizes and combines features from principal component analysis and multiple regression. It is
particularly useful when we need to predict a set of dependent variables from a (very)
large set of independent variables (i.e., predictors). It originated in the social sciences
(specifically economy, Herman Wold 1966) but became popular first in chemometrics
(i.e., computational chemistry) due in part to Herman’s son Svante, (Geladi & Kowalski
1986) and in sensory evaluation (Martens & Naes 1989). But PLS regression is also
becoming a tool of choice in the social sciences as a multivariate technique for non-
experimental and experimental data alike (neuroimaging, see McIntosh, Bookstein,
Haxby, & Grady, 1996). It was first presented as an algorithm akin to the power method
(used for computing eigenvectors) but was rapidly interpreted in a statistical framework.
(Herve 2003).

The use of PLS, despite its inherent limitations (most notably, that it is a limited-
information technique, designed to maximize prediction, rather than fit), appears to be a
way in which statistical modeling in management accounting research can move forward
without the need to obtain large samples, something which management accounting
researchers have traditionally found difficult. Another benefit of PLS is the technique's
ability to accommodate non-normal data, due to the less rigorous assumptions
underpinning the technique (Smith & Langfield-Smith 2004).

**LINKING BALANCED SCORECARD WITH PARTIAL LEAST SQUARES**

Ittner and Larckner suggests that "(...) decisions using multicriteria performance
measurement systems should be computed using explicit, objective formula that
prescribes the weights to be attached to each measure, or should be based on subjective
evaluations where the weights to be attached to each measure is implicitly or explicitly
chosen by the decision maker" (Ittner & Larckner 1998). This should be taken into
account in order to build, check and validate assumptions of causality relationship
between the indicators within the framework of the implementation of Balanced
Scorecard in a company establishment, while following the application of a PLS system.
We state that the assumptions of causality relationship between the four latent
variables, represented by the four perspectives in figure 1, remain subjective. This is why
we propose the use of a model of structural equations to show in a more objective way
the force of the links between the latent variables expressed by sets of measurable
indicators. Indeed, if the choice of the perspective and the assumptions that bind them
remain subjective, the model of structural equations proposes "to provide a meaningful
and parsimonious explanation for observed relationships within a set of measured
variables" (MacCallum 1995).
In a system of structural equations we would find latent variables that cannot be measured directly and exactly. These latent variables need measurable variables, which are expressed through indicators which can be directly observed and measured. The system of structural equations is based on a factorial analysis (exploratory or confirmatory, according to the specific case) of the data to define and validate the way of the causal relations which constitutes the architecture of Balanced Scorecard. We stress that one of the limits inherent to the application of a system of structural equations in the context of Balanced Scorecard, is the pre-necessary statistics necessary to the standardization of the data, which requires an important quantity of observations significantly to confirm the results obtained. The collection of a great quantity of data is not obvious, especially in small and medium-sized companies. This is why the application of the PLS is better in our case.

**A PRAGMATIC CASE: Example of a banking commercial network**

We will present our method through an example of a bank institution. To ensure data protection, the name of the bank, as well as some of its products, were camouflaged. The analyzed bank took the name of Case of Deposits (CDF). It is a universal type of bank, that is to say offering all the products and banking services that a specialized intermediary can offer.

The idea of using PLS approach in order to analyze the measures of performance, translated into BSC, will allow the following:

- A better decision-making of resource reallocation with the help of performance simulation of the selected strategy;
- A better communication within the company of this performance;
- Anticipating new strategic indicators.

The first step is the *principal component analysis* (PCA), which makes possible to regroup our variables (indicators) within specific axes. The result will be consequently completely depending on the data available at the time of harvest. A thorough work could be the more thorough analysis object referring to the results of this first approach. In
addition, the objective of this illustration is not to define the best indicator, but to highlight the relevance of the variables available.

This banking institute has already implemented a BSC. However, the institution is confronting with the management difficulties of existing BSC. Thus they selected new indicators, adding them with old ones, putting in danger the synthetic vision of a detailed analysis. Moreover, it is very difficult to judge the evolution of the influence between the main indicators of performance. Fortunately, the Partial Least Square (PLS) approach makes it possible to solve this type of problem. Indeed, as approach PLS precisely requires the use of a method allowing a hierarchisation of the data, it will initially enable to classify the most relevant variables by axes. However, if one wants to cover the whole of strategic performances, a strategic analysis remains necessary nevertheless.

The short term must be ensured by the profitability of the various departments, medium term must control the impact of competition, the resources and the development of the new products in relation with the customer’s future needs. As for the long term, it rather relates to measurements used to anticipate the evolution of the elements touching medium term. In a second phase, the bond of causality between the axes, on one hand, and the variables, on the other, makes it possible to include and understand how to prioritize the actions for the variables. PLS method will synthesize this classification by axes. It will highlight not only the cause-and-effect hierarchy between the axes, but especially will make it possible to simulate more scenarios on total performance by changing the variables.

**THE CHOICE OF VARIABLES**

This part is very important and will condition the whole of our following steps. Indeed, if the choice rests only on the information available, the measured performance will be polluted by non-strategic variables. However, if one selects only strategic variables, the measured performance will synthesize the strategy in progress. To limit the harvest subjectivity, the model of Kaplan can help us to collect data which are not only financial. Briefly it is noted that non-financial data are not held with the same rigour and their periodicities are difficult to guarantee. This information management problem also rests on the applied strategy: "what one does not measure, is non strategic". The choice of our variables largely influences the measured performance. Also, we would like to point out that nothing prevents from adding new variables to verify the definition of a precise axis.

As the strategic decisions depend on management, the choice of the variables will depend on it too. The PCA will make it possible to validate this selection. In addition, these variables must also be available. Indeed, there could be technical or accounting constraints that can prevent from measuring the strategic performance due to lack of relevant data. In our case, the bank IT system had not been developed to be able to determine profitability by product, nor by customer. It determined only profitability by organizational structure.

On another side, one can conclude that the missing data are not necessary to the adopted strategy (not considered as important). In the same way, it is not because the banking world directs its strategy towards service profitability that all the banks must follow them. To avoid any confusion, raw variables are to be preferred, rather than
multiple variable ratios. The choice of the data was made over the 24 months of 2005 and 2006 gathering 108 variables in total. Unfortunately, it was impossible to join together these data over 2004, either because it did not exist, or because the information highlighted inconsistencies.

**TOTAL NUMBER OF AXES**

To be able to define the explanatory axes of the measured performance, we need linear regression technique. The software we chose to use for our computation is SPSS. First we use the PCA in order to determine the axes and the percentage of variance corresponding to each of them. This percentage explains the influence of an axis on the total performance: the higher this percentage is, the more explanation it gives on the performance.

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total % of Variance</td>
<td>Cumulative %</td>
</tr>
<tr>
<td>1</td>
<td>47.2029</td>
<td>43.7064</td>
</tr>
<tr>
<td>2</td>
<td>15.2955</td>
<td>14.1625</td>
</tr>
<tr>
<td>3</td>
<td>10.8805</td>
<td>10.0746</td>
</tr>
<tr>
<td>4</td>
<td>9.5448</td>
<td>8.8378</td>
</tr>
<tr>
<td>5</td>
<td>5.6294</td>
<td>5.2124</td>
</tr>
<tr>
<td>6</td>
<td>4.5011</td>
<td>4.1677</td>
</tr>
</tbody>
</table>

Table 1: Extract of total variance explained

The above table shows the SPSS output when performing the principal component analysis on our data. Studying the table one observes that first six components explain 86.16% of the data, while almost half of this (43.71%) is explained by the first component. Performance of the variables analyzed. The same PCA analysis also gives the variables (indicators) influencing each of these axes and the component matrix determining the correlation of each variable with the selected axes. To be done, one establishes the component matrix that determines the variance of each variable compared to the selected axes.

<table>
<thead>
<tr>
<th>VAR no.</th>
<th>VAR name</th>
<th>1st axis</th>
<th>2nd axis</th>
<th>3rd axis</th>
<th>4th axis</th>
<th>5th axis</th>
<th>6th axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAR001</td>
<td>Total revenue of all savings</td>
<td>0.6978</td>
<td>-0.2729</td>
<td>0.4838</td>
<td>-0.1778</td>
<td>0.2024</td>
<td>0.2767</td>
</tr>
<tr>
<td>VAR002</td>
<td>Monthly revenue CDF savings</td>
<td>0.8423</td>
<td>-0.4860</td>
<td>-0.0267</td>
<td>0.0201</td>
<td>0.0069</td>
<td>-0.1548</td>
</tr>
<tr>
<td>VAR003</td>
<td>Monthly revenue pension transfers</td>
<td>-0.8423</td>
<td>-0.2740</td>
<td>0.4031</td>
<td>-0.0960</td>
<td>0.0140</td>
<td>0.1340</td>
</tr>
<tr>
<td>VAR004</td>
<td>Monthly revenue pension savings</td>
<td>0.4751</td>
<td>-0.5542</td>
<td>0.1691</td>
<td>-0.0360</td>
<td>0.3785</td>
<td>0.3013</td>
</tr>
<tr>
<td>VAR005</td>
<td>Monthly revenue collective pensions</td>
<td>0.9289</td>
<td>-0.1127</td>
<td>0.3278</td>
<td>-0.0862</td>
<td>0.0058</td>
<td>0.0438</td>
</tr>
<tr>
<td>VAR006</td>
<td>Monthly revenues Town accounts</td>
<td>-0.7332</td>
<td>0.0763</td>
<td>-0.2472</td>
<td>-0.2536</td>
<td>-0.0289</td>
<td>-0.2521</td>
</tr>
<tr>
<td>VAR007</td>
<td>Monthly revenues private accounts</td>
<td>&quot;senior&quot;</td>
<td>-0.9478</td>
<td>-0.0010</td>
<td>0.0778</td>
<td>-0.1551</td>
<td>0.0004</td>
</tr>
<tr>
<td>VAR008</td>
<td>Monthly revenues savings “youth&quot;</td>
<td>0.7362</td>
<td>-0.3021</td>
<td>0.3563</td>
<td>-0.1061</td>
<td>0.2114</td>
<td>0.2373</td>
</tr>
<tr>
<td>VAR009</td>
<td>Monthly revenues saving accounts type A</td>
<td>-0.4641</td>
<td>-0.7170</td>
<td>-0.1426</td>
<td>-0.0530</td>
<td>-0.3184</td>
<td>0.1195</td>
</tr>
<tr>
<td>VAR010</td>
<td>Monthly revenues accounts CDF-Town</td>
<td>-0.0280</td>
<td>-0.8570</td>
<td>-0.2272</td>
<td>-0.0387</td>
<td>-0.0263</td>
<td>-0.3993</td>
</tr>
</tbody>
</table>

Table 2: Extract of component matrix

The above table visualizes the correlation of the first 10 variables with each axis. The closer a correlation is to 0, the lesser the corresponding variable influences the axis.
The data will be sorted and filtered with respect to the influence it has upon the axes. In principal, a variable will be associated with the axes it influences the most (which is given by the absolute value of the correlation).

This procedure will exclude a part of the collected data as not or very little influencing the performance, limiting the irrelevant measures to the performance.

**DEFINING THE AXES**

The sorting by axis makes possible to name and define them strategically. However, that being done, one still needs a small grooming of the data by removing those which would not sufficiently explain the definition given to the axis. Though this step it is not mathematically justified, it is mainly intended to clearing certain data that is not rigorously exact and would pollute the definition of the axis. The exclusion of the variable must be well explained in the light of the strategy for defining of the statistical axes.

The above analysis gives us the following axes: MORTGAGE, SAVINGS, PLACEMENTS, OTHER REVENUES and PERSONNEL each of them with 4 to 6 explanatory variables as explained below.

On this data we implemented a PLS regression whose output would be analyzed in the rest of this section.

![Figure 2: Representation of “MORTGAGE” axis using PLS](image)

**MORTGAGE AXIS**: The composition of the “Mortgage” axis touches mainly the average capital (see figure no. 2). That means that the performance of the mortgage axis is explained mainly according to the average capital and not on the end of month balance. Moreover, these variables have a relatively moderate impact on the axis. That means that an important change in the number of customers will not strongly influence the mortgage perspective, but only in conjunction with several others factors.

The average mortgage capital balance including the debit balance is very close to average mortgage capital balance. This data is recorder on a monthly basis, each entry being computed as a sum of averages effectively realized capital in the whole commercial network. This variable is defined using the average accounting balance at the end of each
month plus the corresponding debit interest. The cause-and-effect relation between these variables and the mortgage axis being positive, this implies that the bigger the average mortgage capital balance (incl. or not the debit balance) is, the higher the influence on the mortgage is.

Given that the absolute value of the mortgage claim interest correlation is smaller than the average mortgage capital balance ones, implies that the latter influence more the axis performance than the former.

As for the number of customers, the bigger is the number; the better is the mortgage performance. The variable representing the customers was related to the mortgage axis because in the PCA on the one hand, the variable was more correlated with the mortgage axis than with the saving axis (where one would expect to find it) and, on the other hand, the general contribution of mortgage axis to the bank performance is greater than the contribution of the saving axis.

Admittedly, it is surprising to see that the mortgage claim income negatively influences the performance. It is composed of an interest rate established by taking into account the market information, multiplied by the average capital. As the average mortgage capital is positively correlated with the axis, while the interest rate is dropping, the performance increases. Thus the lower these interests rates are, the more the customers could be motivated to apply for mortgage. Conversely, one understands that raising the interest rate on the mortgage claims (and thus the interest revenues) lowers the demand for mortgage (with or without interest balance) and thus decreases the total number of clients and, as a result, negatively influences the performance.

**Figure 3: Representation of “SAVINGS” axis using PLS**

**SAVINGS**: The composition of the savings axis is principally given by quantities, on one side, and incomes and charges, on the others (figure no. 3). This implies that the performance of this axis is explained mainly by the number of open accounts and by the magnitude of the revenues. Here also the impact these variables have on this axis is relatively moderate. That means that an important change in the number of accounts will not strongly affect the saving axis. One would need again the conjunction
with several others factors in order to give a meaningful explanation of the axis performance.

Besides the total number of saving accounts, we will also choose specific accounts: saving accounts “type A” and saving accounts “CDF-Town” out of 12 different other saving accounts. The choice was made taken into account the strong influence that these two variables have on the saving axis.

One can remark that the more open saving accounts has, the bigger the interest charges, and particularly those on client engagement are, lesser the revenue of CDF-Town is.

Hence to increase the performance, one has to increase the number of saving accounts, increase the interest charges (and thus the revenue rate) while lowering the interest revenues of CDF-Town accounts. One can remark that the performance in 2005-2006 is partially explained by technical transfer of one account type into another one better adapted to the market needs.

The savings axis is not very well explained as the correlations between the variables and the axis are low. Thus that change in one of those variables has little influence on the axis and hence on the global performance.

![Figure 4: Representation of “PLACEMENTS” axis using PLS](image)

**INVESTMENTS:** The composition of the investments axis is mainly given by incomes (see figure no. 4). This implies that the performance of this axis is explained using the results of placement operations. As a consequence, the investments performance is intrinsic to the operations results which, in turn, depend more on the title market rather than on the average capital. However, the influence that commercial operations and services rendered has on the axis is relatively stronger.
OTHER REVENUES: The composition of “Other revenues” axis is principally given by the end of month balances (see figure no. 5). This implies that the performance of this axis is explained more in terms of invested amounts than of average capital. The impact here of invested amounts in normal deposits rather than saving accounts “type A” is strong and shows a cause-and-effect connection between the placements and savings. The more one invests on placements, the less one saves. As a result, the magnitude of these variables will strongly influence the performance of other revenues axis. Moreover, the performance increases mainly thanks to the positive evolution of the results on auxiliary products (currencies, changes and noble metals).

PERSONNEL: The composition of the “Personnel” axis is mainly given by non-financial indicators (see figure no. 6). As before the data is collected on a monthly basis. The average activity ratio is computed as the sum of all activity ratios within the
commercial network divided by the number of employees. This variable takes into account the activity ratio per employee. The cause-and-effect relation of the sum of average activity ratios with the axis being negative it gives that the bigger the variable, the less it influence on the axis. Part-time employment was thus a source of performance in 2005-2006.

The average age is calculated on the sum of the age of the collaborators divided by their number. As this variable has a positive correlation, it means that an experienced employee gives a better performance to the company.

The number of committed personnel within the CDF is given by to the number of new employees. The cause-and-effect relation with the axis is positive, thus one can increase the performance by hiring new employees. This explains the 2005-2006 trend of replacing “old” collaborators with new staffing having personal experience outside CDF (but in bank sector). One can remark that this process would not lower the average commercial network experience.

**BUILDING THE BSC USING PLS APPROACH**

The PLS method is not only giving a local information (the influence of variable on its axis), but also the global correlation between the axes.

The Kaplan and Norton method gives a simple global model where the “Personnel” axis directly influences the “Mortgage”, “Savings” and “Placement” axis with the latter influencing the “Other revenues” axis. The hypothesis Kaplan makes is a very restrictive one and generally not well adapted to the economic reality. The PLS method we propose has the advantage that the cause-and-effect relations are not imposed from the beginning, but they are constructed and decided during the PLS analysis, so that the model is the most statistically stable possible among all interaction models (the validation used requires Bootstrap technique).

In what follows, we present the global model related to the CDF data (please see figure no. 7).
This correlation model highlights the following conclusions:

1. The “Personnel” axis is indeed at the basis of the process, but not like a charge, but well in its occupancy ratio. In 2005-2006, reducing the global occupation ration by hiring new part-time collaborators, determines an improvement into the company’s performance. The importance of average employed age indicates that the extent of the experience outside the CDF institution is an important element in the performance analysis.

2. The personnel generate 2 types of incomes: savings and mortgages. This means that the employees have a direct influence on two types of standard clients of the bank: those having saving and thus potential investors and those having mortgages. The members of the latter category make savings even with the price of selling some of their placements to finance the mortgage (and thus losing the placement revenues).

3. The savings generates placements. Indeed making investments without having savings is synonymous with speculation, unless the savings are not in another bank institution. It is thus normal that the saver is able to invest his fortune and our model shows that not only this does not kill the savings, but this is a complement. The saving attracts investments.
4. The investments, made in 2005-2006, have been active and have generated additional incomes.

5. The mortgage, however, lower the investments and the additional incomes. One can remark from the figure that the level of mortgages does not have influence on savings, but on the investments and additional income.

This study corresponds closely to the intuitive management that the bank intended to apply. Moreover, this method is able to measure the impact of the mortgage on the investments and additional income on 2005-2006. This approach allows not only highlighting the pertinent strategic indicators, but also emphasizing the logic and technically justifies the strategy applied in the bank institution. Indeed, if there would have been a connection between the savings and the mortgage one would have concluded that a part of the saving (accumulated by the standard customer) would serve to finance its house. In the same way, a positive connection would have meant that the savings were used for investments (speculations). This model also allows validating the behavior of the standard customer in the CDF institute. If some are generally careful (saving - investments), others having a mortgage generally finance their house by decreasing the investments (thus decreasing their additional income). To follow its evolution, it suffices to renew the data in order to ensure the stability of the bank’s strategy. The correlation changes on the cause-and-effect connections in the model allow better understanding of the company’s trend. It also suggests measures to be taken in order to recalibrate, correct and predict with the help of selected indicators on the axes.

**FINAL CONCLUSIONS AND REMARKS**

The most important part in the PLS method is the choice of the axis and of the corresponding variables. If the aim of the study is strategic, it is necessary that the variables have to explain it well.

This brings us to decide to filter out the necessary elements for defining the strategy with respect to the chosen level of analysis. Indeed the measures of the strategy for a company or a sector do not have the same variables as one of a manufacturing unit. However, the manufacturing unit performance are determining in accumulating the necessary added value to finance the risk control, resource, alliances and competition. The defined strategy has to be quantifiable because what is not, this cannot be really regarded as strategic. Indeed, it is difficult to achieve a non-measurable goal.

To make sure that the variables are well correlated, we use the principal component analysis to validate the explanation of their correlation with their corresponded axes. The PLS approach, allows then to synthesize the strategic performance through cause-and-effect connections between variable and axes, on one hand, and between the axes themselves (hierarchisation), on the other hand. The use of this approach allows not only understanding the chain of causality of the strategically performance, but also reinforcing the intuition by a measure of the measure…

This approach also makes possible to simulate the impact of a resource allocation decision on the strategically performance. So why not substituting the budget with this approach…
How to make the strategy evolve is the tools used for measuring it are not. It is thus imperative to improve the balanced scorecard through measuring in a more simplified way the strategic performance. In our opinion it is better to improve the BSC while allowing a quick correction of the strategy, than to have a good vision from the start. This PLS approach could give a real economic competition advantage.

The objective of our work was to put in perspective the Balanced Scorecard in the debate between Kaplan and Norton theory and a more pragmatic approach. We built a strategic chart for a bank institution. We then tested the robustness of this model through the analysis of the links’ validity between the perspectives. With this intention, we used the SPSS software and a home-built PLS software. The results obtained showed us that the reasoning of Balanced Scorecard postulated in the problems can be formalized in a rigorous way. We can moderate the remarks advanced by Kaplan and Norton as we showed in the analysis of the case. In our illustration, we concluded, using the PLS software, a theoretical framework for a pragmatic approach. It should be stressed that the conditions necessary to arrive here are relatively constraining. In general, it is necessary to have sufficient number of indicators being used for estimating each perspective while respecting postulates such as normality or removing the strong correlation between the indicators. Then, it is essential to have a relatively viable and important sample of data. Moreover, the noted real use of Balanced Scorecard lies more in the diffusion and the comprehension of the strategy on all the levels within the company. To conclude, we think that it would be relevant to develop a tool making it possible to formalize and to validate the strategy in a theoretical way, while using a simplified model. The PLS method suffers from a lack of theoretical base. Kaplan and Norton's approach was strongly criticized in the literature for this point of view. The difficulty with which the researchers will be confronted lies in the reconciliation between the pragmatism sought by the institutions and the need for the theoretical framework.
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