# Relationships between Learning, Context and Competency: a Multilevel Study[1]

**Hugo Pena Brandão** *
E-mail address: hugopb@brturbo.com.br
Banco do Brasil, Fundação Getúlio Vargas – FGV Management
Brasília, DF, Brazil.

**Jairo Eduardo Borges-Andrade**
E-mail address: jairo@unb.br
Universidade de Brasília – IP/UnB
Brasília, DF, Brazil.

**Katia Puente-Palacios**
E-mail address: kep.palacios@gmail.com
Universidade de Brasília – IP/UnB
Brasília, DF, Brazil.

**Jacob Arie Laros**
E-mail address: jalaros@gmail.com
Universidade de Brasília – IP/UnB
Brasília, DF, Brazil.

* Corresponding author: Hugo Pena Brandão
SCES Trecho 2, Lote 22, Ed. Presidente Tancredo Neves, 1º andar, Brasília, DF, 70200-002, Brazil.

## Abstract

This study aims to identify the predictor variables for three types of management competencies: financial business management, process management and socio-environmental management. It was hypothesized that attributes of bank managers (such as the learning strategies they use) and those of the branches where they work (such as organizational support) are associated with the expression of management competencies at work. Structured questionnaires were used for data collection. Multilevel regression analyses (HLM) were performed to test the theoretical model of investigation. The sample was made up of 775 managers from the Bank of Brazil, spread among 239 bank branches. The greatest relative contribution to explain the management competencies came from intrinsic and extrinsic reflection, a learning strategy employed by managers at work. The managers' perceptions regarding the company's performance management practices, one dimension of organizational support, appeared as another important predictor. Other learning strategies and dimensions of organizational support, as well as the number of hours spent on training activities, revealed less expressive effects regarding management competencies. Practical recommendations are presented and the study's limitations and contributions are discussed.

**Key words**: management competencies; learning strategies at work; perceived organizational support; multilevel analysis; Bank of Brazil.

## Introduction

Researchers and organizations have shown a growing interest in the topics of learning and competency at work (Calhoun, Vincent, Calhoun, & Brandsen, 2008; Gonczi, 1999). Despite efforts, especially in the theoretical field, to explain the relationship between these constructs and the influence that context has on them, many questions remain unanswered. There are theoretical assumptions and constructions that still lack empirical sustentation (Brandão, 2007).

Furthermore, despite the fact that organizations constitute integrated systems, characterized by having a multiple level structure (Kozlowski & Klein, 2000), the great majority of research done in this field, including that done on learning and competency, does not consider this assumption and simply studies each organizational level in isolation (individual, team, unit or organization as a whole, for example). Due to this, there is a shortage of investigations which not only strive to empirically examine the relationships between these constructs, but which also adopt a multilevel perspective in their analyses (Kreft & Leeuw, 1998; Van Yperen, Van den Berg, & Willering, 1999).

The study presented here had as its objective the development and testing of a theoretical model of investigation, with the expression of management competencies at work as its criterion variable. Based on a multilevel theoretical model and making use of a compatible analysis tool (Hox, 2010; Snijders, 2008), the intention was to empirically verify the existence of predictive relationships between: (a) on one hand, bank manager attributes (such as the informal learning strategies they employ and the number of hours they spend on formal learning activities) and the attributes of the bank branches where they work (such as organizational support, for example); and (b) on the other hand, the expression of competencies at work.

## Background Literature and Theoretical Model

Although competency[2] constitutes a complex and multifaceted concept (Gonczi, 1999; McLagan, 1997), it is traditionally understood as the individual's capability to perform a role in a particular professional context (Brandão & Borges-Andrade, 2008). It is derived from personal attributes, such as knowledge, skills and attitudes (Durand, 2000; Gonczi, 1999), which become evident through the individual's behavior at work (Whiddett & Hollyforde, 1999). Competencies are revealed as people behave in the professional situations they come up against (Zarifian, 1999). They are generally described in terms of behavioral patterns, which represent the organization's expectations regarding the performance of its employees (Gonczi, 1999). The behaviors expected from those people while exercising managerial functions are usually called management competencies (Boak & Coolican, 2001; Cockerill, 1994).

Competencies are developed through the learning process (Sonnentag, Niessen, & Ohly, 2004), which involves acquiring knowledge, skills and attitudes (Durand, 2000; Illeris, 2004). Learning may be defined as a relatively lasting change in a person's capacity or behavior that is transferable to new situations (Pozo, 2000). It constitutes the process through which the competency is developed (Gonczi, 1999; Le Boterf, 1999), while the expression of competencies represents a manifestation of what the person learned (Freitas & Brandão, 2006).

Learning processes may be formal or informal, in such a way that the individual is able to learn just as much from training and development activities (T&D) that are formally undertaken by the organization as from learning practices informally used in the workplace (Sonnentag et al., 2004). These informal activities that people adopt in their professional context – in order to gain knowledge and skills – are referred to as learning strategies at work (Sonnentag et al., 2004). According to Holman, Epitropaki and Fernie (2001), it is possible to empirically distinguish six types of informal learning strategies:

.   reproduction: mental repetition of information, without reflecting on its meaning;

.   intrinsic reflection: formulating mental structures which interrelate the component elements of work;

.   extrinsic reflection: formulating mental structures that connect work to other aspects of the company;

.   interpersonal help seeking: obtaining assistance from other people;

.   seeking help from written material: searching documents, manuals, databases, books and other non-social sources; and

.   practical application: experimentation, trying things out in practice.

The first three strategies are classified as cognitive, while the last three are considered behavioral. Theorists from this area defend that the use of these strategies is positively associated with the effectiveness of the learning process (Warr & Downing, 2000), or in other words, with the acquisition of knowledge, skills and attitudes. Some studies (Felix, 2005; Sonnentag & Kleine, 2000) show that the amount of time dedicated by the individual to training activities or to practices of informal learning affects the domain and the expression of competencies at work.

Learning and expression of competencies can be influenced by employee attributes as much as it can be by contextual variables (Le Boterf, 1999; Sonnentag *et al.*, 2004). Characteristics of the work team (such as managerial support and organizational climate) and of the organization (such as culture, rules and other aspects) can facilitate or restrict the development of competencies as well as the possibility to apply them at work (Abbad, Freitas, & Pilati, 2006; DeNisi, 2000).

Studies carried out on this subject show that the employee's perception on the organizational support can predict the expression of competencies at work (Abbad, Pilati, & Borges-Andrade, 1999; Rhoades & Eisenberger, 2002). Perceived organizational support refers to the worker's perception of the quality of the treatment he or she receives as compensation for the efforts made at work (Eisenberger, Huntington, Hutchison, & Sowa, 1986). It is related to the employee's opinions about how much the company values the employee's contributions and how much it takes care of the employee's well-being (Abbad *et al.*, 1999). Such opinions about organizational support can be classified into four dimensions of the work context (Abbad *et al.*, 1999):

.   performance management practices: describes the actions taken by the organization related to improving work processes, to professional training, to stimulating employee participation, and to the availability of orientation, among others;

.   workload: involves goals and time limits, workday, and work volume;

.   material support: meaning the availability, quantity and quality of material, equipment, tools, furniture, and other elements needed to work; and

.   promotion and reward practices: includes organizational policies regarding incentives, professional ascent, and compensation and employee appreciation.

According to Abbad, Freitas and Pilati (2006), even though the learning activities undertaken by the individual have promoted the acquisition of knowledge, skills and attitudes, it is possible that this learning process does not generate favorable effects on the expression of competencies at work, if the individual doesn't have the adequate organizational support in the context of work. So, organizational support variables can moderate the relationship between the acquisition and the expression of competencies at work (Brandão & Borges-Andrade, 2008).

The influence that these variables have on the work context characterizes one of the main presuppositions in the organizational behavior field of study: that an organization composes an

integrated and multilevel system, since its results are influenced by processes occurring on various levels, which interact with each other in an interdependent manner (DeNisi, 2000).

According to Kozlowski and Klein (2000), if one level of the organization influences and is influenced by other levels, this should be taken into consideration in theoretical models and their empirical tests; given that no single level can solely explain, in a complete and appropriate manner, the nature of organizational behavior phenomena. Despite the fact that it is assumed that the development and expression of an individual's competencies at work can be influenced just as much by the person's own attributes as by the characteristics of the team and organization to which the person belongs (Abbad *et al.*, 2006), many times this relationship is not well articulated nor adequately dealt with in empirical research.

Multilevel analysis constitutes a theoretical and methodical approach which has been indicated for filling the gap between theoretical assumptions and their empirical tests (Jex & Bliese, 1999; Kozlowski & Klein, 2000). This approach defends that the lowest level of an organization (the individual, for example) is contained in the higher levels (team, unit and organization) and that people can modify organizational processes just as much as groups and the organization itself can influence the performance of individuals (DeNisi, 2000).

The multilevel approach permits the construction of explanatory models containing data that represents different levels, thus making it possible to assess the relative importance of individual and organizational attributes in the relationships between the studied variables (Elovainio, Kivimaki, Steen, & Kalliomaki-Levanto, 2000; Hox, 2010). According to Kozlowski and Klein (2000), by admitting the investigation of a phenomenon, analyzing it at multiple levels, such an approach favors a more integrated and vast understanding of different constructs, making it possible to build an organizational science that is theoretically rich and may have practical relevance.

From a mathematical point of view, multilevel analysis permits the examination of particular contributions of predictor variables from different levels towards explaining the phenomenon of interest, as well as investigating the presence of random coefficients (Hox, 2010; Kreft & Leeuw, 1998), which indicates that the magnitude of the effect produced by these predictors varies according to the different scenarios in which they occur (for example, in different teams or work units). Its utilization is recommended not only for theoretical reasons, but also because this approach uses procedures which improve the reliability of statistical tests. By taking the variance within each group and between the groups into consideration, multilevel models produce more precise predictive estimates, in addition to providing a more adequate description of the relationships between the variables studied (Van der Vegt, Emans, & Van de Vliert, 2001). For this reason, a multilevel approach was chosen to serve as the foundation for constructing and testing this theoretical model.

The main purpose of this study was to test a theoretical model of the expression of management competencies at bank branches, which was formulated on the basis of the theoretical and empirical foundations reviewed in this section. The variables included in this study and the hypothesized predictive relationships (direct and moderated) are described in Figure 1. This model is structured into two levels of analysis (Elovainio *et al.*, 2000), in which individual employees holding management positions (level 1) at the Bank of Brazil are grouped in organizational units called bank branches (level 2). It deals with a cross-level model because it specifies relationships between constructs at different levels, looking to unite the company's micro and macro perspectives (Kozlowski & Klein, 2000).
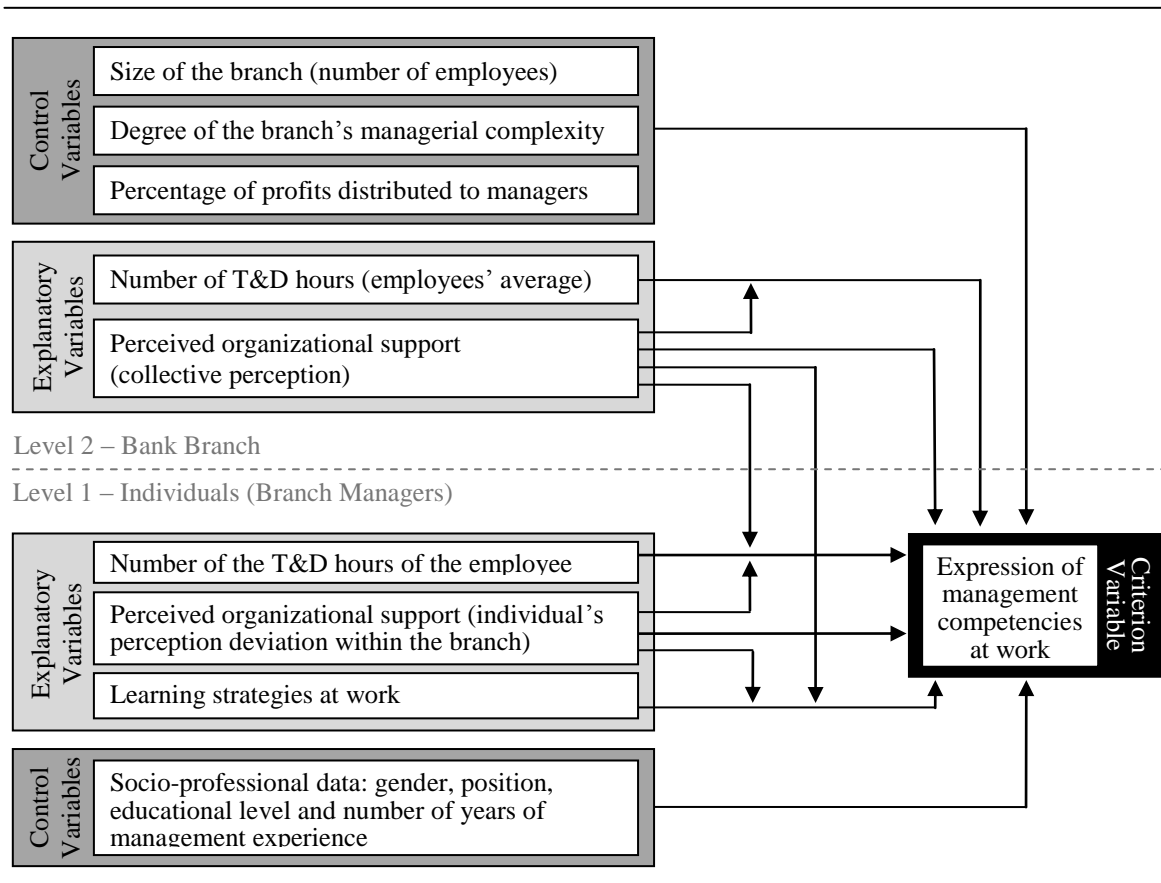
**Figure 1.** Theoretical Model of the Expression of Management Competencies at Bank Branches.

## Method

The study was done at the Bank of Brazil, a company partially owned by the Brazilian Government, whose mission is "to be the solution in financial services and intermediation, meet the expectations of customers and shareholders, strengthen the commitment between employees and the company and contribute towards the development of the country" (Banco do Brasil, 2008). When this study was carried out in 2008, the Bank of Brazil had more than US$300 billion in assets, about 50 million customers, 4,052 large, full-service branches in Brazil, 11,031 small, limited-service branches in Brazil, 42 branches abroad, 81,855 employees, and 9,119 interns (Banco do Brasil, 2008).

Its branches are business units that account for the product and service sales, and are segmented according to bank customer markets (retail, private, small business, large companies, government, and other markets). Each branch is managed by an employee who holds the position of General Manager. Depending on the number of employees and customers and on the potential size of the customers market, a branch may have other management positions (accounts managers, for instance), which are subordinated to the general manager.

In recent years, based on assumptions of management models and instruments such as Balanced Scorecard - BSC (Kaplan & Norton, 1997) and competence-based management (Durand, 2000; Heene & Sanchez, 1997), the Bank has managed the performance of its branches through the establishment of objectives, goals and competencies, aligned with its organizational strategy, in different performance perspectives: financial, customers, processes, organizational behavior and society (Brandão *et al.*, 2008).

Considering these characteristics of its management practices, the company has encouraged the accomplishment of applied research that may support and guide its strategies and management actions. This is the case of studies carried out by: (a) Brandão *et al.* (2008), describing the development and implementation of the competence-based management model adopted by the bank; (b) Leite and Porsse (2003), analyzing organizational learning processes in the company; (c) Brandão, Borges-Andrade, Freitas and Vieira (2010), which describes the development and validation process of a scale to measure management competencies at bank branches; and (d) Brandão and Borges-Andrade (2011), which describes the development and validation process of a scale to measure learning strategies used by bank managers for developing their competencies. The measurement scales just listed were used for data collection in the present study, as described ahead.

Primary and secondary data were used to test the hypothesized relationships in Figure 1. Primary data was collected through structured questionnaires – previously subjected to semantic validation[3] –, completed and returned by the internal mail system of the organization being studied, in March and April of 2008. The instruments were sent to all of the 2,205 managers working in 329 branches, which were randomly selected. Secondary data was obtained from Bank databases.

## Sample

A total of 926 questionnaires were received, representing a return rate of 42%. Questionnaires were eliminated when they: (a) had more than 10% of missing answers; (b) received the same answer on the scale for all items (unvarying responses); (c) were multivariate outliers (identified by the Mahalanobis distance); (d) had respondents who worked for less than four months in their respective branches (the minimum amount of time needed to share perceptions); or (e) belonged to respondents who constituted the only reply from the branch where they worked (branches with only one respondent). With these exclusions, the adjusted sample totaled 775 participants grouped into 239 bank branches, with groups ranging from 2 to 8 members (an average of 3.25 managers per branch).

On the whole, the respondents were males (69.3%), holding the position of team manager (69.6%), had a college degree or post-graduate degree (84%) and on average had around 8 years of experience in managerial functions.

## Measures

The following measures were taken in order to test the model:

a) **Expression of management competencies**: criterion variable, pertaining to the individual level (level 1), measured with fourteen items from the scale developed by Brandão *et al.* (2010), which described observable behaviors at work, representing three dimensions of management competencies: financial business management (4 items, $\alpha = .82$); process management (4 items, $\alpha = .80$); and socio-environmental management (6 items, $\alpha = .86$). Participants responded on a 10-point scale anchored at the extremes by **non-expressed competency** (1) to **fully expressed competency** (10). An example item is **Monitoring the quality of internal processes, in order to avoid having to replicate previous work efforts**;

b) **Number of T&D hours per branch**: explanatory variable at the branch level (level 2), which represents the average number of hours that branch managers dedicated to training and development activities (T&D) in 2007. It can be interpreted as an effort to develop competencies (Felix, 2005; Sonnentag *et al.*, 2004). Data were collected from secondary sources (database from the organization being studied);

c) **Perceived organizational support (collective perception)**: explanatory variable, measured with a scale adapted from Abbad, Pilati and Borges-Andrade (1999). This measure has 28 items distributed throughout four dimensions: material support (6 items, $\alpha = .91$); performance management practices (7 items, $\alpha = .87$); workload (7 items, $\alpha = .85$); and promotion and reward

practices (8 items, α = .85), which were responded to on a 10-point agreement scale, ranging from 1 (**I totally disagree**) to 10 (**I totally agree**). An example item is **In the organization where I work, the employees receive all orientation and information needed to efficiently execute their activities**. The data were collected at the individual level (level 1), through the managers self-report, and later pooled together (by the average of responses from each branch) to represent the branch level (level 2);

d) **Number of T&D hours per employee**: explanatory variable pertaining to the individual level (level 1), which represents the number of hours each employee spent on T&D activities in 2007 (secondary data);

e) **Perceived organizational support (individual's perception deviation within the branch)**: explanatory variable, pertaining to the individual level (level 1), which represents the relative position of the person within the group (the branch). It constitutes the deviation of the individual support score compared to the branch's average (Hox, 2010; Kozlowski & Klein, 2000); that is, the difference between individual perception and collective perception of organizational support. Although the perceived support reflects certain beliefs held by members of a group regarding the quality of the treatment they receive from the company - conceived as a group level variable - such beliefs may result as much from the objective qualities of the support offered by the company as from the employee's personal characteristics. Two employees from the same bank branch may report differing levels of perceived support, depending on their capacity to process information and on their interests, experiences and other personal attributes (Hox, 2010). As a result, the scores on perceived organizational support were separated into two distinct measurements: (a) one relative to the average of the workers' perceptions at a branch, pertaining to level 2 of the analysis; (b) the other relative to the deviation variable within the branch (the individual score minus the group average), representing level 1 of the analysis; and

f) **Learning strategies at work**: explanatory variable belonging to the individual level (level 1). Measure developed by Brandão and Borges-Andrade (2011), based on Holman *et al.* (2001), and Pantoja (2004), it contains 26 items grouped into five dimensions: extrinsic and intrinsic reflection (9 items, α = .92); interpersonal help seeking (5 items, α = .88); seeking help from written material (5 items, α = .79); reproduction (4 items, α = .79); practical application (3 items, α = .82). Participants responded on a 10-point scale, varying from 1 (**I never do**) to 10 (**I always do**). An example item is **I ask for help from my co-workers when I need to learn something at work**.

Besides these measures, the following were used as control variables: (a) on level 1 of analysis, gender, position held, education level, and years of management experience of the participants; and (b) on level 2, the percentage of profits distributed to managers, size and managerial complexity of the branch (secondary data). In this way, the intention was to isolate the eventual effects of these variables from the effects produced by the explanatory variables, which constitute the main object of interest of this study.

The procedures adopted to develop and to evaluate the psychometrical quality of the three perceptual measures used (management competencies, learning strategies at work and perceived organizational support) are described in detail by Brandão *et al.* (2010), Brandão and Borges-Andrade (2011) and Abbad *et al.* (1999), respectively. All the dimensions of these three scales are valid and internally consistent[4], showing Cronbach's alphas equal to or above .79, as previously stated.

## Data analysis

After collecting the primary data, the statistical assumptions were verified in order to carry out a multilevel regression analysis (hierarchical linear model). Considering the recommendations of Miles and Shevlin (2001) and Maas and Hox (2005), it can be affirmed that: (a) there was sufficient linearity in the relationships between the explanatory variables and the three dimensions of management competencies (criterion variables), which was verified by visual inspection of scatter plots and observing the magnitude of the correlations between the variables; (b) no signs of multicollinearity

were encountered since all of the correlation coefficients between the explanatory variables were less than .60; and (c) the sample size was large enough on both levels (individuals and branches) to diminish the eventual effects of small deviations from the normality. In single-level regressions, the sample should contain at least 50 individuals plus 8 respondents for each explanatory variable (Tabachnick & Fidell, 2007). In multilevel regressions, the sample should contain more than 50 groups (level 2) and, to ensure greater accuracy of estimated parameters, a large number of groups is more important than a large number of individuals per group (Maas & Hox, 2004, 2005). Since in the present study the adjusted sample totaled 775 individuals grouped into 239 bank branches, it is safe to assume that this sample is large enough for both levels of analysis (individuals and groups) in order to generate reliable estimates. After testing the regression models, it was verified, following the recommendations of Rasbash, Steele, Browne and Prosser (2004), that these models met the assumptions of homoscedasticity and of a normal distribution of regression residuals, aspects which will be explained later when presenting the results.

Another requirement which was examined refers to the intraclass correlation (ICC) of criterion variables, a coefficient that indicates the magnitude of differences between the groups (branches) or the answers consistency (Kreft & Leeuw, 1998). The calculations of this index are based on the comparison of the amount of variance between groups with the amount of variance within groups (Kozlowski & Klein, 2000). The intraclass correlation indicates which proportion of the variance can be attributed to differences among the units of the macrolevel (bank branches). Since the existence of significant differences at the level 2 of analysis, related to the criterion variables, constitutes an assumption for constructing and testing multilevel models (Van der Vegt *et al.*, 2001), the ICC of these variables was calculated in order to confirm that the collected data justified adopting a multilevel approach.

The three dimensions of competencies showed that they had intraclass correlations different from zero: financial business management (ICC = .05), process management (ICC = .04) and socio-environmental management (ICC = .11). This coefficient indicates that 5% of the variance of financial business management competencies, 4% of the variance in the process management competencies, and 11% of the variance in the socio-environmental competencies can be explained by differences between bank branches (level 2).

Although it seems to be little substantial, intraclass correlations of this magnitude have justified the adoption of multilevel analysis (Snijders & Bosker, 1999), since they suggested the existence of certain dependence between individual observations, causing the so-called design effect (Hox, 2010). As the average size of the groups in this research is of 3.25 respondents, the design effect would reduce the effective size of the sample, according Hox (2010), to 696 (reduction of 10.2% in the adjusted sample) in the case of expression of financial management competencies, and 711 (8.3% reduction) and 621 (reduction of almost 20%) in relation to the process management competencies and to socio-environmental management competencies, respectively, if the data were analyzed using conventional regressions. Considering these parameters, using conventional regression models (ordinary least squares [OLS]) for data analysis could lead to an underestimation of regression standard errors, undermining the reliability of tests (Elovainio *et al.*, 2000; Van Yperen *et al.*, 1999) and increasing the likelihood of Type-1 Errors (Kreft & Leeuw, 1998). This is the reason why a multilevel regression model was considered more appropriate in the present research.

Before proceeding with the model testing, the adequacy of the perceived organizational support measures (collective perception) was examined in order to represent group level attributes (bank branches). This was necessary because, even though perceived organizational support is theoretically defined as a group level construct (Abbad *et al.*, 1999), the data regarding this variable were collected from individual responses from bank managers. In order to verify if the manager's individual perceptions (level 1) could be aggregated (arithmetic mean) to represent the characteristics of the branches where they work (level 2), the intraclass correlation coefficient (ICC) and the interrater agreement index ($r_{wg}$) were calculated for the four dimensions of perceived support, as James, Demaree, and Wolf (1993), and Kozlowski and Klein (2000) recommend. Such statistical indicators reveal the degree of similarity of the individual perceptions, which, if the magnitude is sufficient,

justifies the adoption of the arithmetic mean as a level 2 measure. The following coefficients were obtained: material support (ICC = .24; $r_{wg}$ = .93); management performance practices (ICC = .12; $r_{wg}$ = .94); workload (ICC = .13; $r_{wg}$ = .81); and promotion and reward practices (ICC = .16; $r_{wg}$ = .86). Although some dimensions of perceived organizational support had shown ICC values of only moderate magnitude (approximately .12), all the dimensions of this construct revealed $r_{wg}$ coefficients greater than .80, which indicate there was sufficient homogeneity of responses within groups (bank branches) to aggregate individual observations (Kozlowski & Klein, 2000; Kreft & Leeuw, 1998, Tucker, Sinclair, & Thomas, 2005). Together, these coefficients (ICC and $r_{wg}$) attest to the construct validity of the aggregate measures (branches averages).

After evaluating all of these requirements, the model was tested. Beforehand, all the explanatory and control variables were standardized, in order to allow for comparisons between the regression coefficients.

The analyses were done in six steps, utilizing the deviance (-2*Loglikelihood) to verify the adjustment of the models, as recommended by Hox (2010). In the first step, the called null or empty model was computed, to define a base of comparison in relation to the following steps (Hox, 2010; Van Yperen *et al.*, 1999) and to decompose the variance of the expression of management competencies in the individual level variance (level 1) and in the branch level variance (level 2) (Van der Vegt *et al.*, 2001). In the second step, control variables were inserted at the individual level (gender, position held, educational level and management experience) and at the branch level (size, degree of branch's managerial complexity, and percentage of profit distribution). In the third step, explanatory variables at the individual level were added (number of T&D hours, the individual deviation for the four factors of perceived organizational support, and the five factors of learning strategies at work). In the fourth step, explanatory variables at the branch level were included (average of T&D hours and the four factors of collective perception of organizational support). In the fifth step, the existence of random effects was verified (Hox, 2010; Kozlowski & Klein, 2000) for level 1 variables, while the sixth step included interactions between explanatory variables from levels 1 and 2.

Data analysis was performed with MLwiN, version 2.02, a software for analyzing hierarchically structured data (Rasbash, Steele, Browne, & Prosser, 2004; Snijders, 2008), using the Iterative Generalized Least Squares (IGLS) estimation method.

## Results

In relation to the criterion variable **expression of financial business management competencies**, the empty model was initially computed, which revealed an estimate of -2* Loglikelihood (deviance) equal to 2,673.67. This amount served as a parameter of comparison to verify the adjustment of the models in subsequent stages, once the deviance reflects the lack of adjustment between the data and the model. In step 2, level 1 (individual) and level 2 (branch) control variables were inserted as described in the previous Figure 1. In this stage, three variables revealed significant effects: degree of branch's managerial complexity, position held, and education level of the participant; the first one pertaining to level 2 and the last two pertaining to level 1. The deviance was reduced to 2,642.91, and this reduction of 30.46 was significant at 5% level since the chi-square test (dividing the difference in deviance by the degrees of freedom) was above the critical value of 1.96 (Hox, 2010; Snijders, 2008).

Level 1 explanatory variables were inserted in step 3. Significant effects were from: the frequency of use of **extrinsic and intrinsic reflection** and of **seeking help from written material** learning strategies and the individual's perception (deviation within the branch) about the company's **performance management practices** and the **workload** (factors of perceived organizational support). There was a substantial decrease in the deviance (182.32), which was significant ($\chi^2$ = 45.58), indicating an improvement in the adjustment of the model. Table 1 assists in visualizing and

comparing the estimated parameters in steps 1, 2 and 3 for the criterion variable **expression of financial business management competencies**. Given such parameters, it is worth mentioning that, in step 3, the regression coefficients of two control variables lost significance, but these were maintained in the model, for two reasons: (a) they showed significance in step 2, whose adjustment served as a parameter for comparison in relation to the other models; and (b) their removal damaged the adjustment of the model (elevating the deviance).

Table 1

**Comparison between Models 1, 2 e 3 for the Expression of Financial Business Management Competencies**

| Predictor Variables | Model 1 (Empty) | | Model 2 (Reference): Inclusion of Control Variables | | Model 3: Inclusion of Level 1 Explanatory Variables | |
|---|---|---|---|---|---|---|
| **Fixed Parameter** | Effect (β) and Standard Error | *t ratio* | Effect (β) and Standard Error | *t ratio* | Effect (β) and Standard Error | *t ratio* |
| ($\gamma_{00}$) Intercept | 8.02 (.05) | --- | 8.01 (.05) | --- | 8.01 (.05) | --- |
| ($\gamma_{01}$) Degree of branch's managerial complexity | | | .11 (.05) | 2.20* | .09 (.05) | 1.80 |
| ($\gamma_{10}$) Position held | | | .14 (.05) | 2.80* | .03 (.05) | .60 |
| ($\gamma_{20}$) Education level | | | .16 (.05) | 3.20* | .15 (.05) | 3.00* |
| ($\gamma_{30}$) Extrinsic and intrinsic reflection (learning strategy) | | | | | .46 (.06) | 7.67* |
| ($\gamma_{40}$) Seeking help from written material (learning strategy) | | | | | .16 (.06) | 2.67* |
| ($\gamma_{50}$) Performance management practices (perceived organizational support) | | | | | .14 (.05) | 2.80* |
| ($\gamma_{60}$) Workload (perceived support - individual deviation within the branch) | | | | | .09 (.04) | 2.25* |
| **Random Parameter** | Variance and Standard Error | *t ratio* | Variance and Standard Error | *t ratio* | Variance and Standard Error | *t ratio* |
| ($\sigma^2_{u0}$) Level 2 Variance | .09 (.06) | 1.50* | .08 (.06) | 1.33 | .08 (.05) | 1.60* |
| ($\sigma^2_{e}$) Level 1 Variance | 1.83 (.11) | 16.64* | 1.77 (.11) | 16.10* | 1.37 (.08) | 17.13* |
| **Model Adjustment** | | | | | | |
| Deviance (-2*Loglikelihood) | 2,673.67 | | 2,642.91 | | 2,460.59 | |
| Number of estimated parameters | 3 | | 6 | | 10 | |
| Difference between deviances | | | 30.76 | | 182.32 | |
| Difference between no. of parameters (d.f.) | | | 3 | | 4 | |
| Test $\chi^2$ | | | 10.25* | | 45.58* | |

**Note.** *$p < .05$.

Then in step 4, the explanatory variables from level 2 were inserted. Although only two variables (the number of T&D hours and the collective perception on **material support**) revealed significant effects, there was a new decrease in the deviance (15.79), which was significant ($\chi^2 = 7.90$), indicating an improvement in the model adjustment. In step 5, the random effects in level-1 variables were inserted. The **seeking help from written material** learning strategy and the individual deviance of the perceived **performance management practices** were shown to have random effects – also called aleatory – indicating that the magnitude of the effect exerted by these variables varies from branch to branch. One of these variables (seeking help from written material) revealed effects only

marginally significant at the .10 level, yet it was maintained in the model because its removal damaged the adjustment of the model (elevating the deviance). In this step, a new decrease in the deviance was observed, which shows an improvement in the model fit. According to parameters indicated by Hox (2010) and Snijders (2008), the reduction of 20.59 in the deviance was significant at 5% level, as shown in Table 2, since the chi-square test ($\chi^2 = 4.12$, calculated by dividing the difference in deviance by the number of degrees of freedom) was above the critical value of 1.96.

Finally, in step 6, interaction terms were inserted between level 1 and 2 variables. Significant interaction effects were observed between the following variables: (a) the **extrinsic and intrinsic reflection** learning strategy and the individual deviation of perceived **workload**; and (b) the **seeking help from written material** and the individual deviation of perceived **workload**. This step revealed the model with the best adjustment, due to the fact that the inclusion of the previously stated interaction terms brought about a new reduction in the deviance (7.70), which was significant at 5% level ($\chi^2 = 3.85$). Employing the procedures recommended by Hox (2010) and Laros and Marciano (2008), the explained variance can be estimated at each level of analysis (approximate $R^2$). After isolating the effects of the control variables (degree of bank branch's managerial complexity, position held and educational level of the participant), at least 22.6% of level 1 variance and 37.5% of level 2 variance were explained by the other variables of this model. Table 2 shows the estimated parameters in steps 4, 5, and 6 for the criterion variable **expression of financial business management competencies**.

Table 2

**Comparison between Models 4, 5, and 6 for the Expression of Financial Business Management Competences**

| Explanatory Variables | Model 4: Inclusion of Level 2 Explanatory Variables | | Model 5: Inclusion of Random Effects Level 1 Variables | | Model 6: Inclusion of Interaction Terms | |
|---|---|---|---|---|---|---|
| **Fixed Parameters** | **Effect (β) and Standard Error** | *t ratio* | **Effect (β) and Standard Error** | *t ratio* | **Effect (β) and Standard Error** | *t ratio* |
| ($\gamma_{00}$) Intercept | 8.01 (.05) | --- | 8.01 (.05) | --- | 8.01 (.05) | --- |
| ($\gamma_{01}$) Degree of branch's managerial complexity | .08 (.05) | 1.60 | .08 (.05) | 1.60 | .09 (.05) | 1.80 |
| ($\gamma_{10}$) Position held | .03 (.05) | .60 | .03 (.05) | .60 | .03 (.05) | .60 |
| ($\gamma_{20}$) Education level | .14 (.05) | 2.80* | .13 (.05) | 2.60* | .12 (.05) | 2.40* |
| ($\gamma_{30}$) Extrinsic and intrinsic reflection (learning strategy) | .47 (.06) | 7.83* | .49 (.06) | 8.17* | .47 (.06) | 7.83* |
| ($\gamma_{40}$) Seeking help from written material (learning strategy) | .13 (.06) | 2.17* | .12 (.06) | 2.00* | .13 (.06) | 2.17* |
| ($\gamma_{50}$) Performance management practices (perceived organizational support) | .14 (.05) | 2.80* | .13 (.05) | 2.60* | .14 (.05) | 2.80* |
| ($\gamma_{60}$) Workload (perceived support - individual deviation within the branch) | .09 (.04) | 2.25* | .09 (.04) | 2.25* | .09 (.04) | 2.25* |
| ($\gamma_{02}$) Number of T&D hours (branch) | .15 (.05) | 3.00* | .15 (.05) | 3.00* | .15 (.05) | 3.00* |
| ($\gamma_{03}$) Material support (collective perception on organizational support) | .09 (.04) | 2.25* | .10 (.04) | 2.50* | .11 (.04) | 2.75* |
| ($\gamma_{70}$) Interaction: reflection *x* workload – individual deviation | | | | | -.16 (.06) | 2.67* |
| ($\gamma_{80}$) Interaction: seeking material help *x* workload - individual deviation | | | | | .17 (.06) | 2.83* |

**Continues**

**Table 2 (continued)**

| Explanatory Variables | Model 4: Inclusion of Level 2 Explanatory Variables | | Model 5: Inclusion of Random Effects Level 1 Variables | | Model 6: Inclusion of Interaction Terms | |
|---|---|---|---|---|---|---|
| **Random Parameter – Level 2** | **Variance and Standard Error** | *t ratio* | **Variance and Standard Error** | *t ratio* | **Variance and Standard Error** | *t ratio* |
| ($\sigma^2_{u0}$) Variance - intercept | .05 (.05) | 1.00 | .10 (.05) | 2.00* | .11 (.05) | 2.20* |
| ($\sigma^2_{u4}$) Slope variance - seeking help from written material | | | .05 (.04) | 1.25 | .04 (.04) | 1.00 |
| ($\sigma^2_{u5}$) Slope variance - performance management practices - deviation | | | .08 (.04) | 2.00* | .09 (.04) | 2.25* |
| **Random Parameter – Level 1** | **Variance and Standard Error** | *t ratio* | **Variance and Standard Error** | *t ratio* | **Variance and Standard Error** | *t ratio* |
| ($\sigma^2_{e}$) Level 1 Variance | 1.37 (.08) | 17.13* | 1.18 (.08) | 14.75* | 1.17 (.08) | 14.63* |
| **Model Adjustment** | | | | | | |
| Deviance (-2*Loglikelihood) | 2,444.80 | | 2,424.21 | | 2,416.51 | |
| Number of estimated parameters | 12 | | 17 | | 19 | |
| Difference between deviances | 15.79 | | 20.59 | | 7.70 | |
| Difference between no. of parameters (d.f.) | 2 | | 5 | | 2 | |
| Test $\chi^2$ | 7.90* | | 4.12* | | 3.85* | |

**Note.** *$p < .05$.

Aiming to examine the nature of the associations between the variables, a plotting of identified interactions was done, using the procedures suggested by Aiken and West (1991). In Figure 2, the first graph shows the relationship between using the **reflection** learning strategy and the expression of **financial business management competencies**, as a function of the difference between individual and collective perceptions regarding **workload** (individual deviation within the branch). From the slopes of the regression lines, it is possible to see that when an individual's perception regarding the workload is more positive than the branch's collective perception (a standard deviation above the difference between individual and group perceptions), the relationship between the use of **extrinsic and intrinsic reflection** and the expression of **financial business management competencies** is weaker. On the other hand, when an individual perceives the workload as more inadequate compared to the group perception (a standard deviation below the difference between individual and collective perceptions), then the relationship between the **reflection** and the expression of **financial business management competencies** is revealed as stronger. This indicates that the positive individual deviation of the perceived **workload** (individual deviation within the branch) lessens the effect of the **extrinsic and intrinsic reflection** on the **financial business management competencies**.

The second graph in Figure 2 shows the relationship between using the strategy of **seeking help from written material** and the expression of **financial business management competencies**, as a function of the difference between individual and collective perceptions about **workload** (deviation within the branch). It can be noted that, when the individual's perception regarding workload is more negative than that of the group (bank branch), the relationship between the use of **seeking help from written material** and the expression of **financial business management competencies** is practically null. On the other hand, when an individual's perception regarding workload is more positive than the group perception, then there exists a reasonable relationship between **seeking help from written material** and the expression of these competencies. Better said, the positive individual deviation of the perceived **workload** (deviation within the branch) strengthens the effect of **seeking help from written material** over the **financial business management competencies**.
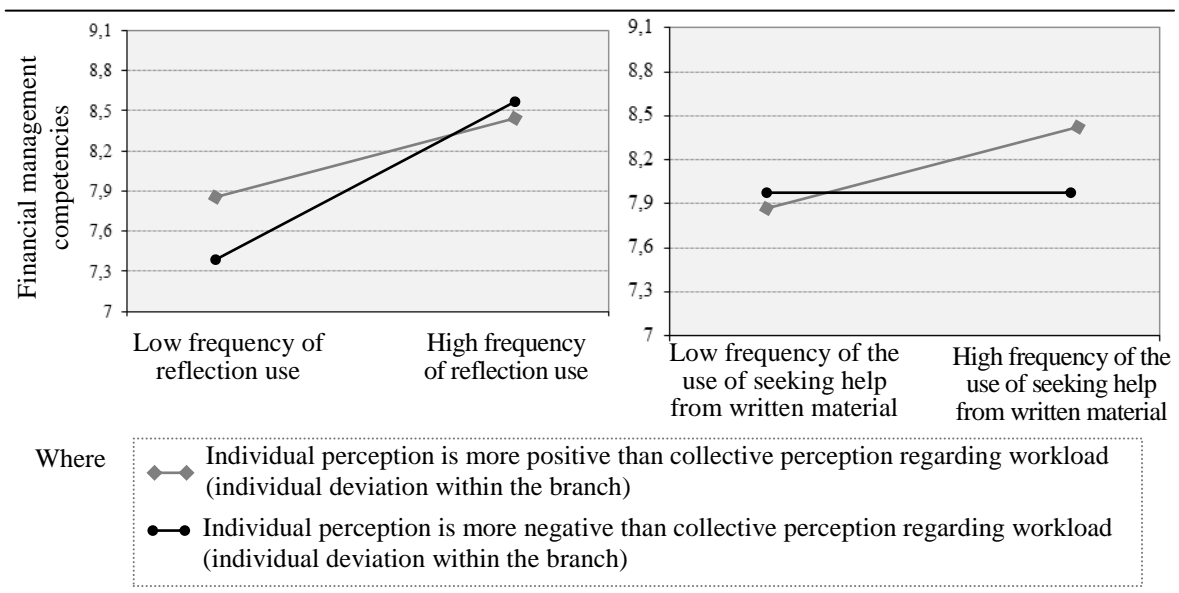
**Figure 2.** Plot of the Moderating Effect Exerted by Workload on Relationships between Learning Strategies and the Expression of Financial Business Management Competencies

Figure 3 presents the theoretical-empirical model for the expression of financial business management competencies, showing the predictor variables, the nature of the relationships (direct and moderating) and the magnitude of the effect ($\beta$) that they exert on the criterion variable.
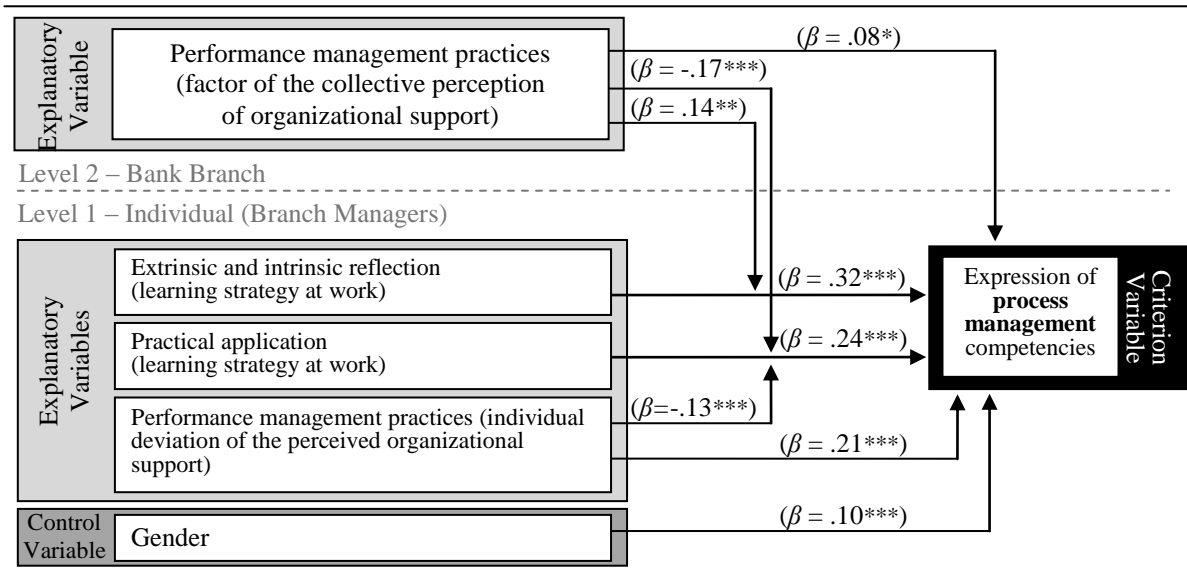
Finally, following orientations from Rasbash *et al.* (2004), and Laros and Marciano (2008), graphs on the dispersion of standardized residuals were produced, at levels 1 and 2 of analysis; which indicated that the assumptions of normality of the distribution of residuals, linearity of relationships, and homoscedasticity were not violated by the tested model.
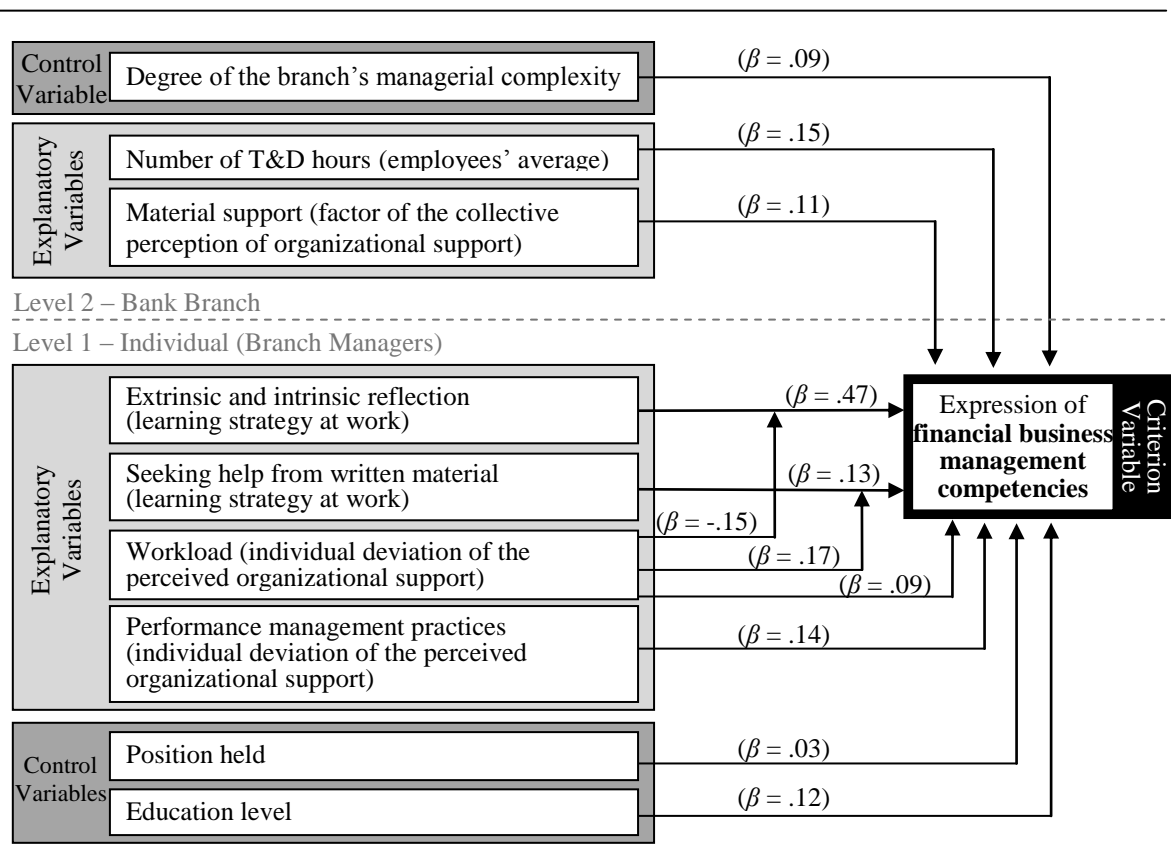
**Figure 3.** Theoretical-empirical Model of the Expression of Financial Business Management Competencies.

The previously stated steps were also adopted for testing the models relative to the other two criterion variables: the expression of process management and socio-environmental management competencies, whose final results are shown in Figures 4 and 5. After isolating the control variables' effects, the explanatory variables presented in Figure 4, all together, explain 32.8% (approximate $R^2$) of the variance of process management competencies at the level 1 of analysis (individuals); while those described in Figure 5, all together, explain 25.8% (approximate $R^2$) of the variance of socio-environmental competencies in level 1 (individuals) and 29.2% (approximate $R^2$) of the variance in level 2 (branches).

| Explanatory Variable | Performance management practices (factor of the collective perception of organizational support) | ($\beta$ = .08*) |
|---|---|---|
| | | ($\beta$ = -.17***) |
| | | ($\beta$ = .14**) |

Level 2 – Bank Branch

Level 1 – Individual (Branch Managers)

| Explanatory Variables | Extrinsic and intrinsic reflection (learning strategy at work) | ($\beta$ = .32***) | Expression of **process management** competencies | Criterion Variable |
|---|---|---|---|---|
| | Practical application (learning strategy at work) | ($\beta$ = .24***) | | |
| | Performance management practices (individual deviation of the perceived organizational support) | ($\beta$=-.13***) | | |
| | | ($\beta$ = .21***) | | |
| Control Variable | Gender | ($\beta$ = .10***) | | |

**Figure 4.** Theoretical-empirical Model of the Expression of Process Management Competencies.

**Note.** *$p$ < .05; **$p$ < .01; ***$p$ < .001.

| Control Variable | Degree of the branch's managerial complexity | ($\beta$ = .10*) |
|---|---|---|
| Explanatory Variables | Number of T&D hours (employees' average) | ($\beta$ = .16**) |
| | Material support (factor of the collective perception of organizational support) | ($\beta$ = .13*) |
| | Performance management practices (factor of the collective perception of organizational support) | ($\beta$ = .15*) |

Level 2 – Bank Branch

Level 1 – Individual (Branch Managers)

| Explanatory Variables | Extrinsic and intrinsic reflection (learning strategy at work) | ($\beta$ = .45***) | Expression of **socio-environmental** management competencies | Criterion Variable |
|---|---|---|---|---|
| | Seeking help from written material (learning strategy at work) | ($\beta$ = .19**) | | |
| | Performance management practices (individual deviation of perceived organizational support) | ($\beta$ = .24***) | | |
| Control Variables | Gender | ($\beta$ = .09*) | | |
| | Positon held | ($\beta$ = .19***) | | |

**Figure 5.** Theoretical-empirical Model of the Expression Socio-environmental Management Competencies.

**Note.** *$p$ < .05; **$p$ < .01; ***$p$ < .001.

## Discussion

This study aimed to examine, through a multilevel analysis, if the attributes of mangers of the Bank of Brazil (level 1 of analysis) and of the bank branches where they worked (level 2) predicted the expression of management competencies at work. Among the variables pertaining to level 2 (branch), the number of T&D hours revealed a significant effect on financial business management competencies ($\beta$ = .15) and on socio-environmental management competencies ($\beta$ = .16). The positive regression coefficients show that the greater the number of hours the branch dedicates to T&D activities, the higher the intensity of expression of competencies at work. This result suggests that formal learning occurred: planned and structured learning activities – whether an initiative of the organization or somehow supported by the organization – intended to promote knowledge, skills and attitudes acquisition (Sonnentag *et al.*, 2004).

In what is referred to as perceived organizational support (collective perception), the **performance management practices** factor revealed a significant effect on the expression of process management competencies ($\beta$ = .08) and of socio-environmental management competencies ($\beta$ = .15), while the **material support** factor affected the financial business management competencies ($\beta$ = .11) and the socio-environmental management competencies ($\beta$ = .13). The positive regression coefficients point out that, the better the group's (branch) perception regarding those dimensions of organizational support, the greater the expression of the competencies of the branch managers. This relationship was expected because, when there are adequate working conditions, organizational support, and orientation, it is more probable that the employee manages to successfully apply knowledge, skills, and attitudes (KSAs) at work (Abbad *et al.*, 2006; Rhoades & Eisenberger, 2002). In order to stimulate the expression of the managers' competencies, such results suggest the importance of taking actions regarding individual components for the acquisition of KSAs and regarding organizational aspects, such as creating a context that offers psychosocial and material support to the employee.

Among the variables pertaining to level 1 (individual), the learning strategy named **extrinsic and intrinsic reflection** showed the greatest contribution to explain the three dimensions of competencies: financial business management ($\beta$ = .47), socio-environmental management ($\beta$ = .45), and process management ($\beta$ = .32). The more frequently this strategy is used, the greater the intensity of expression of competencies at work. In dynamic sectors, such as the financial one, it is common for the manager to have to deal with unprecedented problems and situations, whose solutions are not pre-established. In these cases, it is up to the professional to rely on the act of reflecting upon the individual work and the organization, in order to find solutions to problems. This seems to induce the use of this learning strategy and its effects on the expression of competencies. Given the predictive relevance of this learning strategy, the Bank of Brazil could implement an instructional policy to develop such a strategy in its managerial training courses, making use, for example, of exercises and case studies that demand the participants' reflection.

Two other learning strategies revealed less expressive contributions. **Seeking help from written material** predicts the expression of financial business management competencies ($\beta$ = .13) and of socio-environmental management competencies ($\beta$ = .19), while **practical application** has a significant effect on the expression of process management competencies ($\beta$ = .24). This positive effect seems to come from a peculiarity of the banking industry. Banks, in order to reduce being exposed to risks, commonly adopt rigid operational patterns (Banco do Brasil, 2008), usually in the form of written material (rules, regulations and internal proceedings).

Such results represent an important contribution of this study to the deepening of research on the consequences of using learning strategies at work, for two reasons: (a) the predicting relationships identified here meet the theoretical supposition that the use of these strategies is positively associated with the efficacy of the learning process and its application at work (Warr & Downing, 2000); and (b) although some authors (Sonnentag *et al.*, 2004) pointed out the need to examine whether learning

strategies lead to competency development and expression, this appears to be the first study dedicated to examining these relationships in a work context.

Still on level 1 of analysis, the difference between individual and collective perception about organizational support (the individual deviation within the branch) exerts some effects. The individual deviation in relation to the company's **performance management practices**, one of the factors of perceived organizational support, revealed significant effects on the expression of financial business management competencies ($\beta = .14$), process management competencies ($\beta = .21$), and socio-environmental management competencies ($\beta = .24$). The deviation regarding the **workload** factor, on the other hand, showed an influence ($\beta = .09$) on the expression of financial business management competencies. Such effects represent the influence of the individual's relative standing within the branch – the difference between the individual score and the branch mean in the organizational support factors – on the expression of competencies at work, which some authors refer to as the frog-pond effect (Hox, 2010; Kozlowski & Klein, 2000). These results suggest the importance of providing adequate organizational support to the managers.

Moderating effects exerted by factors of perceived organizational support were also identified. The manager's perception regarding **workload** (individual deviation within the branch): (a) attenuates the effect of the **reflection** strategy over the expression of **financial business management competencies**; and (b) strengthens the influence exerted by the **seeking help from written material** strategy on the expression of those competencies. On the other hand, the collective perception regarding the company's **performance management practices**: (a) attenuates the effect of the **practical application** strategy over the expression of **process management competencies**; and (b) strengthens the effect of the **reflection** learning strategy over the expression of those competencies. These last interactions indicate that the referred to dimension of organizational support moderates the relationship between the use of learning strategies at work and the expression of **process management competencies**.

Furthermore, some level 1 variables (individual), like certain learning strategies employed by managers at work, revealed random effects (Hox, 2010): the magnitude of the influence they exert upon the expression of management competencies varies depending on which branch the individual works in.

Differing from what was expected, some variables, such as the learning strategies of **reproduction** and **interpersonal help seeking**, did not reveal significant effects on any dimension of management competencies. This result suggests that the use of certain learning strategies does not necessarily result in the development and application of management competencies. Such strategies cannot be useful for all people, occupations and organizations, or for the development of any competency, as suggested by Warr and Downing (2000). Similarly, one of the dimensions of perceived support (promotion and reward practices) turned out to be a non-predictor of management competencies, suggesting that the positive perception regarding dimensions of organizational support do not always results in greater expression of competencies at work.

The method used in this study imposes four main limitations on its results:

.  Self-report measures may have resulted in common variance impact. There is also no absolute guarantee that the judgments made by the participants represent reliable indicators of the expression of competencies, since estimates based on self-report could contain imprecision and halo errors (Van Yperen *et al.*, 1999);

.  The use of a sample restricted to only one organization provided internal validation, but restricted the results to the company which was studied, preventing generalizations to other organizational contexts;

.  The ICC values of two criterion variables (.05 for financial business management competencies and .04 for process management competencies) are relatively small and may have arisen in the

analyzed sample due to random errors. In this case, perhaps the use of multilevel analysis to test these models would not have been justified.

. The cross-sectional nature of the study precludes causal statements about the relations between the studied variables (Van der Vegt *et al.*, 2001), making it impossible to establish the causal order theoretically hypothesized in Figure 1.

These possible limitations, although they might restrict the results, do not invalidate important contributions offered by this study. The main contribution refers to the explanation of the phenomenon studied by adopting a multilevel model, which had its appropriateness investigated through the use of multilevel analysis. Its utilization provided the identification of diverse types of effects: (a) direct ones exerted by level 1 variables; (b) cross-level direct ones (Kozlowski & Klein, 2000), exerted by level 2 variables; (c) frog-pond ones (Hox, 2010), exerted by the individual's relative standing within the bank branch; (d) moderating ones exerted by dimensions of perceived organizational support over the relationship between learning strategies and management competencies; and (e) random ones (Kozlowski & Klein, 2000; Kreft & Leeuw, 1998) exerted by level 1 variables.

The results indicate the appropriateness of using multilevel models, given the existing dependency between individual observations within the branches. Its empirical testing allowed more precise predictive estimates and a better examination of the relationships between variables that belong to different analysis levels (individual and branch). The use of this approach helped identify contextual factors that are directly or moderately associated with the expression of competencies at work, making it possible for this study to offer richer and more relevant contributions to the comprehension of the phenomenon under investigation. However, more studies are needed in order to confirm the consistency of these findings, especially in other professional areas, organizations and sectors of the economy.

## Notes

[1] This article was presented at XXXIV Encontro da Associação dos Programas de Pós-Graduação e Pesquisa em Administração – EnANPAD (the 34th Encounter of the Brazilian Academy of Management), September, 2010, under the title Relações entre aprendizagem, contexto e competência: um estudo multinível (Relationships between learning, context, and competency: a multilevel study).

[2] In the literature about the subject, there exists a great variety of concepts for defining competency. This study does not intend to discuss the various theoretical currents and conceptual approaches which exist, since the subject has sufficiently been covered by many authors, such as McLagan (1997) and Gonczi (1999), among others.

[3] Procedure that consists of previously submitting the questionnaire to some members of the population of interest and later to interview them, with the purpose of identifying and correcting eventual errors, suggestive items, and ambiguities in the instrument, in order to guarantee that the statements and scales are adequately understood by the research participants (Pasquali, L. (1998). *Psicometria: teoria e aplicações*. Brasília: Ed. Universidade de Brasília).

[4] Besides, after collecting the primary data, all items representing the three perceptual measures (management competencies, learning strategies, and perceived organizational support) were subjected to a discriminating factor analysis, using procedures suggested by Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis*. New Jersey: Prentice-Hall and Van Yperen *et al.* (1999), which provide evidence that the three scales represents empirically distinguishable constructs.

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