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# Assessing educational leadership: a competence-complexity based test

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## Abstract

This study is focused on the validation of a leadership test, based on a complex model of leadership skills, as a tool for assessing teacher's educational competence, viewed as important in conducting adolescent and adult learning classes. Its specific purpose is to establish the norms and interpretation criteria for the test, in educational contexts. The model highlights the skills for leadership effectiveness, in a definite cultural setting, the Academy of East Timor National Police, viewing leadership as an essential way of steering human systems. The postulates of the model hypothesize the positivity of leadership as a result from an appropriate combination of power and information, while executing the fundamental activities of dinamizing and controlling the performance and results of the learning activities. The test was applied to a sample of trainees in an educational military context, the Academy of East Timor National Police. The results of their evaluations on each competence for leadership effectiveness were valid and reliable. Nevertheless, the authors plan to test this tool in other specific contexts, in order to complete the evaluation of the leadership complex set of competences required by educational contexts.

**Keywords:** Leadership test. Management mode of piloting. Leadership mode of piloting. Educational competences. Transformational leadership.

## 1 Theoretical background

The literature on the nature of leadership encompasses a long time and produced many theoretical concepts and models. This article will focus attention on the activity where the leadership process, like other related concepts, is integrated: the activity of piloting complex systems of action (MORIN, 2005). Piloting is

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conceived here as the basic process of conducting and governing the human system; leadership and management are the two basic ways of putting that process into practice.

The concept of management has essentially the same content as the concept of instrumental leadership: to plan, organize, direct and control the work of employees, as pointed out by Lewin, Lippitt and White (1939) , at the University of Ohio (FLEISHMAN; BURT, 1955; FLEISHMAN; PETERS, 1962; HALPIN; WINER, 1957) and at the Michigan University (LIKERT, 1961). In this paper, the concept of *management mode* is used by the authors to mean the competencies required for an effective performance in those activities; the concept of “leadership mode”, as distinct from management, is related to what Ohio researchers defined as consideration. It includes the competencies that ensure the leader’s effectiveness: mutual trust, respect and consideration for subordinates’ ideas. In this paper, the educational settings are focused and the authors propose the “leadership mode” of piloting, even the transformational leadership proposed by Burns (2004), to the teacher, as a means to be effective in meeting learning and development objectives of today high school and university students (Table 1).

To pilot a human system effectively, the pilot must establish a relationship with the global system and not only with any particular dimension; therefore, the two modes of piloting are required to deal with the material and human processes of the organization, assuring that it responds effectively to the demands of the context (ZALEZNIK, 1992). The technological model of complex leadership which supports the leadership test – named Multiplex Model in this paper, in memory of the term coined by Morin (1995) in one of his writings on complexity - is based on six postulates, presented in Tables 2 to 5.

**First postulate:** the piloting of a human system takes place through two fundamental activities: dynamization and control.

**Table 1.** Two basic modes of piloting human systems.

Piloting, Governing: An Activity or Function Essential in Human Systems	
b. Management mode	a. Leadership mode
Piloting focused on the use and control of material resources, predominance of norms, structure and roles, impersonal posture.	Piloting focused on the construction of the human system, predominance of relationships and communication, informal and personalized interaction.

Source: Authors’elaboration (2018).

Control activities are more oriented to the organization of operations and material resources; they require, therefore, skills associated with the management mode: the human system appears as a “must be”, a necessary condition, whose fundamental feature is the difficulty to manage it.

The dynamization of activities relies heavily on leadership skills: the pilot must be focused on the conduction of people, as it is the way to organize and use the resources available to the system. The control of material resources appears as secondary and, therefore, it is sometimes neglected. The second postulate materializes this idea.

**Table 2.** Dynamization and control activities.

Dynamization Activities	Control Activities
Setting attractive goals, motivating to act in a definite direction	Defining and carrying out financial and quality controls
Creating a positive climate and a dynamic culture	Measuring performance: of organization, of teams and collaborators
Delegating power for decision and action	Assessing and controlling the conditions of work structures
Giving incentives and rewards	Defining and controlling working processes
Giving a positive example, fostering the development of skills, innovation and positive change	
Promoting the flow of useful information, creating operations synergy	

Source: Authors’elaboration (2018).

**Table 3.** Core competences of the two modes of piloting human systems.

Management Mode Competences	Leadership Mode Competences
Organization of working means and resources	Influence and persuasion
Cognitive analysis	Creating attractive goals
Definition and imposition of standards	Proposing role models
Definition of structure	Active listening
Activity planning	Creating positive views
Process control	Personal attractiveness
Assuring homogeneity	Use of diversity
The obedience to the norm means efficiency	Induction of the sense of grandeur

Source: Authors’ elaboration (2018).

**Second postulate:** Each mode of piloting is based on a different set of skills: there are competences more akin to the management mode; or competences more associated with the leadership mode.

**Third postulate:** To achieve the combination of competences required by the leadership mode, the pilot of the system must develop three types of competencies (proposed by Katz in 1974); they are an essential condition to choose the combinations based on the criteria listed above.

**Fourth postulate:** To carry out the two types of pilotage activities – dynamization and control – taking into account position, tasks and context - two instruments are available to the leader: information (mainly to energize) and power (essentially to *control*).

Power is the application of energy (motivation, emotion) to control employees' behavior; information is the transmission of meanings that influence their representation of reality (WHETTEN; GODFREY, 1998). As any energy, power varies in intensity: high power; medium power; low power. The intensity of power results from the combination of power types with the frequency of their use. In this text, power types are described on the basis of categories adapted from Etzioni (1984): coercive (threat, punishment); manipulative (promise); and assertive (supporting, offering resources).

While power moves behavior by its energetic condition, information moves it by a transmission of meanings, which define the objects that trigger emotion (energy) in the subject. The concept of information proposed in the Multiplex Model is based on two theoretical proposals:

**Table 4.** The triple competence and the effectiveness of piloting.

<b>Technical Competence (T)</b>	Technical competence ensures organizational skills and efficiency of execution: doing well, according to quality standards, what must be done.
<b>Interpersonal Competence (I)</b>	Maintaining positive and true relationships: to develop positive, open and pleasant emotions and feelings in the relationship; to assure a high level of truth in relationships: the practice of a style of resolute communication (Deutsch, 1973) assures a high level of this competence.
<b>Strategic Competence (E)</b>	Making effective and timely decisions, to conceptualize situations and design projects; intelligent use of power and information in decisions and in the relations with the human system.

Source: Adapted from Katz (1974).

- the studies of the Palo Alto School, presented in Drucker (1972), who distinguishes information from communication, proposed as the necessary condition for information to exist, not just noise;
- the styles of bargaining communication which Deutsch (1973) called competitive (or power-oriented behavior) and collaborative (i.e. problem-solving or information-oriented behavior).

To characterize more precisely the proposed styles, their description by Deutsch was translated into the categories of Rogers (1951) and Porter (1950), transforming Deutsch’s description into indicators capable of statistic treatment (Table 5)<sup>1</sup>.

**Table 5.** Communication styles, according to deutsch and porter.

Competitive Style (Deutsch)	Behavior Indicators (Porter)
Shortage of communication; misleading information	Prevalence of AV and O attitudes
Predominant sensitivity to threats and differences	Low presence of attitudes E and R, and even A
Dichotomous perception of the value space (good/bad, no nuances)	Partial perception of the other (as manipulable)
Distrust of the interlocutor, exploitation of his weaknesses	Frequent use of coercive and manipulative types of power (Ezioni, 1984)
Conviction that conflict can only be resolved by the use of force	
Collaborative problem-Solving Style (Deutsch)	Behavior Indicators (Porter)
Exchange of relevant information	Extensive use of attitudes: A, E and R
Sensitivity to similarities and complementarity of efforts	Perception of the other as a person (capable of mutual clarification)
Nuanced perception of the value space:	
Trust, do not take advantage of the weak points of his interlocutor	Nuanced and polycentric perception of the value space
A conviction that conflict is intelligible and that negotiation is the adequate instrument to resolve it	Predominant power type used: assertive power

Source: Authors’ elaboration (2018).

<sup>1</sup> In this paper, the interactional categories poposed by Elias Porter were arranged into five categories:  
**Negative evaluation attitude (AV** - from the portuguese word - **Avaliação**): disagreement, censorship, devaluation, punishment;  
**Orientation attitude (O** - from the portuguese word -**Orientação**): instructions, opinions, counseling suggestions, orders;  
**Supporting attitude (A** - from the portuguese word - **Apoio**): agreement, sympathetic expressions;  
**Getting information (E** - from the portuguese word - **Exploração**): direct or indirect questions, declaring own lack of information;  
**Empathy, comprehension attitude (R** - from the portuguese word - **Reformulação**): to repeat what the other person says; to express what the other is feeling with the same or similar words.

## 2 The technologically oriented use of information and power

The Multiplex Model guides the leader to use power and information in an intentional and theoretically grounded manner, not spontaneously driven by his emotions. This technologically oriented use of power is based on the fifth postulate.

Fifth postulate: Power and information vary inversely, a relation which can be expressed by a L-curve (PARREIRA; SILVA, 2015).

As asserted in the postulate, the use of power is recommended in the Multiplex Model, only when a quick control effect is desired; but this reduces the energizing effect of information (Figure 1). Therefore, it is frequently important to reduce the use of power when conducting human systems, which one can obtain by controlling a. and b. conditions:

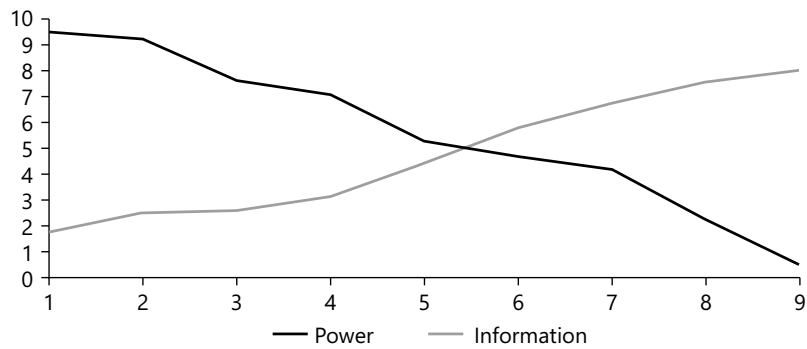
- a) The control of the strength or intensity of power (using high power, medium power or little power, according to the conditions of the situation);
- b) The intensity of power results from the number and duration of the leader's interventions and the type of power used:
  - long or very frequent interventions indicate high power;
  - coercive power demonstrates high intensity; manipulative power tends to situate itself at medium
  - intensity; assertive power is associated to medium or low intensity.

To use information as a tool for piloting, the leader needs to master the interaction style named **cooperative** or **problem-solving** style (Deutsch, 1973); thus, it needs training in the attitudes that compose it (note 1, p. 7).

**Sixth postulate:** The greater the complexity of the system, the greater the need for the leadership mode; there are objective criteria for determining this complexity and therefore the advantage of conducting the human system in leadership mode (Table 6).

## 3 The empirical study for the construction of the Lid-MultiplexTest

Based on the assumptions of the model, the empirical research aims to validate a leadership test (named Lid-Multiplex Test), based on the model explained above. The test under study uses the concept of triple competence (KATZ, 1974) and



Source: Authors' elaboration (2018).

**Figure 1.** Relationship between power and information.

**Table 6.** Criteria for deciding on the need for leadership mode (Multiplex Model).

<b>1. Structural Position</b>
The higher the position in the structure, the greater the complexity of actions and decisions; so, the greater the need for leadership competencies
<b>2. Type of Task</b>
The more the tasks requires the involvement of people, the greater the complexity of situation; this reinforces the need for leadership mode
<b>3. Type of Context</b>
The more the context is mobile and the larger its external variety the greater its complexity and, therefore, the stronger the need for leadership mode

Source: Authors' elaboration (2018).

the paradigm of complexity, to describe the behavior patterns required by the leadership mode of piloting. The test includes five evaluative sections of leadership:

- Three sections for measurement of the three types of competences (EC - strategic competence in action and decision; CI - interpersonal, relationship competences, TC - technical competencies, conformity to standards).
- A section (EO) to measure the involvement with the organization, the adherence to its project, the search for results.
  - A section (CET) to assess the ethical attitude towards oneself, organization, and others within and outside the organization.

Several studies are planned by the authors on this matter; the present one is the first essay to establish leadership competence criteria in educational settings, based on the two referred theoretical approaches.



## 4 The field research

This study focuses on the definition of leadership quality indexes and the analysis of leadership relationships in a millitar educational setting – the Academy of East Timor National Police – with a sample constituted by the trainees.

Hypotheses for the research about leadership quality indexes:

H1: In educational contexts, leadership efficacy is associated with high values (above 7,08) in the three competences (E, I, T)<sup>2</sup>;

H2: In educational contexts, positive leadership is associated with values above 7,08 in I, EO, CET competences;

H3: Leadership complex reasoning is associated with values above 7,08 in items related to it<sup>3</sup>.

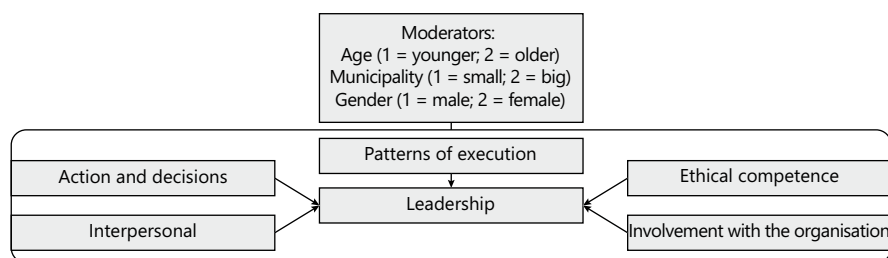
Hypotheses about moderating variables of the five constructs of leadership:

H4: Age moderates the relationship between the five constructs;

H5: Region moderates the relationship between the five constructs;

H6: Gender moderates the relationship between the five constructs.

The empirical investigation concretised in Timor brings first-hand information about these patterns of the leadership behavior and sheds light on the emphasis given to leadership constructs by gender (male, female), age (younger 19-22, older 23–25) and municipality (small, with 63–148 villages; big, with 149–281 villages). Figure 2 shows the proposed model.



**Figure 2.** The Leadership Model.

Source: Authors' elaboration (2018).

<sup>2</sup> These values were picked up from studies about the numeric value attributed to quantity adverbs (PARREIRA; SILVA, 2016). The proposed value 7,08 corresponds to **quite enough** (*bastante*). These studies were conducted in 2002 and 2013 (PARREIRA; SILVA, 2016), with two distinct samples. In this study, the authors chose the scale used in the research made in 2013, due to the similarity of the samples and the same number of scale positions (6): **extremely** (*extremamente*, value number 9,25); **very much** (*muito*, value number 7,62); **quite enough** (*bastante*, value number 7,08); **medially** (*medianamente*, value number 4,62); **little** (*pouco*, value number 2,27); **nothing at all** (*nada*, value number 0,54). The similarity of the numeric values obtained is noteworthy, despite of a time span of ten years: (extremely: 9,43; quite enough: 7,14; medially: 4,76; little: 2,07; nothing at all: 0,26).

<sup>3</sup> The items of the test to associated to complex reasoning are these ones: (CE 2, 4,6, 7, 10, 12, 16, CT 5).

## 5 Methodology

### 5.1 The sample

The data in the study were gathered from a sample of 249 East Timor respondents. This sample includes 95% of the applicant's universe, trainees in the Academy of East Timor National Police, engaged in the course to become officers. The questionnaire was applied at the school classes of 2015–2016, by one of the authors of the present study. Before its application the questionnaire was explained to the trainees, who could clarify any doubts about the items and become familiar with response instructions. The guiding question to answer was the following one: "Paying attention to the context where you are integrated, please, indicate the level your officer-trainers must attain in each competence, to be evaluated by you as an undoubtedly positive leader. Please, use the scale in front of each item to signal the position which best indicates what you think." Data must be screened to ensure it is reliable and valid for testing our hypotheses.

Descriptive analysis was carried out to test the normality of all variables before testing the measurement model and structural model. Results showed that all variables of the five constructs were negatively skewed. The skewness statistics ranged from  $-1.05$  to  $-1.65$ , and kurtosis statistics ranged from  $2.35$  to  $2.78$ . Because all our scale variables have kurtosis inferior to 3, they will not cause normality problems (Hair et al. 2010). Also, the estimation method of maximum likelihood used by Structural Equation Modelling (SEM) is fairly robust to violation of normality (CHOU; BENTLER, 1995). We proceed with the analysis of missing data. Missing data can indicate systematic bias because respondents may not have answered particular questions due to a common cause. Our data have no missing cases and in this way, this will not cause estimation problems and will not reduce the validity of our model. Outliers can influence our results pulling the mean away from the median and also can affect distributional assumptions. According to box-plot for all scale variables, there are no univariate outliers (extreme values for a single variable). Mahalanobis d-square statistics have values superior to 0.5 indicating that our data have not multivariate outliers (uncommon values for a correlation). Data screening ensured that our data are clean and ready to go before we conduct further our planned statistical analysis.

Exploratory factor analysis (EFA) of the data was conducted to extract underlying dimensions of leadership. A principal components method with promax rotation was used.

Table 7 shows the constructs, the correlation of each item with the factors, and their internal consistency. Cronbach's coefficient alpha was used as an indicator of internal

consistency. Such formulae indicate what the correlation would be between different versions of the same measurement, and therefore estimate what the repeatability of the test is likely to be. Multiple items of a single factor with high inter-item correlations produce consistent responses. Alpha de Cronbach is calculated for all the items of each of the five factors obtained applying EFA, and all have values superior 0.7, indicating good internal consistency (PESTANA; GAGEIRO, 2014).

**Exploratory Factorial Analysis.** This step checks the measurement model fit, and assesses reliability, validity (convergent, discriminant), invariance (configural, metric), and common method bias. To study reliability, convergent validity and discriminant validity, the following fit indices must be applied and their recommended **values** verified:  $CMIn/df < 5$ ;  $RMSEA < 0.08$  (HAIR et al., 2010);  $SRMR < 0.08$  (BENTLER, 1995);  $CFI \geq 0.9$  (HAIR et al., 2010);  $NFI > 0.9$  (BENTLER; BONETT, 1980);  $TLI > .95$  (TUCKER; LEWIS, 1973),  $AGFI > 0.9$  (JÖRESKOG; SÖRBOM, 1988). Composite reliability (CR) is used as a reliability index, and should be  $CR \geq 0.7$  (HAIR et al., 2010). Average variance extracted (AVE) estimates (FORBELL; LARCKER, 1981) were calculated for the constructs. Discriminant validity for a given pair of constructs is achieved if their AVE estimates are both greater than the square of the construct correlation, or alternatively is supported if the confidence interval with two standard errors around the correlation estimate does not include 1.0 (ANDERSON; GERBING, 1988).

Exploratory Factorial Analysis with Maximum Likelihood estimation method (HOYLE; PANTER, 1995), and Promax rotation, shows a good sample adequacy ( $KMO = 0.801$ ), with 4% of reproduced correlations having non-redundant residuals with absolute values greater than 0.05, explaining 75% of total variance. The five constructs extracted are reliable, with Cronbach's Alpha on average superior to 0.7 (NUNNALLY; BERNSTEIN, 1994), and have convergent validity, loadings are  $> 0.4$  (PESTANA; GAGEIRO, 2014) and by factor are  $> 0.70$  (HAIR et al., 2010); they have discriminant validity, with all the cross-loadings differing from more than 0.2 and all items being connected with just one factor (HAIR et al., 2010). There are no problems of multicollinearity between constructs, because all the correlations are  $< 0.7$ . One item of the construct "Interpersonal"; one item of the construct Patterns of Execution", and fourteen items of the construct "Action and Decision" were considered relevant characteristics of a leader for all respondents, reason why they are not included into the model due to no significant contribution to explain it.

The two-step approach from Anderson and Gerbing (1988) was used to empirically examine the hypotheses applying structural equation modelling (SEM). Our sample is superior to the minimum 200 required for SEM by Hair et al., (2010). The results of SEM used AMOS and Stat Tools package.xlsm from Gaskin (2016).

**Table 7.** Pattern matrix of exploratory factorial analysis.

Constructs	Items	Cronbach's Alpha	Factor				
			1	2	3	4	5
			0.701	0.799	0.811	0.869	0.861
Actions and Decision	He has a high capacity to integrate divergent information in its decision	CE4	0.746				
	He knows the context and market of the company to the level required by your position	CE8	0.785				
	He knows the organization, its structures and processes	CE9	0.787				
	He organizes well the interdepartmental communication	CE13	0.689				
	He knows how to vary in method and action, when it is useful	CE17	0.668				
	When making decisions he knows how to be flexible with the usual rules, but always within the ethics	CE19	0.756				
	He plans and organizes work efficiently	CE20	0.698				
	He organizes and controls his time	CE22	0.695				
	He has sensitivity to high things, he has the sense of greatness	CE24	0.715				
	He has good perception of others, he understands their behavior	CI1		0.785			
	He usually uses open communication, listens to others, and uses their ideas	CI2		0.790			
	He encourages communication with other teams and departments	CI3		0.812			
	He encourages open communication and mutual trust	CI4		0.528			
	He uses effective negotiation and mediation practices	CI5		0.786			
	In situations of friction and conflict, he has the capacity to positively integrate the divergences	CI6		0.865			
Interpersonal	He has the habit of expressing positive emotions and giving appropriate praise	CI7		0.768			
	He is able to adjust the expression of its negative emotions in the various situations	CI8		0.654			
	He reacts positively to the emotional expressions of others	CI9		0.873			
	He affirms himself by a positive attitude, he has an optimistic view of things	CI10		0.899			
	He can help people to regulate emotions	CI11		0.765			
	He encourages the personal expression of each one	CI12		0.876			

Continue

## Continuation

Interpersonal	He views the success as a result of the quality of people and working methods	CI13	0.883
	He criticizes in a positive way, in order to facilitate acceptance	CI14	0.672
	He always creates ways to motivate and energize employees	CI16	0.443
	He has an affirmative attitude in relation to superiors	CI17	0.554
	In relationship with others he has the sense of service, he is not an advantage seeker	CI18	0.921
	He considers the others as true partners and not as resources available to him	CI19	0.850
	He has the practice of not favoring differences of status between people	CI20	0.623
	He can diversify contacts, to meet different people	CI21	0.774
	He knows how to approach and act appropriately in meetings and when socializing	CI22	0.753
	He has the capacity to stimulate meetings to stimulate new ideas	CI23	0.444
	He has the capacity to foster the adaptation to the changes	CI24	0.476
	He has credibility in his information, decisions and actions	CI25	0.723
	He executes and promotes execution without errors	CT1	0.758
	He executes and encourages execution quickly	CT2	0.950
	He meets and enforces safety standards	CT3	0.649
Patterns of Execution	He maintains and promotes hygiene	CT4	0.887
	He facilitates synergies in the way things are done	CT5	0.654
	He encourages the organization of the workspace	CT7	0.751
	He prevents the waste of resources	CT8	0.865
	He practices and promotes high quality standards in all activities	CT9	0.612
	He knows the legal constraints and fulfills them conveniently	CT10	0.634
	He does his work with commitment and dedication	ENV1	0.514
	Whenever possible, he proposes ideas to improve the functioning of the organization.	ENV2	0.950
	When something does not go well, he does his best to resolve the situation	ENV3	0.808
	He protects information that can benefit the organization	ENV4	0.785

Continue

## Continuation

Involvement in the Organisation	His behavior respects the values, norms and principles that	ENV5	0.805
	guide the organization		
	He defends the organization	ENV6	0.956
	when others criticize it		
	Worried when the organization	ENV7	0.566
	has a problem		
	He considers the organization	ENV8	0.891
	a great place to work		
	He is socially responsible and sets the	ENV9	0.965
	example, behaving as a model for others		
	If his work has any flaws or delays, he is	ENV10	0.887
	concerned about the consequences		
	for the organization		
	He obeys principles only for the	CET1	0.877
Ethical Competence	advantage that they can give		
	He obeys moral standards only for	CET2	0.843
	fear of the consequences		
	He is ready to devalue someone to gain	CET3	0.667
	an advantage in a possible promotion		
	He complies with the standards only to	CET4	0.752
	be similar to the way of acting		
	of the correct people		
	He accepts bonuses in secret, knowing	CET5	0.863
	that in the future this will weigh		
	in favor of who gives them		
	He obeys norms and laws because they	CET6	0.611
	are the foundation of a healthy society		
	Obtaining a financial advantage	CET7	0.634
	that is against ethics is absolutely		
	unacceptable for a positive leader		
	Arresting himself to ethics issues	CET8	0.961
	and so losing business is clearly		
	stupid for a serious leader		
	Moral and ethical failures are excusable,	CET9	0.843
	when they are not very serious and our		
	interest demands to do it		
	The human being is in itself a value	CET10	0.743
	that can never be neglected when		
	making management decisions		
	If someone is not honest with the	CET11	0.756
	leader, he either does not have to be		
	honest with that person		
	The leader should never act against the	CET12	0.433
	truth, even if it goes against his interests		
	The social responsibility measures must be	CET13	0.980
	subordinated to the success of the project		
	Ethics is an irrefutable action; any	CET14	0.841
	competitive advantage has to be		
	achieved without questioning it		
	Extraction Method: Maximum Likelihood.		
	Rotation converged in 8 iterations		

Source: Authors' elaboration (2018).

**Confirmatory Factorial Analysis.** This step analyses the model using moderators, checks the measurement model fit and assesses reliability, convergent validity and discriminant validity of the five constructs that define a leader in the proposed model: “Action and Decision”; “Interpersonal”; “Patterns of Execution”; “Involvement with the Organisation”; and “Ethical Competence”. The structural model does not have outliers, because Cook’s distance for each construct is  $< 1$ . Additionally, there are no influential variables, because all variables have tolerance  $> 0.1$  and VIF  $< 3$  (PESTANA; GAGEIRO, 2014).

To assess the moderation effect of age (1 younger, between 19–22 years old; older, between 23–25 years old), gender (1 male, 2 female), and municipality (1 small, including 63–148 villages; big, including 149–281 villages), critical ratios for differences in the characterization of a leader were used.

## 6 Results

A significant majority of Timor respondents were male (83.9%), aged 19–22 years (59.8%), with high school degree (92.4%), and coming from bigger municipalities, with 149 to 281 villages (63.5%). With 95% of confidence, small municipalities have between 1.04 and 1.55 times younger Timorese (19–22 years) than bigger municipalities (Table 8).

**Table 8.** Socio-demographic variables.

	N	%	Test	Sig
Gender				
Male	209	83.9	Binomial	$< = 0.0005$
Female	40	16.1		
Age	N	%		
19–22	149	59.8	Binomial	$< = 0.0005$
23–25	100	40.2		
Age by Municipalities	N	%	Odds Ratio	95% Confidence Interval
With 63–148 Villages	91	36.5	1.27	for Odds Ratio [1.04; 1.55]
19–22	63	42.3		
23–25	28	28.0		
With 149–281 Villages	158	63.5	Binomial	$< = 0.0005$
19–22	86	57.7		
23–25	72	72.0		
Education	N	%		
Technical school	5	2.0	Chi-Square = 391.012; df = 2; $p < = 0.0005$	
High School	230	92.4		
University	14	5.6		

Source: Authors’ elaboration (2018).

Confirmatory factorial analysis has an acceptable fit (Chi-square/df = 1.12; CFI = 0.96; NFI = 0.95; GFI = 0.95, TLI = 0.95; AGFI = 0.80; RMSEA = 0.022). The model also has metric invariance, because at least one indicator of each factor is not significantly different between groups (age, gender, municipality). All constructs have convergent validity (AVE > 0.5), discriminant validity (AVE > MSV) and are reliable (CR > 0.7) (Table 9).

As the data obtained in this study are from a questionnaire, common method variance (CMV) needs to be examined. Harman’s single factor test was implemented using CFA, in which all the items were modeled as indicators of a single factor that represents the common method (MOSSHOLDER et al., 1998). CMV is not a problem because the hypothesized model does not fit the data well. CMV was eliminated and the factor scores were imputed. Table 10 shows the descriptive statistics of the constructs. Ethical competence is the most relevant factor to define a leader, while patterns of execution and involvement in the organisation are the less relevant. All responses are more concentrated at higher values of the scales that measure the constructs, with an asymmetrical negative distribution (Table 10).

As reliability and validity are supported, we proceed to examine the hypotheses.

Gender does not moderate the relationships between constructs, not supporting hypothesis H6. Those that are younger (19–22 years) and reside in small municipalities, have a stronger positive association between “interpersonal”, “action and decision” and “involvement with the organization”, but those effects decrease when they are older and reside in big municipalities. These results support hypotheses H4 and H5 (Table 11).

**Table 9.** Constructs validity and reliability.

	CR	AVE	MSV	MaxR (H)	Action and	Interpersonal	Patterns of	Involvement with	Ethical
	> 0.7	> 0.5	< AVE	> CR	Decision		Execution	Organisation	Competence
Action and Decision	0.721	0.521	0.158	0.725	0.681	-	-	-	-
Interpersonal	0.874	0.538	0.535	0.908	0.214	0.735	-	-	-
Patterns of Execution	0.836	0.564	0.560	0.938	0.199	0.536	-0.751	-	-
Involvement with Organisation	0.829	0.547	0.225	0.953	0.158	0.425	-0.479	0.741	
Ethical Competence	0.844	0.645	0.159	0.964	0.399	0.363	-0.291	0.221	0.802

Source: Authors’ elaboration (2018).



**Table 10.** Descriptive statistics of the constructs.

	Mean	Median	Mode	Std. Deviation	Skewness	Std. Error of Skewness	Percentiles		
							25	50	75
Action and Decision	5.94	6.04	5.32	1.08	-1.38	0.15	5.38	6.04	6.67
Interpersonal	5.79	6.12	6.42	1.46	-1.54	0.15	5.28	6.12	6.71
Patterns of Execution	4.39	4.46	3.94	0.84	-1.05	0.15	3.95	4.46	4.98
Involvement with Organisation	4.67	4.83	4.92	1.12	-1.58	0.15	4.20	4.83	5.46
Ethical Competence	7.04	7.39	7.73	1.71	-1.60	0.15	6.42	7.39	8.24
Complex Reasoning	6.13	6.50	7.24	1.06	-1.65	0.15	4.41	6.50	8.03

Source: Authors' elaboration (2018).

**Table 11.** Structural model with moderation effects.

Moderators	Relationship		Younger/Small		Older/Big		z-score
			Estimate	P	Estimate	P	
Age	Action and Decision	<--- Interpersonal	0.442	0.0001	0.337	0.0001	-1.910*
	Involvement with Organisation	<--- Interpersonal	0.261	0.0001	0.254	0.0001	-1.933*
Municipality	Action and Decision	<--- Interpersonal	0.163	0.0001	0.076	0.0290	-2.174**
	Involvement with Organisation	<--- Interpersonal	0.355	0.0001	0.235	0.0001	-2.018**

Notes: \*\*\* p-value &lt; 0.01; \*\* p-value &lt; 0.05; \* p-value &lt; 0.10

Source: Authors' elaboration (2018).

Let us now examine the other hypotheses. These results about their behaviour are worth of further comments.

H1 establishes that effective positive leadership exists when the values achieved in competences E, I, T obey to:  $V(\text{values achieved}) \geq 7.08$ .

H2 states that positive leadership implies values in *Interpersonal, Organizational Engagement and Ethics* (I, EO, CET) obeying to this formula:  $V(I, EO, CET) \geq 7.08$ .

H3: The practice of a leadership complex reasoning is also associated with values above 7.08 in items related to it.

The choice of 7.08 as a cutting point was based on two considerations: it is the numerical value of *quite enough* in the used scale (*quite enough* means clearly above the median); and it corresponds to the percentile 75, in the scale, a common cut-off in the evaluation of human competence.

The results obtained in the military educational setting of East Timor show a cut-off point below that proposed by the authors, not confirming 7.08 as the cut-off point defined in H1, H2 and H3. Nonetheless if these if these values are viewed in the light of the situational theories of leadership (Hersey, 1985) and of the complexity paradigm (GÖDEL, 1986), it seems reasonable to substitute the initial hypothetical cut-off point (7.08) by the values obtained with the sample under research, which in this study are the respondents in East Timor. This option is consistent with the recommendations of situational leadership theories, recognizing that behaviour is conditioned by the context, leading to some variation in the values chosen by the respondents to characterize a positive leader. Indeed, this is a generally followed procedure in psychological tests, recognizing that they are culturally bound. So, one can expect that the cut-off point to define an effective and positive leadership will also be somewhat different, in civil educational contexts. But this study must be replicated in those contexts to verify this assumption.

## 7 A final comment

The above considerations corroborate the assertion of the situational theories of leadership, while shedding some light on how this occurs: the competences required are quite the same, but the characteristic of the context affects the perception and sensitivity of the followers who evaluate them. Indeed, contexts and maturing effectively shape the interpretation of observed events and behavior, so reinforcing the situational dimension of leadership.

The results of this study meet another main objective of the undertaken research: transformational leadership (BURNS, 2004) can be defined in the Multiplex Model as a combination of positive leadership and complex reasoning. Although context variables must be taken into account in the construction of leadership models, one can state that transformational leadership (as defined by the Multiplex Model) is an important competence for educators: the results of this study suggest that it is the most effective to attain the learning and development objectives pursued in educational projects. The authors hope that the planned research on the subject will obtain new data to further enlighten this point.

## **Avaliar a liderança em contexto educativo: um teste baseado na perspectiva complexa das competências**

### **Resumo**

*Este estudo valida um teste de liderança, baseado em um modelo complexo de habilidades de liderança, como uma ferramenta útil para avaliar a competência educacional do professor, considerada como importante para conduzir aulas com adolescentes e adultos. O objetivo específico do estudo foi estabelecer as normas e os critérios de interpretação para o teste, em contextos educacionais, o que se fez num determinado ambiente cultural, a Academia da Polícia Nacional de Timor Leste. O modelo destaca as habilidades para a eficácia da liderança, em um ambiente educacional, visando a liderança como uma maneira essencial de dirigir os sistemas educacionais. Os postulados do modelo hipotetizam a positividade da liderança como resultado de uma combinação adequada do uso do poder e da informação, ao mesmo tempo que executam as atividades fundamentais de dinamização e controle do desempenho e resultados das atividades de aprendizagem. O teste foi aplicado a uma amostra de candidatos em um contexto militar educacional, formandos da Academia da Polícia Nacional de Timor Leste. Os resultados de suas avaliações sobre cada competência para a eficácia da liderança foram válidos e confiáveis. No entanto, esta ferramenta deve ser testada em outros contextos específicos, a fim de completar a avaliação do conjunto complexo de competências exigido pelos contextos educacionais.*

**Palavras-chave:** Teste de liderança. Modo gestão de pilotagem. Modo liderança de pilotagem. Competências educacionais. Liderança transformacional.

## **La evaluación de liderazgo educativo: una prueba basada en la competencia-complejidad**

### **Resumen**

*Este estudio se centra en la validación de una prueba de liderazgo, basada en un modelo complejo de habilidades de liderazgo, como una herramienta para evaluar la competencia educativa de los docentes, considerada importante en la adaptación de las clases de aprendizaje de adolescentes y adultos. Su propósito específico es establecer las normas y los criterios de interpretación para la prueba, en contextos educativos. El modelo destaca las habilidades para la efectividad del liderazgo, en un entorno cultural definido, la Academia de la Policía Nacional de Timor Oriental, viendo el liderazgo como una forma esencial de dirigir los sistemas humanos. Los postulados del modelo tienen como hipótesis la positividad del liderazgo como resultado de una combinación apropiada del uso de poder y de información, mientras se ejecutan las actividades fundamentales de dinamización y control del rendimiento y los resultados de las actividades de aprendizaje. La prueba se aplicó a una muestra de solicitantes en un contexto militar educativo, aprendices de la Academia de la Policía Nacional de Timor Oriental. Los resultados de sus evaluaciones sobre cada competencia para la efectividad del liderazgo fueron válidos y confiables. Sin embargo, los autores planean probar esta herramienta en otros contextos específicos, para completar la evaluación del conjunto de competencias complejo de liderazgo requerido por los contextos educativos.*

**Palabras clave:** Prueba de liderazgo. Modo de gestión de pilotaje. Modo de liderazgo de pilotaje. Competencias educativas. Liderazgo transformacional.

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