

# Types of intelligence in public servants engineers of the Norte de Santander Department, Colombia.

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**Abstract**— The research had the objective of determining the types of intelligence that public servants in the Department of Norte de Santander, Colombia possess, building a model in which intelligence is associated with the variables of transparency, integrity, communication, competence, organizational climate, security, trust and ethical orientation, which public servants should have. A mixed study was undertaken to study these variables, and their association to the types of intelligence. Interviews were applied and a non-experimental factorial design was used with support in two questionnaires, whose validity was high with a Kappa index of 0.78 obtained through the evaluation of experts, and a reliability with Cronbach's Alpha of 0.85. The population was focused on 500 public servants with engineering degrees who work in the metropolitan area of Cúcuta, Ocaña, Patios, Sardinata and Cacota, selecting a sample of 110 officials. The results allow the identification of 8 types of intelligence and 42 emerging categories of skills associated with these types of intelligence in public service engineers. The quantitative factorial confirmatory analysis shows four intelligence models, in which emotional, cognitive-rational, social and creative intelligence have greater weight, the most preponderant being emotional intelligence.

**Keywords:** Type of intelligence, public servant, model.

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## I. INTRODUCCIÓN

Intelligence, beyond being a construct proper to each human and individual being, is a relational process between individuals [1]. In the workplace, intelligence is directly associated with performance based on work skills [2], and it has been proven that these skills have a positive impact on the management of emotions, teamwork, communication, negotiation, orientation to achievement, and increased productivity, among other aspects [3]. From this, lies the importance of the study of intelligence from its different types [4], as a contribution to the achievement of productivity and competitiveness in social organizations [5].

In contributing to organizational performance, engineering plays a fundamental role, and these professionals play an institutional role as social agents who create processes and systems within organizations with an impact on social development [6]. For [7], engineers in the company contribute a systemic vision that contributes to decision making, fulfilling a managerial role that leads to the achievement of challenges imposed by the environment, the management of problems, the analysis of alternatives and the optimization of results. In the case of public organizations, with their direct orientation to improving the quality of life of the inhabitants of different localities, [8] the fact that public servants have a background in engineering brings innumerable benefits to the organizational behavior and optimal social performance of this type of institution [9].

With regard to the importance of public institutions, [10] it refers to the fact that government institutions have a clear function of capitalizing on the resources of the State for social welfare, by promoting production and meeting the overall social needs of the population, through work, support for technological progress, with the government and its institutions being a fundamental basis for economic development and the potential for improving the environment [11]. Therefore, the fact that public organizations have trained human resources to carry out their public functions, in which they must ensure transparency, equity, commitment, productivity, trust, and a harmonious organizational climate, among others, is a matter of special interest [12].

In view of this, public servants become key actors in social development and growth, ensuring the fulfillment of the social mission of this type of organization [13]. According to [14], the most outstanding practices in the performance of public servant actions are related to the personality of the servant, to morality in the management of resources, which has to do with the codes of ethics and coexistence approved as laws in the different countries. In this regard, the management of intelligence in the performance of one's work is considered to contribute to these claims by public organizations in the global context [15].

Based on the above, it is estimated that an ethically based and emotionally intelligent organization pursues an efficient relationship with its collaborators represented by human talent [16], creating the capacity to help proactively and emotionally in the labor field from personality dimensions such as self-knowledge, self-assertion, self-regulation, and self-motivation [17]. In Colombia, a fundamental objective is pursued with public organizations, taking into account all of the country's historical developments regarding the development of its institutions and the issues of government corruption [18]. In this regard, the scenario of coexistence that permeated the post-conflict period requires the commitment of the nation's different social and institutional actors [19].

However, for [20], the particular commitment to transparency and ethical behavior of each and every one of its members is a sine qua non condition for the achievement of lasting peace, since the importance of the peace process in Colombia involves diverse actors and institutions, directly linked in public institutions. In any scenario, its officials, their personalities, and their intelligence have an evident

and relevant presence, precisely because of their mission to guarantee coexistence, projection, and the generation of knowledge within the public policies established by the institutions [21]. Hence, the presence of officials in the diverse and complex social, political, economic, environmental, and cultural situations of Colombia generates confidence and security in the citizens, a matter for which the leadership of these institutions must be vigilant [22].

As for the citizens, their perceptions of the servants, their abilities, their type of intelligence, and their actions, whether on behalf of minority groups, generate an attitude of positioning and security; in contrast, there are situations of immediate disqualification and loss of confidence in the institution, with the consequences that can be observed in the day-to-day relationship between public servants and citizens [23]. Based on the foregoing, the present study aims to determine the types of intelligence that public servants in the Department of Norte de Santander, Colombia, who have a background in engineering, have, taking into account the already prescribed importance of this career in the systemic development of social organizations.

The final product is the construction of a model for the estimation of the implications of the intelligence of the public servant, in variables that this type of employee must present in terms of transparency, ethics, integrity, communication, competence, organizational climate, security, trust and ethical orientation. It is based on the principle that intelligence has a favorable impact on the performance of human talent [24], and that intelligence is perceived as a favorable factor that citizens perceive in public servants [25]. From the theoretical point of view, it is important to note that intelligence influences human performance, [26] which is why this article is considered an important contribution from the academic point of view to the management of public organizations in Colombia. In addition, it is a challenge for institutions of higher education to train professionals in engineering [27], which must ensure the formation of integral citizens who can generate personal and professional contributions in the institutions and organizations in which they provide their professional services [28].

The development of intelligence in higher education is an ontological element of curricular design, which should be transversal to training in each area of knowledge, and should not only correspond to cognitive intelligence [29], since professionals must demonstrate comprehensive skills and attitudes that enable them to perform assertively in the organizational context [30], from which training by competencies in being, doing and knowing follows [31]. For Colombia, ensuring the incorporation of comprehensive professionals into its institutions is a key issue in public policy [32], and it is essential that citizens perceive the performance of their officials [33], with intelligence and its implications for work performance playing a leading role [34]. Hence the contributions of the model of relations between intelligence and performance characteristics of public service engineers, which can be extrapolated to studies in any type of social organizations and other types of professions.

## II. METHODOLOGY AND PROCEDURE

The present research is of mixed design [35], within the methods of social research based on multivariate methods, factorial design, evaluative of a transversal explanatory type [36], with which it is sought to explain the phenomena at a level of logical structuring, supported by the technique of structural equations to analyze the factors of the structure of covariance, analysis of latent variables and confirmatory factorial analysis [37]. The selection of this design obeys the intention of generating the explanatory model of the types of intelligence of public service engineers, and their multiple dependency relationships and cross references of variables associated with personnel performance, from the initial variables: transparency, ethics, integrity, communication, competence, organizational climate, safety, confidence and orientation to achievement. It also seeks to determine

the capacity to represent concepts not observed in these relationships, taking into account the error of measurement in the estimation process [38].

Depending on the type of model analysis, the parameter estimation procedure requires a minimum sample size of 100 units or more [37]. Therefore, we worked with a population of 500 engineers who work as public servants in various institutions in the municipalities of Cúcuta, Ocaña, Sardinata, Patios, Cúcuta, in the Department of Norte de Santander, Colombia. For the determination of the sample, we assumed a multi-stage sampling, by cluster, with simple random sub-sampling [39], obtaining a sample number of 110 subjects. The information collection techniques were the interview and the survey, using an interview script with open-ended questions to identify elements that could influence the perception of the institution's transparency and the roles of its members, as well as a questionnaire of Likert-type response alternatives, whose validity with the Kappa index was 0.78, obtained through expert evaluation. The reliability with Cronbach's Alpha was 0.85 [40].

In the first phase, the perceptions of public servants regarding their performance of their duties were analyzed on the basis of the interview, from which information was extracted, based on the Grounded Theory [41], the codes and dimensions representative of variables associated with intelligence, and of categories representative of the types of intelligence on the basis of the considerations of [4], [29] and [42]. In the second phase the information is triangulated with the results of the questionnaires, and in the third stage the analysis of inferential statistics is developed for the construction of the model [43], [44]. The correlation of the variables was made from Bartlett's sphericity tests, Chi Square and the Kaiser-Meyer-Olkin sample adequacy measure [45].

### III. RESULTS

As a characteristic result, the questionnaire showed that the civil engineers in the sample are between 27 and 63 years old; their employment includes administrative, academic or government positions: civil works, engineers, builders, designers, analysts, technicians, vibration analysts, miners, traders, consultants, teachers, managers, communicators, administrators, councilmen, translators, laboratory technicians, managers, priests, musicians, artists, journalists, economists, lawyers. 70% of the employees over 50 years of age, do not have any post-graduate training; 30% have only secondary education. 25% of the employees are student leaders or community representatives. In terms of the objective of the work, four types of public servants are identified, associated with four types of intelligence, based on the classification of [42], as shown in Table 1.

Table 1: Server type and intelligence type

Server type	Description	Intelligence type prevalent	Positive characteristic	Negative characteristic	Acceptance level
Traditional	Technical achievement individual	Intrapersonal	Reflect on themselves	Difficulty of coping with failure slow down processes	Low
Creative	New solutions to problems	Creative- logical Mathematical Emotional Linguistics	Innovation, originality	Interpersonal relationship	High
Humanist	Relationship based on values	Naturalist Existential- collaborative Linguistics	Elf-knowledge, discerns about emotions, graphic, artistic, spatial reasoning skills	Experiences of life and death	High
Bureaucrat	Power oriented, personal and entity achievement	Intrapersonal Linguistics	Control of thought and emotions, deductive ability	Individual Achievement Elitism Skewed Collaboration	Medium

Fuente: Elaboración propia.

In this table, the first group is represented by the traditional servants who only go to do their job and return home, are not recognized and mention problems associated with health and welfare; they think that the task and maintenance are important, have a strong need to feel esteemed, are interested in technical achievements, are not interested in the organization achieving achievements, are continuously facing failures and adverse situations, flee the conflict, remain in office having fixed appointment positions.

A second group of servers with the characteristics of finding new ways of doing things in the face of current problems and proposing alternatives, surpasses the pre-established models and thinks openly beyond the available information; they are considered creative and intellectual; they unite objective, maintenance, projection and teamwork; they program short and long term objectives, attend to personal relationships, are enthusiastic, innovative and creative, seek to project their goals to those who collaborate with them; their relationships are based on commitment, based on rules but flexible, open to change and risk when new solutions are provided; they consider the radical or unconventional, even if it means taking risks.

The third group is characterized by its humanistic nature, seeking to fulfill objectives, relationships for its management based on values of loyalty, affection and timely assistance. The fourth group is oriented to the norm, is interested in personal fulfillment and the entity, gets things to work without much effort, is oriented to hierarchical structures, likes to be recognized, maintains an external elite group, and recognizes themselves as bureaucrats. After the factorial analysis of the four types of public service engineers, their characteristics, ways of acting in situations, leadership styles and communication; was obtained through the method of the main components:

- For the personal and academic profile, in Bartlett's sphericity test,  $p=0.493$ , chi-square approximately 14.54, the adequacy measure of the Kaiser-Meyer-Olkin sample of 0.545, concluding that there is no significant correlation between both variables.
- In the case of positive and negative characteristics of the server against the type of server, in Bartlett's sphericity test,  $p=0.001$ , chi-square approximately 30.87, the measure of adequacy of the Kaiser-Meyer-Olkin sample of 0.671, which indicated a good adequacy of the sample to the analysis, concluding that there is a significant correlation between the variables.

- For the type of server intelligence versus the type of server, in Bartlett's sphericity test,  $p=0.065$ , chi-square approximately 28.4, Kaiser-Meyer-Olkin sample adequacy measure of 0.525, concluding that there is no significant correlation between the variables with a 95% significance level.
- In the case of the role of the server versus the type of intelligence of the server, in Bartlett's sphericity test,  $p=0.004$ , chi-square approximately 37.5, measure of adequacy of the Kaiser-Meyer-Olkin sample of 0.511, with which it was concluded that there is no significant correlation between the variables.

Considering that the correlation is not significant between the type of server and the role it plays, the time of service and the characteristics of the public servant, the characteristics associated to the emerging categories of the interview were reorganized, generating a new instrument with scale associated to 8 types of intelligence and 42 variables, which is shown in Table 2.

Table 2: Type of intelligence and role associations

Type of intelligence	Emerging category ability	Relationship intensity	Type of intelligence	Emerging category ability	Relationship intensity
Emotional Intelligence	Transactional Leadership	0.93	Ethical Intelligence	Values	0.99
	Empathy	0.97		Congruent attitude	0.89
	Transformational Leadership	0.98		Rational thinking	0.97
	Affection	0.97		Boosting the other	0.98
	Autonomy	0.96			
Communicational intelligence	Verbal Fluency	0.99	Social Intelligence	Psychological flexibility	0.99
	Commitment	0.89		Avoidance	0.89
	Written fluency	0.97		Interpersonal	0.97
	Secure Participation	0.98		Intrapersonal	0.98
	Histrionic	0.90		Ability to negotiate	0.90
	Interpretation of ideas	0.96		Democratic life	0.98
	Critical thinking	0.97		Entrepreneurship	0.95
Cognitive-rational intelligence	Divergent thinking	0.97	Solidarity Intelligence	Sensitization	0.89
	Convergent thinking	0.96		Participatory Identity	0.89
	General/specific knowledge	0.94		Trust and initiative	0.90
	Metacognition	0.97		Action based on dialogue	0.92
	Logical-mathematical thinking	0.98		Coaching	0.89
Creative Intelligence	Managerial creativity	0.98	Spatial Intelligence	Location	0.90
	Holistic situation assessment	0.97		Dynamic Imagination	0.92
	Innovative behaviour	0.99		Spatial Reasoning	0.95
	Application of ideas	0.99		Image manipulation	0.92
	Generation of new products	0.94		Graphics Skills	0.92
	Creative thinking	0.98			

Fuente: Elaboración propia.

The intelligences that resulted in the scale were emotional intelligence, which allows one to become aware of one's own feelings at the precise moment they are produced, to self-regulate one's emotions and, by default, one's behaviors [46], to interact effectively with others through empathy. The second type of intelligence was social [47], which is composed of the wide range of capacities and abilities that an individual possesses to relate to others, and which can allow the individual to communicate with others through the brain and body. This type of intelligence can avoid conflicts generated with their negotiation situations given the psychological flexibility of the server, the avoidance or risk, their capacity for internal discernment as well as the capacity to relate to the other; it is related to government and economic roles. The third type of intelligence was communicational intelligence, which refers to the use of language, that is, syntax, semantics, pragmatics, and phonology, tone and rhythm [48]. The fourth type of intelligence was cognitive-rational, which was correlated with the development of logical-mathematical thinking,

which is based on direct contact with reality, abstract thought, science, and logic [49].

The fifth type of intelligence was spatial, [50] associated with the precision of the location and graph of spaces, senses and visual perceptions. The sixth type of intelligence was ethical, associated with values, congruent attitudes, rational thinking and collaboration with others [47]. The seventh type of intelligence was solidarity intelligence [14], related to awareness, participatory identity, trust and initiative, action based on dialogue, and training, which promotes personal development. The last type was creative intelligence [51], evidently indicative of creative thinking, in addition to managerial creativity, holistic evaluation of the situation, innovative behavior, application of ideas, and generation of new products.

When evaluating the weight of the intensity of the relationship in the factors of each type of intelligence, four dimensions are extracted as those of greatest weight: emotional, cognitive-rational, social and

creative intelligence. Later, confirmatory factor analysis [37], shows four intelligence models in which the factors of the four main types are combined, as shown in Table 3.

Table 3: Confirmatory factorial analysis model of the shared flow scale.

Model s	Nº ítems	S-B $\chi^2$	Df	$\chi^2$ FD	CFI	TLI	RMSEA	90% CI of RMSA
Model 1	16	1343.740**	324	4.14	0.74	0.72	0.104	0.098,0.110
Model 2	12	954.887***	312	3.06	0.83	0.81	0.084	0.078,0.090
Model 3	41	983.099***	315	3.12	0.83	0.81	0.086	0.080,0.092
Model 4	27	675.933***	305	2.21	0.90	0.90	0.061	0.058,0.071

Fuente: Elaboración propia.

In this table, it was assumed \*\*\* $p \leq 0.0001$ , \*\* $p \leq 0.010$  and \* $p \leq 0.050$ . In model 1, there is only one first order factor; model 2 has three first order factors; model 3 has eight dimensions and one second order factor; and model 4 handles the four dimensions, twenty-seven variables and one second order factor. Model 4 exceeds the other models NNFI=0.9, Model fit:  $\chi^2=4142.07$ ,  $p \leq .001$ ; CFI= 0.909; TLI= 0.902; RMSEA=0.061(95% CI[0.059...0.063]). It should be noted that the Mean Square Approximation Error (RMSEA), represents the anticipated adjustment with the total population value; in this regard, if the RMSEA is less than or equal to 0.05 it indicates a smaller error of approximation of the model with reality.

#### IV. CONCLUSIONES

In general, it is observed that the public service engineers under study have different types of intelligence, associated with different forms of work, perform tasks, fulfill their objectives or those of the entity and lead a team or institution; some with followers, others proactive with few followers. A marked influence of the political groups to which they belong or support was observed and on which their actions and performance are based. In cases where the servant leader has a humanistic style, a tendency towards average productivity was observed.

In the foreground were eight types of intelligence associated with the performance of the public service engineers in the sample, of which creative intelligence and humanistic intelligence were the most representative. By delving into the interviews, an intelligence matrix was constructed, consisting of 8 types of intelligence and 42 related performance factors, from which the statistical evaluation of the intensity of the relationships between factors and dimensions was made, finding that the four most representative types of intelligence that stand out in the public servant engineers of Norte de Santander are emotional intelligence, ethical intelligence, social intelligence, creative intelligence and cognitive-rational intelligence. From these types of intelligence, four models were developed in which the approximation of these four types of intelligence to the studied reality was effectively proven.

As he explains [52], the results of this research allow for a better understanding of the role that public officials play in optimizing the performance of the social organization, from the emphasis on the recognition and appropriate use of their intelligence. Recognition of the types of intelligence involved in the work performance of these professionals in these organizations will allow for better management of human talent and greater citizen satisfaction with the service provided by public officials in Colombia [53]; it also guides engineering training for the integrality and globalization to which these professionals must respond [54].

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