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**A PERSONNEL EVALUATION APPROACH IN PUBLIC SECTOR**

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**Abstract**

Human capital is considered as the most valuable resource for an organization. Proper personnel selection for recruitment and positioning, including authority (managerial) positions, may affect significantly total organizational performance. In the Greek public sector, a research was conducted about the criteria used for personnel evaluation for positioning and performance. Our aim was to investigate the employees' opinion about the variables used for personnel selection, promotion and performance, revealing their possible important statistical correlations. Results showed that employees consider formal qualifications, such as education, training and job experience, very important to evaluate candidates for the best matching to the appropriate positions, including authority positions. Statistical analysis, showed important statistical correlations between employees' formal qualifications and parameters connected to performance. Exploratory Factor Analysis revealed four main factors for positioning and performance criteria. Confirmatory Factor Analysis led to a model to validate the statistical significance between the above factors. The model produced will represent the basis for further analysis techniques in order to predict the employees' performance through formal qualifications even in the selection stage, using algorithms.

**Keywords:** positioning, employees, criteria, performance, public sector

**1. Introduction**

Human Resource Planning (HRP) is the process by which any organization ensures that has the right number and kind of people, at the right position, at the right time, capable of effectively and efficiently completing the tasks, that help the organization achieve its overall objectives (Decenzo and Robbins, 2009; Ralević et al., 2015; Rodriguez and Walters, 2017; Mohammad, 2020). HRP focuses on selection of the appropriate number of human resources, with the right capabilities, at the right times and the right places, considering that allocation of personnel to jobs is for long periods of time (Vineeth, 2019). The staff to be acquired for recruitment or promotion, is usually selected through an evaluation process. The primary purpose of recruitment process should be the selection of candidates that add value to the organization (Laumar and Eckhardt, 2009; Hippolute and Haruna, 2017; Li, 2018). Performance evaluation is a key tool for organizations, because help them to maximize the good use of human capital (Prowse and Prowse, 2009; Utama and Rustamaji, 2018; Yoon, 2021; Alves and Lourenço, 2021). It is important for an organization or a company to be able to predict the future performance of its

employees. Performance appraisal is the assessment of employee's current or past performance, in relation to the standards set for their position, linking this way the appraisal to the job analysis (Dessler, 2012). An efficient performance evaluation system not only should identify skill needs deficiencies and address them by the suitable training and development programs, but also unearth hidden talents (Montague, 2007). Candidates are usually evaluated on required professional qualifications to match the proper employees in the appropriate positions. The multi-criteria nature of the problem of personnel selection is very complicated because of the presence of many qualitative and quantitative factors. Many employers use pre-employment assessments, to identify the best candidates among an outsized pool of qualified candidates. Employers adopt predictive tools to define the most successful candidates, to detect the potential top performers from other applicants and furthermore to measure their capabilities, skills and personality traits. Through successful hires they hope to reduce the recruitment process time, to cut off the recruitment cost per employee, to maximize quality of recruitments and staff retention and to increase the total organizational performance (Bogen and Rieke, 2018). When personnel performance is increased the overall performance of the organization is increased, too. Performance management improves the overall performance of an organization by improving the performance of individuals in a team framework. Performance management is a tool for achieving organizational excellence as a cyclical process, beginning with performance planning to define the roles and responsibilities of employees, according to job analysis and ends with the retirement of an employee. More specifically, performance management begins with job description, before the entry of an employee to an organization. The selection of the proper applicants is the next step according to personnel needs identification and performance standards. Moreover, results measurement and feedback throughout the year to identify educational and organizational needs, is necessary to implement personnel career development plans. Performance management is one of the strategies for developing human resources efficiency and productivity, creating a kind of synergy between employees' goals and organizational goals (Sadraei and Rostam, 2019).

The aim of our approach is, to investigate the opinion of personnel in public sector, about parameters used to evaluate employees' suitability for positioning (including managerial positions) and performance evaluation criteria. For that purpose, a questionnaire was conducted so that, employees in the public sector have the opportunity to express their opinions on the weights of those parameters. Through statistical analysis, exploratory and confirmatory factor analysis important correlations were explored between variables and factors used for employees' selection for recruitment or promotion and parameters connected to personnel performance. The actual purpose of this work was to establish a theoretical framework for personnel evaluation performance and positioning in the Greek public sector. The produced model provides a basis for further analysis techniques, using classification algorithms to predict the fitness of employees to certain positions.

This paper is organized as follows: In Section 2, existing literature about criteria taken into account during personnel selection is reviewed. Section 3, provides the used research methodology to find the relation between formal qualifications and performance criteria. In section 4, results of descriptive statistical analysis, exploratory and confirmatory factor analysis,

are presented. Section 5 provides overall presentation and discussion. Finally, in the section 6 conclusions, limitations of the research and prepositions for further research are presented.

## **2. Literature Review**

Personnel selection is the process of choosing individuals who match the qualifications required to perform a defined job in the best way and is a key success factor for all organizations (Dursun et al., 2010). According to CEDEFOP (2002), capability is defined, as the proven ability of an individual to utilize the know-how, skills, qualifications or knowledge to successfully manage, both embedded and new occupational situations and requirements. Skills define the knowledge and experience that a person possess and are necessary to perform a specific task. According to Bogen and Rieke (2018), the hiring funnel consists of four stages, the sourcing stage, the screening stage, the interviewing stage and final the selection stage. In the **sourcing** stage, employers seek out candidates to apply for their job opportunities, in the screening stage, employers formally begin reviewing applications, rejecting unqualified and prioritizing the remainder for closer consideration. Predictive tools evaluate and classify applicants according to their qualifications, skills, and other capabilities that help managers' decisions. During interview stage, human resources managers interact directly with candidates and recruitment decisions are usually clarified. More specifically, entry-level employment interviews, appears to be highly valid predictors of supervisory ratings on job performance. During the selection stage, employers make final recruitment decisions, which might include negotiation of working terms. The clear description of the position and the given criteria for selecting human resources that are set, limit the choice error. Qualifications and skills are formed in groups to assist the human resources departments to make easier decisions about the positioning of the appropriate employee in the appropriate position (Gibbs et al., 2010), according to job analysis. Dessler (2012) defines job analysis as "the process by which the tasks corresponding to each job are defined and the characteristics of the people hired to fill those jobs". Job-based job analysis focuses on the skills that employees' should have (Sanchez and Levine, 2009). Job analysis is consisted of two parts, job description and job specification. The first clarifies job requirements and skills, arisen from the position, determines the schedule and rewards, while the second outlines the job qualifications for the position.

Among individuals' qualifications assessed in applied psychology, cognitive ability is one of the most important variable to consider for purposes of employees' selection, because according to Campbell (1990) general mental ability is a significant determinant of job performance for any job including information-processing tasks. Cognitive ability is related to individuals' capability to deal with tasks in general and complex tasks in particular (Ones et al., 2012). General cognitive ability has been shown to be predictive of performance in all training stages (Jensen, 1998). According to Hunter (1986) cognitive ability makes easier the learning process and promotes higher performance. Intelligence and education level are positively and significantly correlated (Kaufman, 1990; Trusty and Niles, 2004). Individuals with higher levels of education have greater intelligence (Ceci, 1991; Neisser et al., 1996). It is found that those who attended college, scored higher on IQ tests than did those who did not attend colleges (Howard, 1986; Kuncel et al., 2004). Individuals with more education are likely to have greater analytical knowledge and creativity (Ceci, 1991). Evaluating job applicants on the basis of cognitive

ability, more creative and innovative workforce is selected and overall performance is increased (Dilchert, 2008). Furthermore cognitive ability is strongly related to leadership effectiveness (Judge et al., 2004) and is associated with moral development, which has a negative connection to unethical behaviors (Kish-Gephart et al., 2010). An individual in order to be selected for a job position should have the required skills and the necessary knowledge. The skills and knowledge acquirement, begins during formal education, primary, secondary school, college, university and is continued during formal job training, on-the-job-training, in order to acquire more specialized job knowledge. The knowledge and skills' acquirement is related to general mental ability of an individual, because the higher an individual's general mental ability is, the faster acquisition of knowledge is got, both in formal training and on the job (Kuncel et al., 2004). In order for an individual to achieve distinct performance, must have a combination of abilities (Goleman, 2000). Employers usually take into account criteria connected to candidates' existing qualifications and skills, such as prior job experience, education degrees, computer certification and foreign languages' knowledge. Managerial positions usually require higher qualifications that are prerequisite for more in-depth consideration. In addition to specialized professional knowledge, modern workers must also have a range of social skills, such as cooperation, creativity, adaptability, leadership, innovative spirit, creativity, communication skills etc. Information associated with job description, skills, motivation, personality and work experience are usually employed to draw conclusions about the abilities of candidates (Brown and Campion, 1994; Chapman and Webster, 2003). But in general, employees' evaluation is difficult to be fully acceptable without quantitative criteria. The use of quantitative criteria enhances the transparency of the decision-making process, because of its objectivity. The adoption of quantitative and analytical methods increases objectivity of evaluation procedures. When employees are evaluated with methods based on reliable criteria, the evaluation is more acceptable and can be a success factor for an organization, assisting the decision support system (Dulebohn and Johnson, 2013).

Emre et al. (2011), in their research, resulted that many factors, must be evaluated when selecting candidates for an organization, related with criteria such as personality, leadership abilities, oral communication skills, job experience, general aptitude, self-confidence and first impression. In another research in order to select the best candidate for the position of management executive in a maritime company, the most highly ranked criterion was honesty, followed by responsibility, capabilities in decision making, team spirit, communication skills, time management ability, knowledge of foreign languages and computer skills (Koutra et al., 2017). The performance appraisal criteria should also be taken into account, especially when selecting employees for promotion in managerial positions. According to a conceptual framework the most important performance criteria are, the criteria concerning job procedures, that show if tasks are accomplish according to quality standards, avoiding errors, complying with protocols, observing quality specifications and solving workplace problems. The representation criteria are followed, that show orientation towards positive results, seriousness in accomplishing work tasks, orientation towards quality, effective communication, openness to problem solving and respect in approaching relationships throughout the company (Hutu and Avasilcai, 2011). Finally, the profile criteria show the ability to communicate efficiently, the capacity to understand work tasks, the competence in developing good work relationships, the ability to

efficiently act in crisis, the ability to solve organizational problems and the total attention in carrying out tasks (Rusu et al., 2016).

Another research showed that criteria related with working stress and energy' handling, seems to have a good prediction ability of future human resource performance and should be considered for the selection of a person for recruitment. They assumed that a person who is coherent in thinking, lucid and physically strong is more productive than a person who is incoherent, mentally unclear and physically weak. The research resulted that working stress may reduce job performance. On the contrary an increase in the level of person' energy, may directly lead to increase of its professional performance (Torp et al., 2018). As a result, candidates full of energy that can effectively handle working stress, should be preferred because usually have a better job performance than those cannot handle effectively with working stress. Another research showed that, criteria related to school tiers, academic titles, and experience, were the main characteristics related to the predicted job goals. Employees with higher qualifications, higher educational level, such as postgraduate or doctoral and employees with one or more years of work experience, performed better but their resignation rate was also higher than other employees (Chien and Chen, 2008). Azar et al. (2013) tried to connect working performance to some critical skills of employees and they identified five important criteria connected to employees' development: work employment, education level, exam score, interview score and work experience.

### **3. Research Methodology and Data Analysis**

Our research was carried out through a structured questionnaire, which was formed by the researchers based on the criteria set, used by current legislation about performance appraisal and the Supreme Staff Selection Council, that is responsible for the recruitment procedures of the public sector in Greece. The questionnaire was common to all respondents, was anonymous and distributed through internet to the official and personal mails of civil servants of the regions of Ionian Islands and Crete. In total 196 answers were collected from April to July 2020, in accordance to international rules of research ethics. It consisted of 49 questions which (except for the three demographic questions) were graded according to a Likert-type scale. Questions were formed as "closed-ended", with specific content, in which respondents were asked to express their degree of agreement or disagreement in order to define the most important considered criteria for employees' positioning and performance. In our analysis it should be noted, that SPSS v.26, AMOS v.20 and Microsoft Excel software were employed, upon which all required licenses exist. Firstly a Pilot test ran efficiently on 20 individuals. In relation to the validation process upon the variety of statistical tools and techniques required, in this particular case, it was based on Cronbach's Alpha test. Since the Cronbach's alpha indicator reached the value 0.849 which is above the threshold of 0.7 (Bonett and Wright, 2014) the internal consistency was achieved and an exploratory Factor Analysis (EFA), a Confirmatory Factor Analysis (CFA) and regression analysis between variables followed. More specifically, during the statistical analysis, regression weights were acknowledged allowing the performance of Composite Reliability (CR), Average Variance Extracted (AVE), which according to Alumran et al. (2014), evaluates the correlation with model items. In order to check the uni-dimensionality and consistency of the extracted factors, a Confirmatory Factor analysis (CFA) was also conducted, assessing maximum likelihood estimation between the factors occurred by EFA and a

Structural Equation Model (S.E.M.) was employed. The validity of the produced model was also checked using several different indices such as goodness of fit, including Chi-square degree of freedom ratio ( $X^2/df$ ), root mean square error of approximation (RMSEA) and Goodness of Fit Index (GFI). The followed methodology was designed to associate formal skills and performance abilities upon which, algorithms can be developed. Furthermore the significance of correlations extracted can create a basis to determine the weights of personnel skills (Fig. 1).

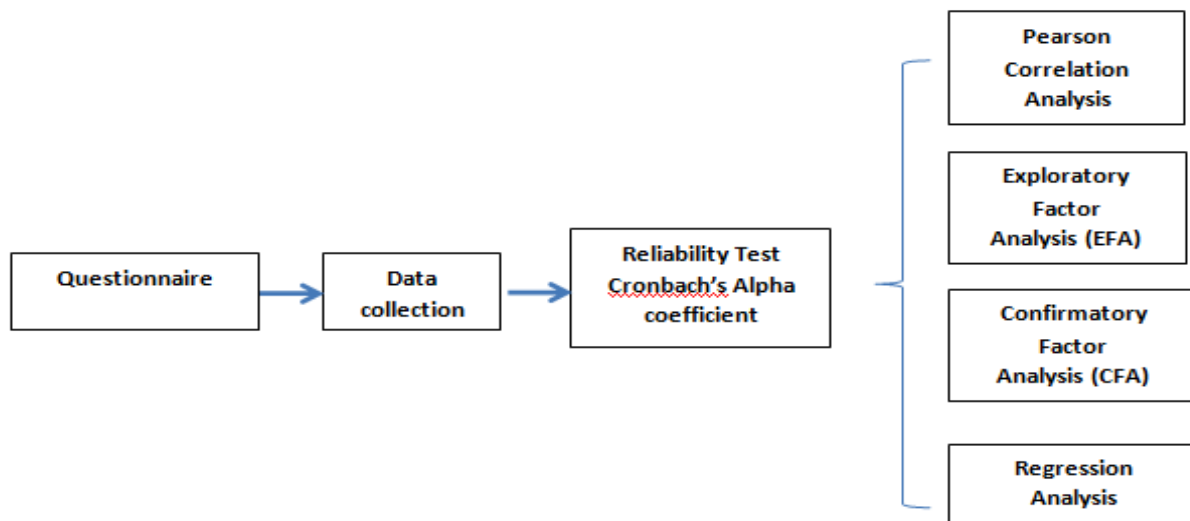


Figure 1. Methodology scheme

## 4. Results Analysis

### 4.1 Descriptive Statistical Analysis

From descriptive statistical analysis, according to means frequencies, employees consider the most important criteria to define employees' suitability for best positioning, including authority positions, as follows: Experience, University degree level, Job training, Master degree, PhD diploma, Experience in authority positions, National School for Public Administration, Languages, participation to Group work and Committees, Research work, Degree value, Interview score and Appraisal mean score. Qualifications totally measurable and clearly recognizable like: education, experience and training, are considered as very important to define employees' suitability for a position. In Figure 2 are presented the means frequencies for positioning criteria according to respondents' opinion.

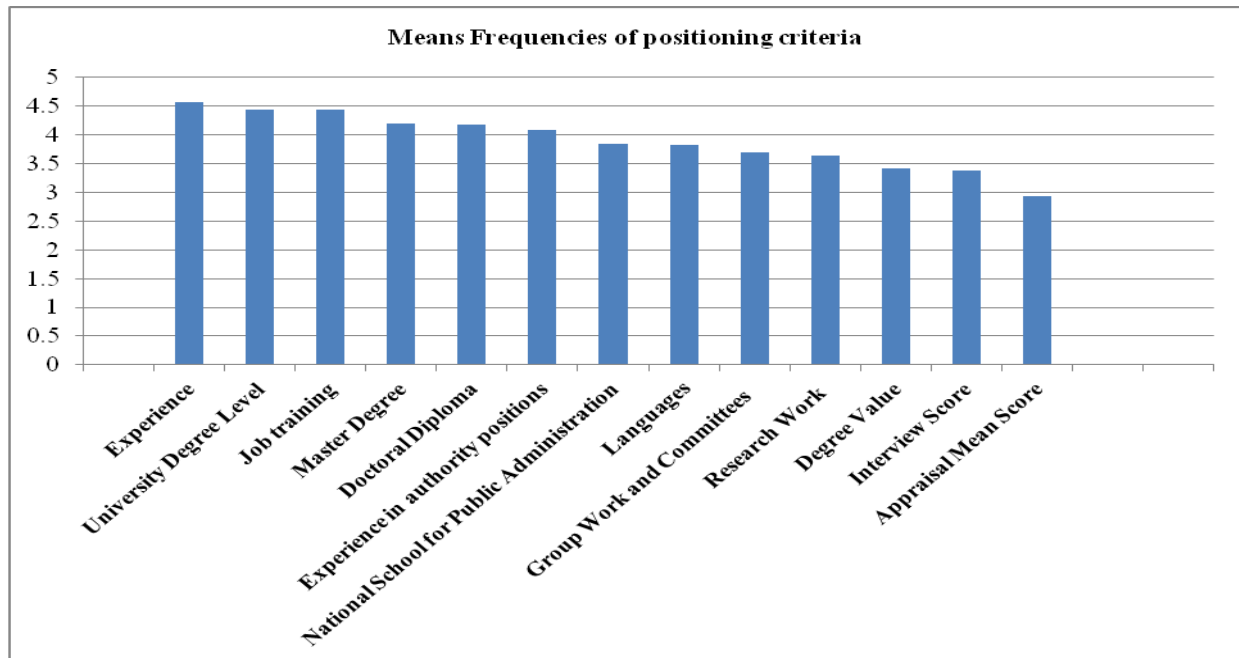


Figure 2. Human Resources “Positioning Criteria”

Additionally, the most important performance criteria, according to employees’ opinion are, the ability to prioritize, the ability of objective judgment, the effective use of working time, the communications skills, the crisis handling ability, the effective handling of working stress, the leadership skills and the ability to introduce innovations, as are presented in Figure 3.

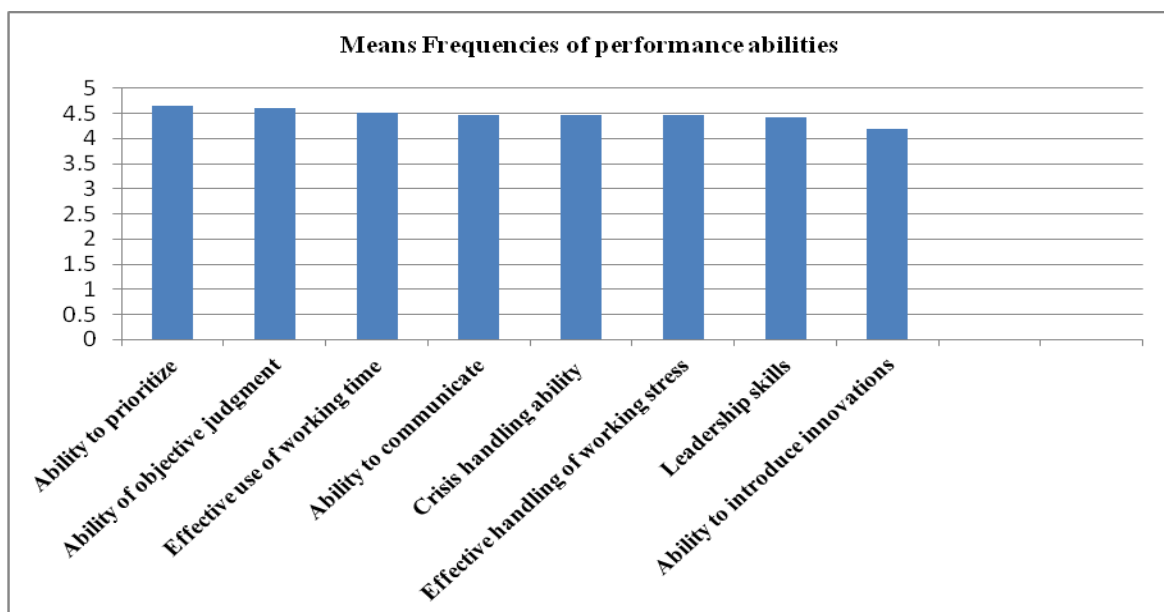


Figure 3. Means Frequencies for “Performance Abilities”

*4.2 Pearson Correlations Analysis*

In our dataset we found a few significant correlations between criteria, validated by the implementation of Pearson correlation coefficient (the simplest correlation method, especially when data show linear relations and are continuous numeric). In Table 1, significant correlations between formal qualifications and performance criteria are presented. University degree level, Master degree, Research work and Job training are correlated positive to the crises handling ability and the ability to introduce innovations (r-values from 0.160 to 0.231), while PhD diploma is correlated to the ability of introducing innovations (r= 0.193).

Table 1. Formal Qualifications and Performance criteria correlations

	<b>Crisis handling ability</b>	<b>Ability to introduce innovations</b>
<b>University degree level</b>	0.162*	0.204**
<b>Master degree</b>	0.160*	0.203**
<b>PhD diploma</b>	ns	0.193**
<b>Research work</b>	0.231**	0.283**
<b>Job training</b>	0.186**	0.182**
	<b>Effective use of working time</b>	<b>Effective handling of working stress</b>
<b>Job experience</b>	0.188*	0.200**
	<b>Communication Skills</b>	
<b>Appraisal score</b>	0.270**	
<b>Interview score</b>	0.215**	

\*. Correlation is significant at the 0.05 level (2-tailed) \*\*\*. Correlation is significant at the 0.01 level (2-tailed)

Job experience is correlated with the effective use of working time and effective handling of working stress (r-values close to 0.2). Appraisal and interview scores are directly correlated to communications skills (r= 0.270 and 0.215 respectively).

In Table 2, correlations between performance criteria are presented. All special skills needed for better performance are significantly correlated to each other.



Table 2. Performance criteria correlations

	Ability to introduce innovations	Leadership ability	Effective use of working time	Effective handling of working stress	Ability to set priorities	Communication skills	Ability of objective judgment
Crisis handling ability	0.533**	0.503**	0.425**	0.509**	0.467**	0.446**	0.516**
Ability to introduce innovations		0.524**	0.354**	0.378**	0.392**	0.341**	0.395**
Leadership ability			0.430**	0.373**	0.525**	0.427**	0.519**
Effective use of working time				0.722**	0.630**	0.327**	0.460**
Effective handling of working stress					0.573**	0.451**	0.523**
Ability to set priorities						0.436**	0.577**
Communication skills							0.547**

\*\* . Correlation is significant at the 0.01 level (2-tailed)

More specifically, crisis handling ability is significantly correlated to the ability to introduce innovations, the leadership ability, the effective use of working time, the effective handling of working stress, the ability to prioritize, the ability of objective judgment and communication skills (r-values generally high and around 0.5). The ability to introduce innovations is significantly correlated to the leadership ability (r= 0.524), the effective use of working time, the effective handling of working stress, the ability to prioritize, the ability of objective judgment and communication skills. The leadership ability is significantly correlated to the effective use of working time, the effective handling of working stress, the ability to prioritize (r= 0.525), the ability of objective judgment and communication skills. The effective use of working time is significantly correlated to the effective handling of working stress (r= 0.722, the highest correlation), the ability to prioritize (r= 0.630), the ability of objective judgment and communication skills. The effective handling of working stress is significantly correlated to the ability to prioritize (r= 0.573, one of the highest), the ability of objective judgment (r= 0.523) and communication skills. The ability to set priorities is significantly correlated to the ability of objective judgment (r= 0.577) and communication skills. It is clearly that crisis handling ability,

ability to introduce innovations, ability of objective judgment and communication skills are strongly correlated to all the other presented performance criteria.

#### *4.3 Exploratory Factor Analysis (EFA)*

Factor analysis identified four main factors that influence the suitable positioning of employees, including authority positions, in order to define employees' suitability so as to achieve their best performance. Also, the analysis showed a strong correlation between the factors. In the first phase of the validation, we measured the internal consistency using the statistical tool of Cronbach's alpha coefficient. Being aware of the validity threshold of 0.70 (Avdimiotis, 2019) the indicator showed the satisfactory score of 0.849, which allowed the researchers to proceed to the second phase of validation which was to contact, as also mentioned, an Exploratory Factor Analysis (EFA) to determine the number of items that are successfully loaded explaining sufficiently the variable of selection and positioning criteria. Results indicate that EFA was successfully implemented with the Kaiser Mayer Olkin (KMO) index of sampling adequacy being above the acceptable threshold of 0.6 reaching the value of 0.825, while the variability was sufficiently (61.278%) explained. Using Varimax rotation method four factors were extracted as are followed presented:

1. The factor "**Performance Abilities**", is consisted of the items:
  - Crisis handling ability,
  - Ability to introduce innovations,
  - Leadership Skills,
  - Effective use of working time,
  - Effective handling of working stress,
  - Ability to prioritize,
  - Communication skills,
  - Ability of objective judgment.
2. The factor "**Formal Qualifications**", is consisted of the items:
  - University Degree Level,
  - Degree Value,
  - Master Degree,
  - Doctoral Diploma (PhD),
  - Diploma from National School for Public Administration,
  - Languages,
  - Research Work.
3. The factor "**Evaluation**", is consisted of the items:
  - Appraisal Mean Score,
  - Interview Score,
  - Participation to Group work and Committees.
4. The factor "**Experience and Training**", is consisted of the items:
  - Experience,
  - Experience in authority positions,
  - Job training.

*4.4 Confirmatory Factor Analysis (CFA)*

To furthermore obtain the internal validity of the questionnaire, in the third phase of questionnaire’s validation process, a Confirmatory Factor Analysis, was implemented in order to test the fit of the new model between the factors extracted (Performance Abilities, Formal Qualifications, Former Evaluation and Experience-Training). A correlation analysis followed between above factors. Regarding the matrices of the constructed multi-variable model, the model yielded an X<sup>2</sup> value of 404.917, with 189 degrees of freedom (p<0.001) and an acceptable CMIN/DF of 2.142. In response to chi-square's inbuilt limitations, the CMIN/DF fit (X<sup>2</sup> divided by the degrees of freedom) surfaced as the most appropriate fit statistic with values less than 5, indicating an acceptable fit model (Tabachnick and Fidell, 2007). These values established acceptable fit according to the criteria suggested by Bagozzi and Yi (1988), Hair et al. (2010), Fornell and Larcker (1981) for this metric (X<sup>2</sup>/df<5). In particular, the model achieved a satisfactory Root Mean Square Error of Approximation (RMSEA) of 0.077, a GFI (Goodness of Fit Index) score 0.802, with all other metrics falling into the acceptable fit ranges (Hair et al., 2010). PRATIO (0.900) were also into the acceptable fit thresholds (Mulaik et al., 1989).

A significant statistical correlation was found between the factor “Formal Qualification” and

- Performance Abilities, as the correlation was estimated to 0.686.
- Experience and Training, as the correlation was estimated to 0.600
- (former) Evaluation, as the correlation was estimated to 0.569.

In Figures 4 and 5 and Table 3, correlations between the above main factors are presented, according to AMOS v.20.

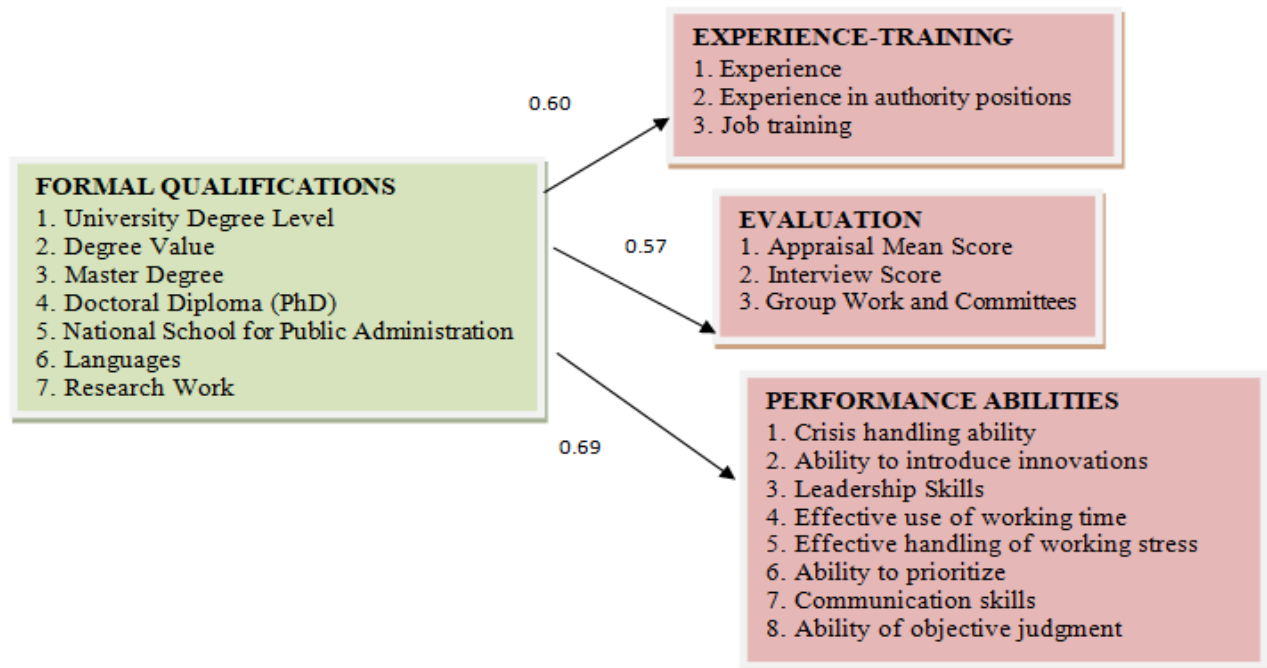


Figure 4. Analytical Model Factor Correlations (including variables)

Table 3. Correlations between formal qualifications, performance abilities, experience & training and former evaluation

			Estimate	S.E.	C.R.	P
Experience	<---	Formal_Skills	.600	.112	5.359	***
Performance_Abilities	<---	Formal_Skills	.686	.125	5.494	***
Former_evaluation	<---	Formal_Skills	.569	.133	4.262	***
C17 Research Work	<---	Formal_Skills	1.000			
C11 Languages	<---	Formal_Skills	.846	.154	5.490	***
C7 Diploma from National School for Public Administration	<---	Formal_Skills	.814	.159	5.123	***
C6 Doctoral Diploma (PhD)	<---	Formal_Skills	1.059	.155	6.847	***
C4 Master Degree	<---	Formal_Skills	1.039	.146	7.120	***
C3 Degree Value	<---	Formal_Skills	.645	.148	4.349	***
C1 University Degree Level	<---	Formal_Skills	.563	.106	5.295	***
D8 Ability of objective judgment	<---	Performance_Abilities	1.000			
D7 Communication skills	<---	Performance_Abilities	.955	.130	7.346	***
D6 Ability to prioritize	<---	Performance_Abilities	1.001	.114	8.819	***
D5 Effective handling of working stress	<---	Performance_Abilities	1.059	.134	7.882	***
D4 Effective use of working time	<---	Performance_Abilities	1.070	.138	7.736	***
D3 Leadership Skills	<---	Performance_Abilities	1.026	.132	7.763	***
D2 Ability to introduce innovations	<---	Performance_Abilities	1.112	.159	7.013	***
D1 Crisis handling ability	<---	Performance_Abilities	1.138	.140	8.121	***
C15 Participation to group Work and Committees	<---	Former_evaluation	1.000			
C14 Interview Score	<---	Former_evaluation	.895	.260	3.445	***
C13 Appraisal Mean Score	<---	Former_evaluation	1.217	.313	3.890	***
C10 Job training	<---	Experience	1.000			
C9 Experience in authority positions	<---	Experience	1.262	.264	4.776	***
C8 Experience	<---	Experience	.742	.145	5.129	***

(\*\*\*) statistically significant at  $p < 0.001$ .

The presented analysis proves the magnitude of correlation between formal skills, performance abilities, experience and evaluation, more clearly presented in Table 3. The positive correlations reflect in direct improvement of the factors by improving certain variables.

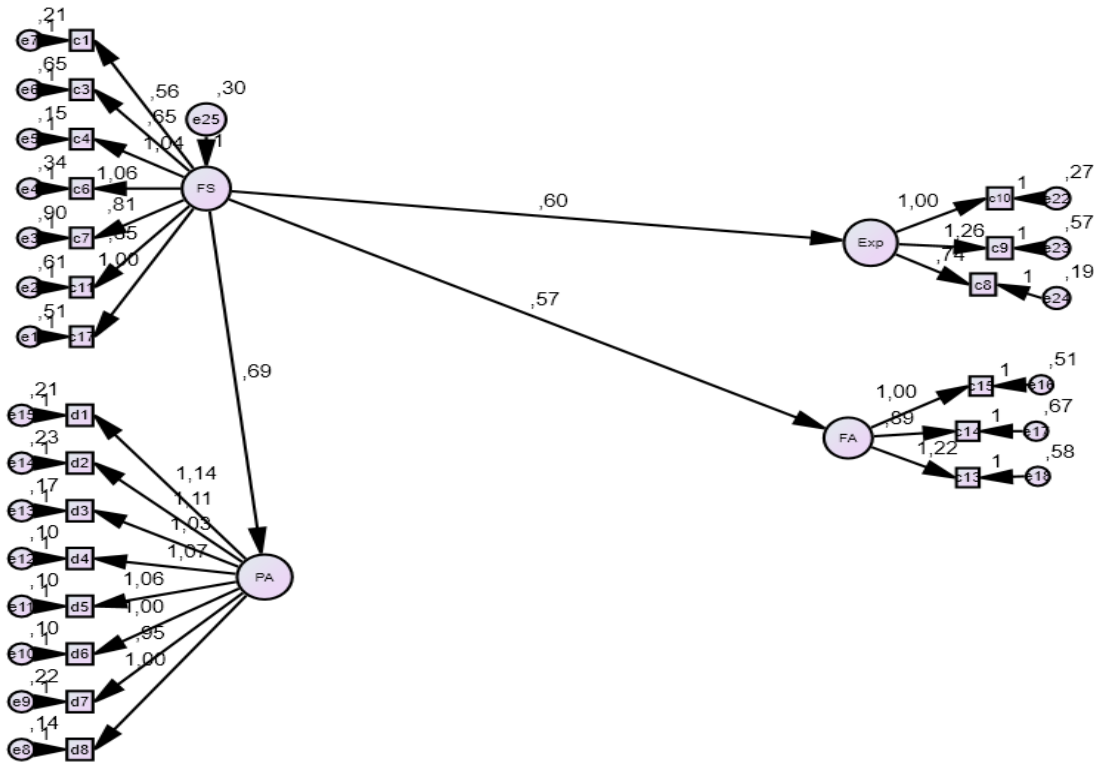


Figure 5. Model Factor Correlations, according to AMOS program

**5. Overall Presentation and Discussion**

Many organizations use education as an indicator of a person’s skill levels or productivity (Benson et al., 2004) and as a prerequisite in hiring decisions. Education promotes self-confidence, self-motivation, carefulness and the desire to set personal goals (DiVesta and Thompson, 1970; Howard, 1986; UNDP, 1995). Job knowledge is the direct and proximal determinant of overall job performance and a link between cognitive ability and job performance (Borman et al., 1991; Borman et al., 1993; Schmidt et al., 1986; Schmidt, 2002; Schmidt and Hunter, 1992).

In our research, descriptive statistical showed that formal qualifications are considered from respondents very important, for positioning, including authority (managerial) positions. According to calculated means’ frequencies, the most important qualifications to define employees suitability for a position are: Experience, Job training, University degree level, Master degrees, PhD Diplomas, Experience in authority positions, National School for Public Administration degrees, Languages, Participation to group work and committees, Research work, Degree value, Interview and Appraisal score. Concerning performance criteria, the most important are, the ability to prioritize, the ability of objective judgment, the effective use of

working time, the crisis handling ability, the effective handling of working stress, the leadership skills, the ability to introduce innovations and communications skills.

Pearson correlation analysis showed significant positive correlations between:

- a. university degree level, master degree, research work, job training and crisis handling ability,
- b. university degree level, master degree, PhD diploma, research work, job training and the ability to introduce innovations,
- c. job experience and effective use of working time,
- d. job experience and effective handling of working stress and
- e. interview scores, appraisal scores and communication skills.

According to current legislation in Greece, the degree value is very important for employees' selection for recruitment, but not for promotion to authority (managerial) positions. Degrees such as, PhD diplomas, master degrees, postgraduate degrees and National School for Public Administration degrees, are taken into account, either for recruitment or for promotion to authority positions. Legislation considers as very important the performance appraisal and the interview score, for promotion in authority positions. But in general, although performance appraisal is widely used in public sector, does not sufficiently support decisions related to human resources development (Mishken and Juhasz, 2008).

Exploratory factor analysis, showed four main factors (formal qualifications, performance abilities, experience and training and former evaluation). Confirmatory factor analysis, showed important positive correlations between these factors and more specifically, between: formal qualifications (university degree level, degree value, master degree, doctoral diploma-PhD, national school for public administration, languages, research work) and:

- a. performance abilities (crisis handling ability, ability to introduce innovations, leadership skills, effective use of working time, effective handling of working stress, ability to prioritize, communication skills, ability of objective judgment),
- b. experience and training (total experience, experience in authority positions, job training) and
- c. (former) evaluation (interview, appraisal scores and participation to group work and committees).

It is clear that both, basic statistical analysis and confirmatory factor analysis showed that formal qualifications, performance abilities, education, experience and training, are significantly correlated. Brenner (1982), comparing individuals with different levels of education, concluded that as level of education increased, achievement orientation increased as well. Furthermore, researchers found that many years of education were positively related to conscientiousness (Dudley et al., 2006; Goldberg et al., 1998). On the other hand, values acquired through education such as, responsibility and moral integrity, are negatively related to workplace aggression. Analytical knowledge provided by formal education and job experience, enhance job performance (Ng and Feldman, 2009). According to Ismail et al. (2015), working stress was essential predictor of job performance. There is also a significant relationship between effective use of working time (time management) and job performance (Ahmad et al., 2012). Therefore, according to Ones et al. (2012), criteria such as, overall job performance, counterproductive

work behaviors, leadership, creativity, innovation, voluntary turnover, job satisfaction and career success are connected to intelligence and cognitive ability, which is known as the ability to learn and process information. In general education, training and job complexity, are more likely to translate into career success, concluding terms of rewards.

Employees' education degrees, job experience, training, evaluation scores and participation to group work, are very easy to be measured and identified on a reliable and objective manner. On the contrary the performance criteria related to personal abilities are very difficult to be fairly and objectively measured. In our approach high correlations revealed, showed a significant relationship between formal skills and performance abilities. The measurable employees' qualifications (university degree level, master degree, PhD diploma, research work, job experience, training, interview score, appraisal score, participation to group work and committees) are statistically significant correlated to the qualitative performance abilities, especially the crisis handling ability, the ability to introduce innovations, the effective use of working time, the effective handling of working stress and communication skills. As a result, the totally measurable formal qualifications are proposed to be used as performance indicators, to contribute the human resources' decision support system so as to take full advantage of the human capital, increasing this way personnel performance. This approach is considered suitable for further process using classification algorithms (e.g. decision trees) (Pampouktsi et al., 2021), based on the model produced connecting formal and soft skills to performance. The qualifications' relations may define those parameters that will form the future vector for predictive algorithms.

## **6. Conclusions**

Concluding, our work revealed that employees of the Greek public sector consider formal qualifications as very important to define employees' suitability for positioning, including authority positions. Statistical analysis showed high correlations between formal qualification (university degree level, master degree, PhD diploma, research work, job training and job experience) and performance criteria (crisis handling ability, ability to introduce innovations, effective use of working time and effective handling of working stress). Exploratory Factor Analysis revealed four main factors for positioning and performance criteria. Confirmatory factor analysis revealed a high positive correlation and connection between formal qualifications and performance criteria (not easy to be measured), validating correlations between individual characteristics. As a result, formal qualifications and especially university degree, master degree, PhD diploma, research work, job training and job experience could be used as performance indicators, during the evaluation procedure to define employees' suitability to a job position.

Our work, for the time-being, is limited to public sector, where personnel evaluation for positioning, including authority positions is based on formal qualifications. Since our produced models showed strong and significant correlations between formal qualifications and performance, future work may try to evaluate employees, on the basis of formal qualifications in order to predict their future performance and propose the proper people for the proper job positions using classification methods based on machine learning techniques. Furthermore, in the future, the influence of organizational culture and working safety feeling variables should be analyzed, as factors affecting employees' and total organization performance.

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