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1                   **EMPLOYABILITY OF GRADUATE STUDENTS IN CONSTRUCTION**

2                                   **MANAGEMENT**

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14  
15           **ABSTRACT**

16           The economic crisis that currently affects some western countries has reduced the  
17           employability of graduates in the construction industry. Nevertheless, many young  
18           professionals consider this situation as an opportunity to further their training, thus the higher  
19           enrollment in graduate programs in the construction industry. In light of this scenario, the  
20           authors of this paper sought to identify students' perceptions of training gaps that affect their  
21           employability. The research was based on a case study, conducted in a Spanish graduate  
22           program (M.Sc.) in construction management during two consecutive academic years; a  
23           questionnaire survey was given to all enrolled students at the beginning of the first semester.

24 The statistical analyses consisted of a principal component analysis of the 21 variables listed  
25 as possible explanations for their graduates' unemployment, and an analysis of variance  
26 based on the aforementioned principal components. Respondents recognized the intrinsic  
27 internal barriers, which jeopardized their job opportunities, such as their unwillingness to  
28 move to another country, their lack of knowledge of a foreign language and communication  
29 skills, or their preferences for only well-paid and comfortable jobs. Other perceived problems  
30 were related to economic policy, training gaps, labor market structure, graduate surplus, and  
31 setbacks related to business management.

32

33 **KEYWORDS:** Construction management, employment, graduate degree, labor market.

34

## 35 **INTRODUCTION**

36 Higher education programs must provide adequate training and skills to ensure the  
37 employability and competitiveness of graduates, thus allowing them to enter the job market  
38 (Storen and Aamodt 2010). In this paper, the authors aim to analyze students' perceptions of  
39 training gaps that affect their employability, using a Spanish graduate program (M.Sc.) in  
40 construction management as a case study. With this in mind, we should briefly summarize the  
41 employability of young professionals in the construction industry.

42 In Spain, the construction industry is characterized by its significant influence on the  
43 economy. Until 2007, the contribution of construction to Gross Domestic Product (GDP)  
44 increased year after year. At the same time, the construction industry alone provided about  
45 24% of the GDP and over 26% of new jobs (SEOPAN 2012). Since 2008, the Spanish  
46 construction industry has undergone a significant economic crisis; in the period 2008-2011,  
47 the role of the sector fell to 10% of the GDP. This reduction accounts for about 60% of job  
48 losses (SEOPAN 2012). The unemployment rate for civil engineers and architects in 2011

49 was 10% (CICCP 2012) and 26% (SARQ, 2012), respectively. Nearly 40% of unemployed  
50 civil engineers had graduated in the previous three years (CICCP 2012). These high rates of  
51 unemployment among new graduates (over 60% of the 2011 class of civil engineers)  
52 highlight the urgent need to adapt graduate construction programs in order to ensure that new  
53 professionals have the skills required by the labor market.

54 A literature review reveals a number of studies published in recent years, many of  
55 which analyze the employability of graduates in construction from the point of view of  
56 employers in the United States (Farooqui and Ahmed 2009), the United Kingdom (Henley  
57 Management College 2006), Spain (Martín del Peso et al. 2013), and countries in the  
58 European Union (Teixeira et al. 2006). These studies are succinctly analyzed in the following  
59 paragraphs.

60 Farooqui and Ahmed (2009) surveyed 36 members of the construction industry and  
61 18 members of the education sector (with the majority in the South Central and South East  
62 regions of the United States). With their survey, they identified skills ranked high by industry  
63 but given little attention by educators, such as interpreting on contract documents, listening  
64 skills, and contract negotiation, among others.

65 The research conducted by Henley Management College (2006), commissioned by  
66 The Royal Academy of Engineering, consisted in two phases: an initial qualitative study  
67 based on 18 interviews with corporate executives in the engineering sector and a quantitative  
68 survey of 8,247 contacts of the Royal Academy of Engineering. This study differentiated  
69 between skills currently in demand and requirements based on the changes and challenges  
70 engineering companies will face in the future. Within the group of current requirements, the  
71 two skills most valued by the industry corresponded to technical skills (practical application  
72 and creativity and innovation), while the third most important skill (team work) was related

73 to social skills. Regarding future needs, respondents highlighted the importance of problem  
74 solving, globalization and sustainability, among others.

75 Martín del Peso et al. (2013) conducted a survey of 564 employers who were asked to  
76 evaluate the main gaps (knowledge and skills) detected in young professionals. The most  
77 fundamental gaps were found in the communication competence of employees (public  
78 speaking and presentations) as well as in the detection of new opportunities.

79 Finally, Teixeira et al. (2006) described the results of a survey conducted with  
80 approximately 300 organizations in four European countries (Poland, Portugal, Spain, and  
81 Lithuania) and aimed to identify needs for professional training in construction management.  
82 This project was part of the Leonardo da Vinci program, financed by the European Union; it  
83 focused on lifelong learning and training for professionals. According to the results of this  
84 survey, the four most relevant management areas were planning and scheduling, cost  
85 estimation, quality management, and procurement and tendering procedures.

86 These studies establish a number of shortcomings identified in recent years in  
87 graduate programs in construction. Moreover, recognized institutions, such as ABET in the  
88 United States (ABET 2008) or ANECA in Spain (ANECA 2007), are currently assessing the  
89 quality of higher education, focusing on the graduates' employability as well. Nevertheless,  
90 the current economic crisis has seriously affected the employability of new professionals in  
91 construction, not only in Spain, but also in other western countries as well (HECSU 2010,  
92 Wu 2011, Ichniowski 2012). Regarding the relevance of employability in the decision of  
93 students about joining a program, the contribution of Wu (2011) is remarkable; this author  
94 states that high unemployment rate drives undergraduates to select courses that increase their  
95 employability.

96 This situation raises the question whether the gaps detected in the literature between  
97 construction programs and the labor market are still valid, or if the current economic crisis

98 has changed the needs of the market or even resulted in new shortcomings in graduates'  
99 training. Being this problem so broad to cover in detail, the specific purpose of this case study  
100 is to research students' perception of training gaps that affect their employability. A  
101 subsequent objective is to establish areas for improvements in the case study program and its  
102 syllabi that enhance the students' employability.

103

#### 104 **THE CASE STUDY**

105 The Master of Planning and Management in Civil Engineering (PMaCE henceforth) at the  
106 Universitat Politècnica de València started in 2008, supported by a group of professors in  
107 Construction Engineering and Management at the School of Civil Engineering. While there  
108 are, approximately, ten M.Sc. degrees offered currently in Spain focused on the construction  
109 management field, PMaCE is the only one specialized in managerial issues applied to civil  
110 engineering. Our program represents about 10% of the Spanish graduate students in  
111 construction management. There are also many programs around Europe (and worldwide)  
112 focused in construction management too; some of them were analyzed by two of the authors  
113 of this paper in another contribution (Yepes et al., 2012a).

114 The purpose of the PMaCE was to apply a holistic managerial approach to  
115 construction both from production and business standpoints (Jiménez et al. 2011). The  
116 PMaCE is composed of one year of coursework divided in two semesters, plus an additional  
117 semester to prepare a M.Sc. Thesis. It is structured around four mandatory subjects of similar  
118 importance (Jiménez et al. 2011): project assessment, construction site administration,  
119 innovation and quality, and business management. Finally, an elective subject completes the  
120 second semester, with courses on real estate, e-business, artificial neural networks, lean  
121 construction, managerial skills, and advanced construction technology, among others, being  
122 offered.

123 Since the conception of the PMAcE, the School of Civil Engineering has attempted to  
124 improve the quality of the program, its syllabi, and the teaching methods. In order to do so, a  
125 study was developed on motivation of the students accessing the Master degree (Yepes et al.  
126 2012b); 44 students of the PMAcE (from the 2011-2012 academic year) were surveyed.  
127 Thirty two of them (73% of the sample) acknowledged that, by enrolling the PMAcE, they  
128 were increasing their opportunities to find a (better) job. These results agree with the work of  
129 Wu (2011) who analyzed the influence of the current economic crisis on Taiwanese students'  
130 choices.

131 The School of Civil Engineering also analyzed current teaching methods, putting new  
132 ones into action. The first two classes of the PMAcE remarked that they had to deal with  
133 heavy workloads from every subject, mainly in the first semester, which was based on  
134 homework involving different case studies. In 2010, a common project was designed to solve  
135 the problem, acting as a homework reference for the courses taught in the first semester. The  
136 majority of students of that class had a good opinion of the single common project, and they  
137 agreed that it helped them to improve their teamwork skills (Jiménez et al. 2011).

138 Anyway, despite the decline of the Spanish construction industry (SEOPAN 2012),  
139 the enrollment in the PMAcE has increased since its inception, doubling the number of  
140 students during its four academic years of existence, from 20 in 2008 to 44 in 2011.

141

## 142 **MATERIAL AND METHODS**

### 143 **Questionnaire Survey**

144 To comply with the objectives stated in the Introduction, a survey was chosen as the research  
145 tool because of its suitability for collecting opinions or attitudes. The perception of the  
146 students in relation to each question provided useful information for the analysis. The  
147 population of the study was comprised by the third and fourth-year classes of the PMAcE. At

148 the beginning of each first semester (September 2010 and September 2011) a questionnaire  
149 was given to all the students enrolled in the PMAcE (38 and 44 students, respectively). They  
150 were to complete their questionnaires and return them to the facilitator by hand.

151 The complete questionnaire had two parts (see the Appendix). The first part contained  
152 questions about the respondents' backgrounds: professional degree, gender, nationality,  
153 current working status, expected net salary in the next five years, age, work experience, main  
154 area of professional experience, and organization in which they practice (or have practiced)  
155 their profession. In the second part, respondents were asked to give their opinions on the 21  
156 variables collected in the questionnaire as possible reasons for the high unemployment rate  
157 among graduates in construction. These variables included personal issues (e.g. question 18),  
158 educational issues (e.g. question 17), macroeconomic issues (e.g. question 2), and issues  
159 specific to the construction industry (e.g. question 6). To determine the effect of each of the  
160 21 variables, the students were asked to express agreement or disagreement with the  
161 statements, according to the relative importance attributed, using a standard five-point Likert  
162 scale, with 1 being "completely disagree" and 5 "completely agree".

163

### 164 **Statistical Analysis**

165 Data were analyzed using SPSS (version 16.0.1). The statistical analyses undertaken included  
166 a principal component analysis (PCA) of the 21 variables presented as possible reasons for  
167 graduates' unemployment together with an analysis of variance (ANOVA) based on the  
168 principal components. The objective of the PCA was to reduce the original 21 variables to a  
169 smaller number, recognizing the structure of data (Jolliffe 2002, Hair et al. 2009); this same  
170 approach was used by Rothwell et al. (2008 and 2011) in order to analyze the expectations  
171 and self-perceptions of employability of university students. To check possible differences

172 among respondents, an ANOVA analysis was used to compare perceptions of respondents'  
173 subgroups stratified by nationality, gender, etc. (Hair et al. 2009).

174 In order to facilitate the interpretation of the respondents' perceptions depending on  
175 their background, some of the categories included in the first part of the questionnaire  
176 (professional degree, nationality, current working status, etc.) were reduced in the analysis to  
177 a smaller number of options. Regarding current working status, for example, respondents  
178 were to choose one of four options: employed (full time), employed (part time), on  
179 scholarship, or unemployed. For the ANOVA analysis, this category was reduced to two  
180 possible values: employed (including full time, part time and scholarship recipients), or  
181 unemployed. Similar response groupings were done for other categories (professional degree,  
182 nationality, expected net salary, age, professional experience, and type of organization).  
183 These simplifications allowed for a better interpretation of the data.

184

## 185 **RESULTS AND DISCUSSION**

### 186 **Statistical Characterization**

187 According to their questionnaire responses, the students can be profiled as follows: 25 years  
188 old or younger (45%), male (72%), Spanish (72%), with an academic background in different  
189 areas of Civil Engineering (60%), with no more than three years of experience (70%) in a  
190 construction company (51%), and currently unemployed (51%). In order to facilitate the data  
191 analysis, the 21 variables were coded as indicated in Table 1. This table also offers a  
192 statistical description (mean and standard deviation) of the variables included in the  
193 questionnaire.

194

195

196

Table 1: Statistical Description and Codes of the 21 Variables

Code	Variable	Mean	S.D.
V1	Current economic crisis.	4.46	0.77
V2	Globalization in the Spanish construction sector.	2.63	1.08
V3	Government's employment policy.	3.38	1.19
V4	Government's public infrastructure policy.	3.52	1.12
V5	Lack of government funding for housing.	2.84	1.04
V6	Real estate "bubble".	4.02	1.13
V7	Significant public debt.	3.87	1.16
V8	Lack of training of university graduates.	1.98	1.02
V9	Unemployed graduates only seeking good jobs.	2.71	1.29
V10	Lack of job search know-how.	2.52	1.14
V11	Socially unbalanced job distribution.	2.82	1.09
V12	No eagerness to work.	2.35	1.33
V13	Ill-advised managerial decisions.	3.20	1.12
V14	Many people with simultaneous jobs.	2.54	1.11
V15	Unemployed professionals lack foreign language skills.	3.02	1.22
V16	Unemployed professionals lack initiative to work in other countries.	3.09	1.17
V17	Inadequate design of university programs.	2.54	1.04
V18	Too many professionals for current market demands.	3.99	0.97
V19	Too many universities offering similar undergraduate degrees.	3.52	1.19
V20	Too many universities offering similar graduate degrees.	2.77	1.02
V21	Inadequate master degrees to fulfill market demands.	3.02	1.21

198

199

## 200 **Principal Component Analysis**

201 The principal component analysis (PCA) aims to reduce the dimensionality of the data space.

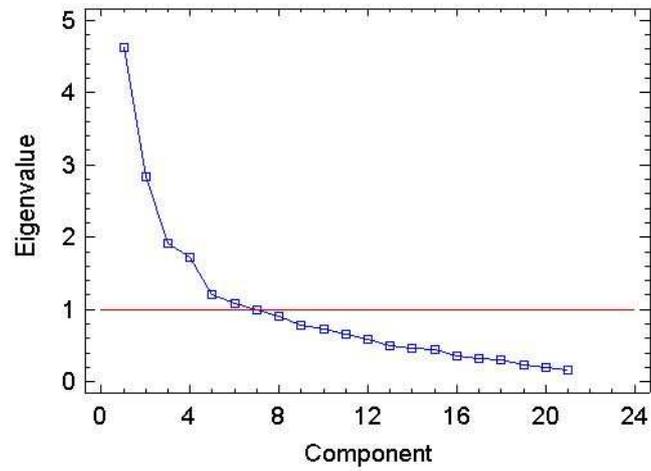
202 The PCA attempts to find a smaller number of dimensions while retaining most of the  
 203 information from the original space. The adequacy of the data set for a PCA is checked by

204 Bartlett's spherical test ( $P=0.000$ ) and by the Kaiser-Meyer-Olkin measure ( $KMO=0.689$ ).

205 These tests indicate if the input data set is suitable for a PCA. For this study, the PCA

206 produced a solution of six components with eigenvalues greater than 1.000 (Fig. 1). As

207 shown in Table 2, these six principal components explain 63% of the observed variability in  
 208 the input data set.



209  
 210  
 211

Fig. 1: Screen Plot of the PCA

Table 2: Principal Component Analysis

<b>Eigenvalues</b>			
<b>PC</b>	<b>Total</b>	<b>% Variance</b>	<b>% Cumulative Variance</b>
1	4.634	22.069	22.069
2	2.834	13.493	35.562
3	1.921	9.146	44.708
4	1.723	8.206	52.915
5	1.203	5.731	58.645
6	1.079	5.136	63.781
7	0.988	4.706	68.488
8	0.899	4.280	72.768
...	...	...	...
20	0.195	0.930	99.250
21	0.157	0.750	100.000

212

213 The factor grouping, based on varimax rotation (Table 3), shows the score for each of  
 214 the 21 variables of the six principal components identified in the PCA. The variables having  
 215 more weight in the principal factors are marked in bold in Table 3.

216 Table 3: Loading Matrix of the Factors in the Principal Components (Rotated)

	PC1	PC2	PC3	PC4	PC5	PC6
V1	-0.430	0.070	0.160	<b>-0.541</b>	0.056	0.318
V2	0.195	<b>0.528</b>	0.163	0.011	-0.230	-0.432
V3	-0.005	<b>0.740</b>	0.079	0.198	0.108	0.202
V4	0.053	<b>0.736</b>	-0.007	-0.084	0.156	-0.170
V5	0.133	<b>0.631</b>	-0.072	0.289	-0.062	0.152
V6	-0.285	0.431	0.059	-0.010	-0.151	<b>0.614</b>
V7	-0.253	<b>0.558</b>	0.155	-0.261	0.103	0.108
V8	<b>0.418</b>	-0.001	0.343	0.234	-0.149	<b>-0.447</b>
V9	<b>0.706</b>	-0.012	0.180	0.297	0.065	0.166
V10	<b>0.731</b>	0.010	0.175	0.268	0.083	-0.037
V11	-0.005	0.123	0.258	<b>0.724</b>	-0.019	0.183
V12	<b>0.736</b>	-0.052	0.053	0.497	0.001	-0.052
V13	0.209	0.003	0.229	0.167	0.067	<b>0.619</b>
V14	0.105	0.144	0.542	<b>0.611</b>	0.006	0.038
V15	<b>0.770</b>	0.031	0.162	-0.242	0.078	-0.043
V16	<b>0.802</b>	0.072	-0.011	-0.117	-0.091	-0.076
V17	0.146	-0.067	<b>0.729</b>	0.198	0.107	0.120
V18	0.010	-0.016	-0.084	-0.157	<b>0.819</b>	0.184
V19	-0.023	0.106	0.130	0.071	<b>0.880</b>	-0.057
V20	0.179	0.185	0.484	0.104	<b>0.531</b>	-0.123
V21	0.096	0.108	<b>0.760</b>	-0.009	-0.001	0.050

217

218 The analysis of the factor loading matrix leads to a reduced number of components  
 219 that can explain the graduates' views on unemployment. These six principal components,  
 220 obtained by grouping the 21 variables, are presented in Table 4.

221 Table 4. Grouping of Variables into Principal Components

PC	Variable	Code	Interpretation
PC1	Lack of training of the university graduates.	V8	Graduate intrinsic reasons
	Unemployed graduates only seeking good jobs.	V9	
	Lack of job search know-how.	V10	
	No eagerness to work.	V12	
	Unemployed professionals lack foreign language skills.	V15	
	Unemployed professionals lack initiative to work in other countries.	V16	
PC2	Globalization in the Spanish construction sector.	V2	Current situation related to Spanish economic policy
	Government's employment policy.	V3	
	Government's public infrastructure policy.	V4	
	Lack of government funding for housing.	V5	
	Significant public debt.	V7	
PC3	Inadequate design of university programs.	V17	Training gaps
	Inadequate master degrees to fulfill market demands.	V21	
PC4	Current economic crisis.	V1	Structure and characteristics of the labor market
	Socially imbalanced job distribution.	V11	
	Many people with simultaneous jobs.	V14	
PC5	Too many professionals for current market demands.	V18	Excess of graduates / qualifications
	Too many universities offering similar undergraduate degrees.	V19	
	Too many universities offering similar graduate degrees.	V20	
PC6	Real estate "bubble".	V6	Construction industry management problems
	Lack of training of university graduates.	V8	
	Ill-advised managerial decisions.	V13	

222  
 223 Principal components are based on the internal relationships between answers. They  
 224 are underlying factors that collect the information present in the different survey questions  
 225 (Jolliffe 2002), in some sense simplifying the structure of this information and giving  
 226 visibility to students concerns about the present situation. If we consider that the order among  
 227 the principal components reflects their relevance for the graduates answering the  
 228 questionnaire (Jolliffe 2002), the first and second components should receive special

229 attention. Therefore, it is worth highlighting the importance of PC1, which accounts for more  
230 than 22% of the variability of opinions (see Table 4). According to this principal component,  
231 the primary reason for the high unemployment rate among young professionals is intrinsic,  
232 that is, they are not willing to move to other countries; they lack knowledge of foreign  
233 languages and communication skills, or they only want well-paid and comfortable jobs.  
234 Regarding the remaining factors, it can be noted that PC2 (economic policies) and PC4  
235 (structure and characteristics of the labor market) are crucially related because both consider  
236 the current economic scenario and its impact on the labor market. These two principal  
237 components (PC2 and PC4) explain 21.7% of the observed variability in the input data set,  
238 and they highlight the importance of variables such as the government's employment policy  
239 and the social distribution of work.

240         It is quite surprising to note that, even if the current crisis were, a priori, the main  
241 reason perceived by the students, their honesty is revealed when they attribute the problems  
242 they have to enter the labor market to their own shortcomings. It is especially of interest to  
243 note how the lack of training in foreign languages and the inertia of staying home and not  
244 traveling to other countries are key elements in the principal component PC1 (intrinsic  
245 reasons). One possible interpretation of this result is that students who have chosen to enroll  
246 in the PMAce are not willing to go abroad to secure employment, at least until they finish  
247 their academic degrees.

248

### 249 **Analysis of Variance**

250 After examining the general opinion of the respondents, an analysis of variance (ANOVA)  
251 was undertaken to determine if the students' background produced different perceptions  
252 regarding unemployment. To this end, the students were characterized in the first part of the  
253 questionnaire. The items included in the questionnaire are the categories addressed in this

254 ANOVA analysis: professional degree, nationality, current work status, expected net salary  
 255 over the next five years, professional experience, gender, age, main area of professional  
 256 experience and organization in which they practice (or have practiced) their profession.

257 Table 5 summarizes the results obtained in the ANOVA analysis. This table indicates  
 258 the categories with statistically significant differences in the perception of the six principal  
 259 components or the reasons for the high unemployment among Spanish young professionals in  
 260 construction. These results are discussed in the following paragraphs.

261 Table 5: Summary of ANOVA Results

Categories	Principal Components					
	PC1	PC2	PC3	PC4	PC5	PC6
Professional degree	N.S.	P= 0.0309	N.S.	N.S.	N.S.	N.S.
Nationality	P= 0.0002	P< 0.0000	N.S.	N.S.	N.S.	N.S.
Current work status	N.S.	N.S.	N.S.	P= 0.0172	N.S.	N.S.
Expected net salary	N.S.	N.S.	N.S.	P= 0.0105	N.S.	N.S.
Professional experience	N.S.	P= 0.0017	N.S.	N.S.	N.S.	N.S.
Gender	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Age	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Main area professional experience	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Organization	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

NOTE: N.S. = Not significant

262

263 Professional Degree

264 This category consists of two levels: 3 or 4 years' degree and 5 or 6 years' degree. Of the six  
 265 components tested, there is a statistically significant difference with a confidence level of  
 266 95% between the average values for PC2 (economic policies) of one professional degree  
 267 level and another (P=0.0309), as shown in Fig. 2.

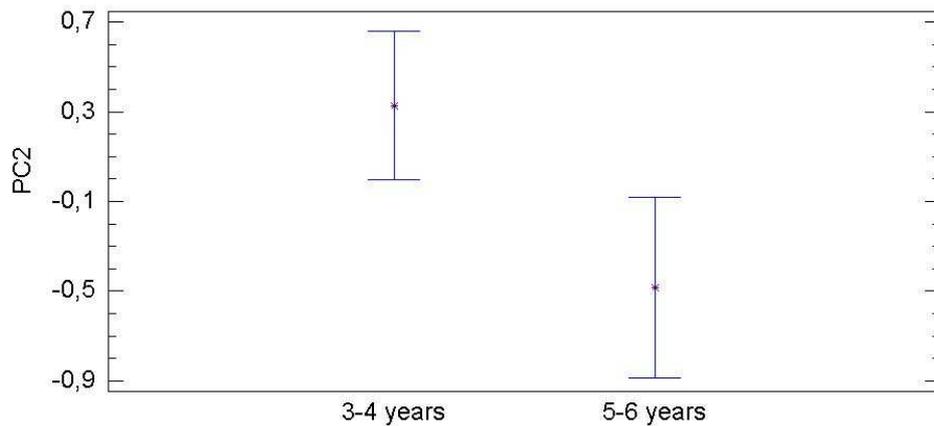


Fig. 2: ANOVA PC2 – Professional Degree: 95% Least Significance Difference (LSD)

On average, graduates with a 3-4 year degree consider that the current economic situation affects unemployment to a greater extent than do graduates with a 5-6 year degree. This concern, expressed by respondents in relation to employability, is intensified in an inverse proportion to the number of years needed to complete their professional degree. This may explain why the students have decided to broaden their knowledge and training through the PMaCE.

### Nationality

In this study, a respondent's nationality was classified as either Spanish or non-Spanish. In this case, the mean value of these two components revealed a statistically significant difference: PC1 (intrinsic reasons) and PC2 (economic policies) ( $P=0.0002$  and  $P<0.0000$ , respectively). Therefore, Fig. 3 shows that the perception of Spanish respondents regarding unemployment is different from that of the non-Spanish ones. It also shows that Spanish respondents give more importance to intrinsic reasons than non-Spanish respondents.

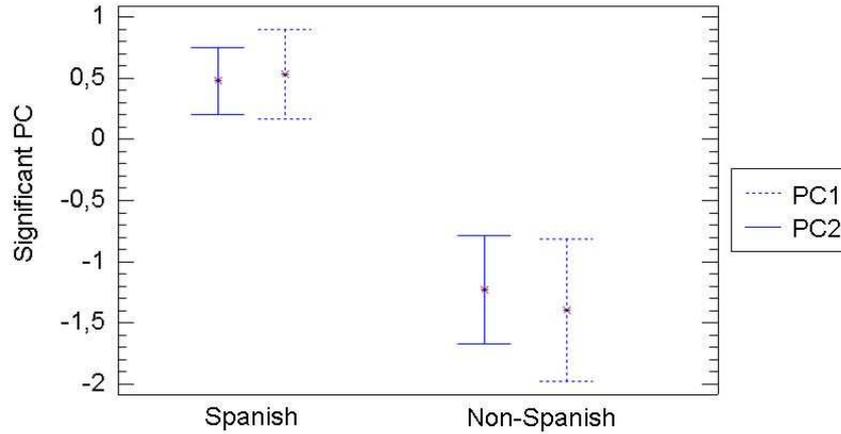


Fig. 3: ANOVA PC1 – Nationality: 95% Least Significance Difference (LSD)

Regarding the assessment of current Spanish economic policy, the ANOVA analysis revealed a statistically significant difference between the opinions of Spanish and non-Spanish respondents. The former consider that this situation has a greater influence on unemployment than the latter, who probably do not envision a professional career in Spain.

#### Current Working Status

This subsection focuses on the different perceptions on graduates' unemployment according to the respondents' current working status. To this end, respondents were classified as either employed or unemployed. The ANOVA analysis showed that the two categories (employed and unemployed respondents) differed significantly in their perceptions of how the structure and characteristics of the labor market (PC4) affect graduate unemployment ( $P=0.0172$ ). Fig. 4 shows that employed respondents consider this factor has more impact on unemployment than unemployed respondents.

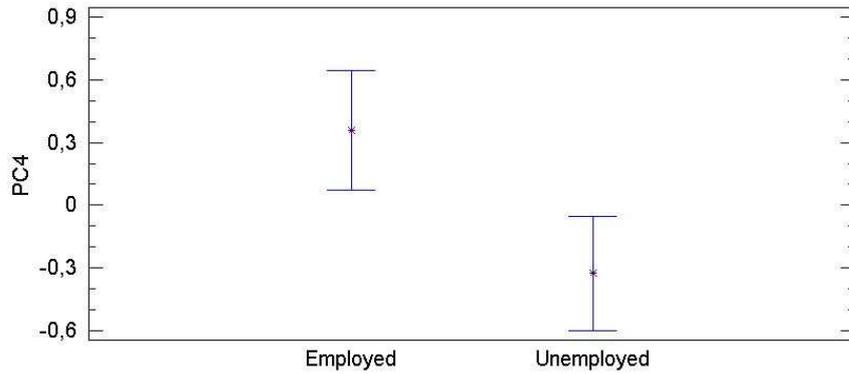
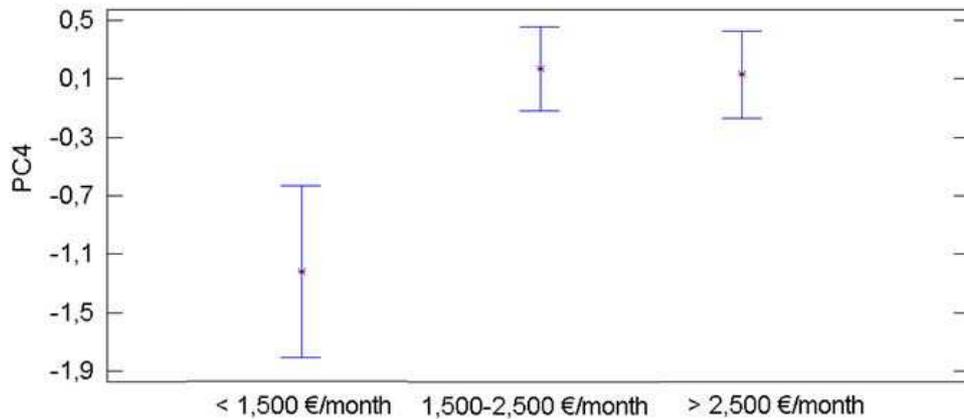


Fig. 4: ANOVA PC4 – Current Working Status: 95% Least Significance Difference (LSD)

### Expected Net Salary

Respondents were classified depending on their expected salary (monthly net and annual gross) over the next five years: 1) less than 1,500 €/month (32,000 €/year); 2) between 1,500 €/month (32,000 €/year) and 2,500 €/month (55,000 €/year); 3) more than 2,500 €/month (55,000 €/year). Some additional information of the current context of the Spanish construction industry is needed in order to understand these figures: the minimum official gross wage is 9,000 €/year, whereas the gross wage in Spain for a construction site manager varies from 30,000 to 40,000 €/year (Michael Page 2012). Of the six components tested, only in the analysis of PC4 (structure and characteristics of the labor market) did the difference becomes statistically significant. Their perceptions of how the labor market affects graduates' unemployment ( $P=0.0105$ ) depended on their expected net salary. Respondents expecting a net salary lower than 1,500 €/month consider that the labor market has less impact on unemployment than these expecting a net salary over 1,500 €/month (Fig. 5).



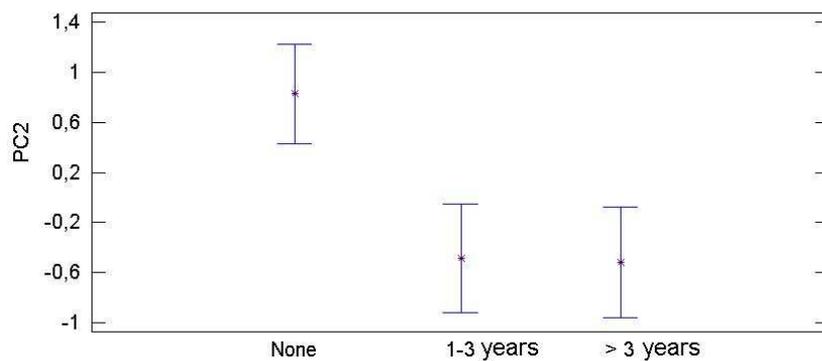
315

316 Fig. 5: ANOVA PC4 – Expected Net Salary (in Euros per month): 95% Least Significance Difference (LSD)

317

318 Professional Experience

319 Respondent perceptions of construction graduates' unemployment were analyzed considering  
 320 the professional experience of the respondents. This category included three possibilities:  
 321 none, 1-3 years, and more than 3 years of professional experience. The ANOVA analysis  
 322 revealed ( $P=0.0017$ ) that respondents with no professional experience consider that the  
 323 current economic crisis (PC2) has a greater impact on unemployment than respondents with  
 324 some professional experience (Fig. 6).



325

326 Fig. 6: ANOVA PC2 – Professional Experience: 95% Least Significance Difference (LSD)

327

328

329

330 Other Factors

331 This study also examined the perception of unemployment according to the participants  
332 gender, age, main area of professional experience, and organization in which he/she practices  
333 (or has practiced) his/her profession. Respondents were characterized as follows: gender  
334 (male or female), age (<26, 26-29, or >29 years old), main area of professional experience  
335 (planning and feasibility analysis / design / construction site supervision / project  
336 management / operation and maintenance / education and research), and organization in  
337 which he/she practices (or has practiced) the profession (private or public sector). An  
338 ANOVA analysis of the six principal components based on these categories was undertaken.  
339 This study concluded with a 95% confidence that there are no statistically significant  
340 differences in the perception of graduates' unemployment.

341

342 **CONCLUSIONS AND LIMITATIONS**

343 A good graduate education may not be the key to improve the employability of  
344 postgraduates, mainly in a context of economic crisis with very little employment  
345 opportunities. Nevertheless, we think that the analysis of students' perceptions regarding  
346 training gaps that affect their employability is a first and very important step for later  
347 research. The problems perceived by students to get a job become their expectations  
348 regarding enrollment in a graduate program. It is also important to note that this paper  
349 presents a case study; thus, the results cannot be extrapolated to the population of young  
350 Spanish professionals working in the construction industry yet. However, this analysis does  
351 offer interesting considerations for future research. Principal components are underlying  
352 factors that collect the information present in the different survey questions, simplifying its  
353 structure and giving visibility to students concerns about the present situation. The first two  
354 components explain one third of the total variability in students' answers, remarking the

355 relevance that students' responses give to "graduate intrinsic reasons" (22% of the variance)  
356 and "current situation related to Spanish economic policy" (13% of the variance). The six  
357 principal components identified explain up to 63% of the variability.

358         The main reasons perceived by graduates as the cause for unemployment are intrinsic  
359 in nature. These intrinsic reasons involve attitude (e.g. unwillingness to move to other  
360 countries to look for work or to accept anything but comfortable or well-paid jobs). Other  
361 issues are related to their lack of training in foreign languages or poor communication skills  
362 (public speaking and presentations, for example), their inexperience in looking for jobs, or  
363 their inadequate managerial skills. It can be concluded that although the current job outlook is  
364 complicated, respondents believe that the main reason for the high rate of graduate  
365 unemployment is directly attributable to them. Therefore, respondents believe that an  
366 increase in employment opportunities depends fundamentally on their capabilities.  
367 Nevertheless, the importance of these intrinsic reasons varies depending on the nationality of  
368 the respondent: non-Spanish respondents are more critical than the Spanish when assessing  
369 how intrinsic factors affect a graduate's employability in the construction sector.

370         Surprisingly, the current situation of the Spanish economy is a secondary factor in this  
371 analysis. This factor explains 13% of the total variability and entails variables such as the  
372 government's employment and public infrastructure policies, the lack of support for housing  
373 and the high public debt. The ANOVA analysis performed in this study highlights  
374 characteristics that generate the respondents' different perceptions of this factor. Three  
375 categories of respondents perceived this principal component differently: professional degree,  
376 nationality, and professional experience. In the characterization of the respondents'  
377 professional degree, statistically significant differences were detected. Respondents with 3-4  
378 year degrees are more concerned about the economic crisis than are respondents with a 5-6  
379 year degrees. Respondents' nationality is also a factor that shows a statistically significant

380 difference in perception. The difference in perception between Spanish and non-Spanish  
381 respondents is that the former consider, on average, that the current economic situation has a  
382 greater effect on the graduate employability. Finally, it can be concluded that respondents  
383 with no professional experience consider that this factor influences graduates' unemployment  
384 more than respondents with professional experience.

385         The remaining factors derived from the 21 original variables included in the  
386 questionnaire explain an additional 28% of the total variability. These factors include training  
387 gaps, labor market, excess of graduates/qualifications and the business structure. From the  
388 analysis of variance based on the categories included in the first part of the questionnaire, we  
389 can conclude that the only factor that has significant differences with any of the categories is  
390 the structure of the labor market. Specifically, two categories provide a different insight into  
391 how the labor market influences graduates' employability: current working status of  
392 respondents and expected net salary. It can be assumed that unemployed respondents and  
393 respondents expecting a net salary below 1,500 €/month believe that issues related to the  
394 labor market contribute less to construction graduate unemployment than do those employed  
395 and expecting higher net salaries.

396         Overall, one can conclude that our students are concerned about employability,  
397 especially young Spanish professionals, who completed a 3-4 year degree and have no  
398 professional experience. They perceive that, being better prepared, they will face their  
399 professional future with greater guarantees. Moreover, respondents recognize that  
400 overcoming internal barriers such as their unwillingness to move abroad and their lack of  
401 foreign language skills, would significantly improve their chances for employment.

402         Considering these training gaps, the PMA CE program could be improved by  
403 implementing transversal competencies in its different subjects and syllabi, establishing a  
404 strategy for differentiation. Mainly, English language should be used in some (or every

405 course) along with English language textbooks as course reference, analyzing papers as a  
406 homework basis, or inviting native speakers to lecture. Communications skills can also be  
407 polished by requiring students to deliver oral presentations of their assignments as done in  
408 professional meetings, and by encouraging them to participate more actively in the  
409 classroom. Furthermore, student mobility and international exchange must be actively  
410 promoted, mostly for the third semester (M.Sc. thesis). The European Union, as well as the  
411 Spanish government and the university, have earmarked considerable funds for mobility and  
412 exchange in spite of the current economic crisis. Thus, the School of Civil Engineering will  
413 have to facilitate outgoing graduate student mobility, especially Europe and America. These  
414 improvements result in the intensive development of leadership, mainly, and team  
415 development, to a lesser extent. Focusing on a specific subject (such as project assessment),  
416 international projects and globalization in construction could be included into the syllabi of  
417 one or more courses, or a new course on this topic can be added to the curriculum; this  
418 subject should address the entire life-cycle of the infrastructure, and present different angles:  
419 cultural and ethical, in the one hand, and legal and contractual, in the other hand.

420 A major limitation of this research arises: this is a case study focused on a graduate  
421 program in construction management. To extrapolate these results to the generality of young  
422 Spanish professionals working in the construction industry, they should be validated by  
423 further empirical investigations on a larger scale; the authors are already working in this line  
424 of research. Nonetheless, similar programs focused on construction management, not only in  
425 Spain but also in other countries currently affected by a similar difficult scenario, could also  
426 take into consideration most of the conclusions inferred in this paper and implement them  
427 into their program and syllabi. Another limitation is that students' perception is not the same  
428 as the reality. Future work should involve a larger study sample of construction professionals  
429 and analyze the changes in the respondents' opinions on employability, in light of the

430 economic situation. This information will be vital when adapting the contents and syllabi of a  
431 graduate program to the labor market needs.

432

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437 anonymous reviewers for their valuable suggestions.

438

### 439 **APPENDIX: QUESTIONNAIRE**

440 1. Professional degree:

441 a) Civil Engineer (5-6 year degree)

442 b) Civil Engineer (3-4 year degree)

443 c) Architect

444 d) Quantity Surveyor / Technical Architect / Similar

445 e) Others (indicate)

446 2. Sex (M / F)

447 3. Nationality:

448 4. Current working status:

449 a) Employed (full time)

450 b) Employed (part time)

451 c) On Scholarship

452 d) Unemployed

453 5. Monthly expected net salary in 5 years' time:

454 a) 800 €/month or less

- 455 b) 800 €/month – 1,500 €/month
- 456 c) 1,500 €/month – 2,500 €/month
- 457 d) 2,500 €/month – 3,500 €/month
- 458 e) 3,500 €/month or more

459 6. Age (years):

- 460 a) Under 25
- 461 b) 26 – 29
- 462 c) 30 – 34
- 463 d) 35 – 39
- 464 e) Over 40

465 7. Professional experience:

- 466 a) No experience or < 1 year
- 467 b) 1 – 3 years
- 468 c) 3 – 5 years
- 469 d) 5 – 10 years
- 470 e) More than 10 years

471 8. Main area of professional experience (in case of no professional experience, indicate area  
472 of main interest):

- 473 a) Planning and feasibility analysis
- 474 b) Design
- 475 c) Construction Site Supervision
- 476 d) Project Management
- 477 e) Operation and Maintenance
- 478 f) Education and Research
- 479 g) Other (Specify)

480 9. Organization in which you practice (or have practiced) your profession (in case of no  
481 professional experience, please indicate organization of main interest):

482 a) Consulting Engineering or Architectural Firm

483 b) Contractor

484 c) Company working in the Operation Phase (including Maintenance Companies and  
485 Concessionaires)

486 d) Other type of company (Specify)

487 e) Public Agency or Administration

488 f) University or Research Center

489 g) Other (Specify)

490 **Many university graduates in the construction industry are currently unemployed**  
491 **because of: (Likert scale from 1 to 5)**

- |  |     |
|--|-----|
| 10. Current economic crisis.   | [ ] |
| 11. Globalization in the Spanish construction sector.                    | [ ] |
| 12. Government's employment policy.                                      | [ ] |
| 13. Government's public infrastructure policy.                           | [ ] |
| 14. Lack of government funding for housing.                              | [ ] |
| 15. Real estate "bubble".  | [ ] |
| 16. Significant public debt.   | [ ] |
| 17. Lack of training of university graduates.                            | [ ] |
| 18. Unemployed graduates only seeking good jobs.                         | [ ] |
| 19. Lack of job search know-how.   | [ ] |
| 20. Socially unbalanced job distribution.                                | [ ] |
| 21. No eagerness to work.  | [ ] |
| 22. Ill-advised managerial decisions.                                    | [ ] |
| 23. Many people with simultaneous jobs.                                  | [ ] |
| 24. Unemployed professionals lack foreign language skills.               | [ ] |
| 25. Unemployed professionals lack initiative to work in other countries. | [ ] |
| 26. Inadequate design of university programs.                            | [ ] |
| 27. Too many professionals for current market demands.                   | [ ] |

28. Too many universities offering similar undergraduate degrees. [ ]  
29. Too many universities offering similar graduate degrees. [ ]  
30. Inadequate master degrees to fulfill market demands. [ ]

492

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