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Additional Information

1 **BARRIERS TO THE PROFESSIONAL DEVELOPMENT OF QUALIFIED WOMEN**
2 **IN THE PERUVIAN CONSTRUCTION INDUSTRY**

3

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5

6 **ABSTRACT**

7

8 The construction industry frequently offers an unwelcoming environment for women, and
9 those who do manage to enter have high rates of turnover and abandonment. Within this
10 scenario, this research aims to identify the barriers faced by qualified women, to analyze the
11 different views that qualified men and women have regarding these barriers, and to find the
12 underlying factors that group these barriers and their degrees of importance. In the context of
13 this research, “qualified” men and women are those who hold a university degree (in
14 construction-related areas). Initially, 20 barriers were identified analyzing previous
15 contributions. These barriers composed the statements of the questionnaire survey; data was
16 obtained from 429 professionals of the Peruvian construction industry. It was found that
17 women face invisible barriers throughout their careers and have fewer professional
18 opportunities than men. The main perceptual dissimilarities between men and women indicate
19 that men interpret womanhood as a form of positive discrimination which, far from being a
20 professional barrier, is considered by them as an advantage. Likewise, women agree that if
21 they take maternity leave, they will suffer a loss in the hierarchical order; furthermore, the

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22 industry does not have flexible work schedules, childcare programs, or provisions for career
23 breaks. Five underlying factors were extracted from the analysis: “male oriented labor
24 market”, “detrimental issues for being a woman”, “harsh working conditions in the
25 construction industry”, “unfavorable perception of the construction industry”, and “high
26 competitiveness of the construction industry”.

27

28 **KEYWORDS:** Women; Barriers; Construction Industry; Qualified Professionals; Peru.

29

30 **INTRODUCTION**

31

32 Occupational segregation by gender exists in almost all organizations and in all professions
33 where men receive higher pay and occupy more prestigious positions (Anker 1997; Blackburn
34 et al. 2002). Occupational segregation imposes limitations on the careers of women, who have
35 lower salaries, less authority, and fewer opportunities for promotion and career mobility
36 (Charles 2003; French and Strachan 2015; Wright 2015). This segregation can be horizontal
37 or vertical (Anker 1997; Blackburn et al. 2002; Charles 2003). Horizontal segregation occurs
38 when there is a predominance of one gender in certain sectors. Vertical segregation involves
39 the unequal distribution of men and women in the hierarchy: women are employed in a
40 reduced number of work posts and their presence is very scarce in others.

41

42 When focusing on construction, the sector offers a relatively inhospitable climate for women,
43 where occupational segregation by gender exists, both horizontal and vertical (Fielden et al.
44 2000; Dainty and Lingard 2006; French and Strachan 2015). In spite of the efforts of many
45 countries to introduce equal employment regulations and acts (Galea et al. 2015; Wright
46 2015), and the increasing number of women participating in the construction sector (Dainty

47 and Lingard 2006; Malone et al. 2014), women still face many challenges in a scenario
48 dominated by masculine culture (Galea et al. 2015; Powell and Sang 2015; Wright 2015). The
49 concern shared by many researchers is to identify the barriers that women face throughout
50 their working lives, not only to enter the field, but also to develop professionally in the
51 construction sector; from the point of view of this research, a barrier is a set of circumstances,
52 impediments or obstacles that prevents progress. This has been the focus of several studies
53 carried out in the United States (Bilbo et al. 2014; Denissen and Saguy 2014; Malone et al.
54 2014), the United Kingdom (Dainty et al. 2000b; Fielden et al. 2000; Dainty and Lingard
55 2006; Ness 2012; Fernando et al. 2014; Powell and Sang 2015), the European Union (Byrne
56 et al. 2005), Australia (Lingard and Lin 2004; Dainty and Lingard 2006; French and Strachan
57 2015; Galea et al. 2015), Singapore (Ling and Poh 2004), South Africa (Madikizela and
58 Haupt 2010; English and Le Jeune 2012), Nigeria (Kehinde and Okoli 2004; Adeyemi et al.
59 2006), Tanzania (Sospeter et al. 2014), Bangladesh (Hossain and Kusakabe 2005; Choudhury
60 2013), Thailand (Kaewsri and Tonghong 2011), Malaysia (Jaafar et al. 2014), among others.

61
62 No studies have been found so far regarding the Peruvian construction industry, where the
63 female labor force representation is 4.1% of the total workers (developed from MTPE 2016),
64 whereas for the whole economy, women comprised 44.9% of the workforce in 2010 (World
65 Bank 2016). Data obtained from the Institute of Engineers in Peru (2014) shows that women
66 represent 13.7% of the civil engineering profession (CIP 2016). Peruvian figures regarding
67 female participation are not so different from those of the United States (2010): 46.2% for the
68 total economy (World Bank 2016), 2.7% for construction trades and 11.0% for managers and
69 professionals (developed from BLS 2016). Moreover, the Peruvian Gross Domestic Product
70 for construction was 6.8% of the total in 2014, having become a steady sector during the

71 previous five years (INIE 2016), with values similar to those of developed economies (Francis
72 and Prosser 2014).

73

74 Furthermore, in the construction sector, human resources can be sorted into two different
75 categories (Fielden et al. 2000; English and Le Jeune 2012): on the one hand, managers and
76 professionals (mainly architects, engineers, and surveyors), as well as administrative and
77 clerical staff; on the other hand, the construction trades. Several of the previous contributions
78 have been focused on the industry as a whole (e.g., Fielden et al. 2000), whereas others have
79 analyzed the role of managers and professionals (e.g., Bilbo et al. 2014), or more specifically
80 the construction trades (e.g., Ness 2012). Some of these studies also point out that women
81 tend to work in administrative and clerical jobs (Fielden et al. 2000; Byrne et al. 2005;
82 English et al. 2012; Francis and Prosser 2014). Ness (2012) quantifies the workforce in
83 building trades as 0.2–0.3% of the total in the United Kingdom. The number of females
84 pursuing academic degrees in construction-related fields is growing gradually (Byrne et al.
85 2005, Dainty and Lingard 2006; Kaewsri and Tonghong 2014), but this fact has not yet been
86 equally reflected in the percentage of female managers and professionals in the industry
87 (Madikizela and Haupt 2010; Fernando et al. 2014). More women in managerial and
88 professional work posts is a key step to guarantee higher levels of gender equality in the
89 construction industry; therefore, analyzing further the role of qualified women in the
90 construction sector is still a challenging issue worth researching. In the context of this
91 research, “qualified women” are those who hold a university degree related to construction.

92

93 The research illustrated in this paper takes a holistic approach regarding the barriers that
94 women face during their entry and advance in the construction industry; previous research has
95 been focused on these issues from a narrowed focus, such as family-related factors (e.g. Bilbo

96 et al. 2014) or women's abilities (e.g. Ness 2012), or only partially, taking into consideration
97 some of the potential barriers (e.g. Dainty and Lingard 2006). Considering this holistic
98 approach, this paper has three goals: (1) to identify and confirm the barriers faced by qualified
99 women; (2) to analyze the different views that qualified men and women have regarding these
100 barriers; and (3) to find the underlying factors that group these barriers and their degrees of
101 importance. As far as the authors are concerned, only Dainty et al. (2000b) analyzed the
102 different views of men and women regarding this topic, using an ethnographic approach;
103 moreover, none of these studies focused on obtaining the latent factors that group these
104 barriers. Hence, regarding the first goal, this study could be considered confirmatory, but
105 regarding the other two goals, this study introduces innovative approaches to the topic.
106 Furthermore, although the context of research is the Peruvian construction industry, the initial
107 barriers analyzed come from research carried out in different countries worldwide; therefore,
108 conclusions can be drawn to decontextualize these findings for a more general audience,
109 confirming or challenging these findings from other countries.

110

111 **RESEARCH METHOD**

112

113 In order to accomplish the goals previously stated, the research team followed the process
114 displayed in Figure 1. A preliminary literature review allowed the research team to establish
115 the goals of the research. Then, a systematic literature search was performed in order to find
116 out the main challenges and difficulties that women (not only qualified women) face during
117 their entry and advance in the construction industry. They were sorted out into 20 barriers
118 (variables) that were the basis for developing a questionnaire. Later, a survey was conducted
119 administering the questionnaire to 429 qualified professionals in the Peruvian construction
120 industry. Through a set of questions, these 20 variables were measured, presented as potential

121 barriers to the professional development of qualified women in the construction industry. The
122 statistical analysis undertaken included not only the descriptive statistics, but also an
123 independent sample t-test to compare the different perceptions of both genders regarding
124 these barriers. Then, a principal component analysis was carried out to find the underlying
125 factors (latent variables) to the professional development of qualified women in the
126 construction industry; later, a regression analysis of these underlying factors was also
127 developed to assess their influence. The research concluded with discussion of the findings,
128 main contributions, and general recommendations to address these barriers, as well as future
129 research to expand the body of knowledge on the topic.

130

131 <FIGURE 1>

132

133 **Identification of Barriers**

134

135 The research team analyzed the main theories on gender segregation (Anker 1997). Later, a
136 systematic search was performed focused on the construction industry; it was not only
137 specifically related to female managers and professionals, but also to gender segregation in
138 general. Applying thematic analysis (Braun and Clarke 2006) to these previous contributions,
139 the team identified a potential list of difficulties and challenges that women face during their
140 entry and advance in the construction industry. In a second step, they were sorted,
141 summarized and condensed into barriers (variables) according to similar meanings using the
142 affinity diagram technique (Carnevalli and Miguel 2008). Following this process, the authors
143 identified 20 variables (barriers), which are displayed in Table 1. In the following paragraphs,
144 these barriers are described and grounded into the contributions referenced in the right hand
145 column of Table 1.

146

147 <TABLE 1 HERE>

148

149 The poor negative image of the construction industry means that many men and women are
150 reluctant or have little interest in working in the sector (Bennett et al. 1999; Fielden et al.
151 2000; Ling and Poh 2004; Bilbo et al. 2014). The male dominated image and the masculine
152 culture of the construction industry effectively deter women from entering it (Ling and Poh
153 2004; Denissen and Saguy 2014). Female construction professionals are few given the image
154 of the engineering profession, a lack of knowledge among the general public of what
155 engineering is, and a misguided emphasis on math and science by recruiters (Bilbo et al.
156 2014; Francis et al. 2014; Pellicer et al. 2014). The misconception that the construction
157 industry involves only site activities considered hazardous, dangerous, difficult and
158 unsuitable, continues to be the major barrier to female entry into the industry (Kehinde and
159 Okoli 2004; Ness 2012; Kaewsri and Tonghong 2014). This is definitely a negative factor in
160 the process of career choice for both men and women (Gale 1994; Ness 2012). The initial lack
161 of knowledge about the reality of the sector as well as a change in expectations means young
162 women become disillusioned with their career choice (Dainty et al. 2000a; b).

163

164 Furthermore, the construction workplace environment is generally competitive, conflictive,
165 and plagued by discrimination against women (Gale 1994; Ling and Poh 2004; French and
166 Strachan 2015). Women are overtly and covertly discriminated against by men, who can
167 undermine their participation and achievements (Dainty et al. 2000a; Denissen and Saguy
168 2014; French and Strachan 2015). The industry is also known for its high levels of
169 interpersonal and organizational conflict, being a predominantly masculine sector that is
170 characterized by a macho culture based on animosity and aggression (Menches and Abraham

171 2007; Francis et al. 2014; Denissen and Saguy 2014), as well as a hostile work environment
172 (Fielden et al. 2000; French and Strachan 2015). In addition, the industry has terms and
173 conditions of employment that steer women away from the profession: brute force, high
174 tolerance to outdoor conditions, adverse weather, foul language, and dirty sites (Agapiou
175 2002; English et al. 2012; Denissen and Saguy 2014). The sector is clearly dominated by men,
176 and the male culture prevails (Dainty and Lingard 2006; English and Le Jeue 2012; Sospeter
177 et al. 2014).

178

179 Several authors have discussed the conflict between work and home life (Agapiou 2002;
180 Dainty and Lingard 2006; Bilbo et al. 2014). This is an on-going problem for women with
181 professional aspirations because organizations tend to treat the family and work as completely
182 independent factors (Fielden et al. 2000; Byrne et al. 2005; Bilbo et al. 2014). Women in the
183 construction industry who expect to balance both family and career success may experience
184 significant difficulties (Lingard and Lin 2004; Menches and Abraham 2007; English and Le
185 Jeue 2012). Success is measured by traditionally masculine notions such as total commitment,
186 and family and personal obligations are thus interpreted as distractions (Menches and
187 Abraham 2007; Bilbo et al. 2014). Organizations are still structured and function in ways that
188 do not always support women's career patterns and their struggle to integrate work with
189 family demands (Lu and Sexton 2010; Malone et al. 2014). It is also recognized that the
190 inability of women to cope, because of their roles as wives/mothers and the demands of their
191 careers, is generally stressful for women (Kehinde and Okoli 2004; Lu and Sexton 2010;
192 Bilbo et al. 2014).

193

194 The existence and persistence of glass ceilings in the professional development of women is a
195 fact (Ling and Poh 2004; Hossain and Kusakabe 2005; Fernando et al. 2014) and the nature of

196 the sector sustains such mechanisms. Many times, these barriers begin in the recruitment
197 process where procedures follow androcentric criteria (Fielden et al. 2000; French and
198 Strachan 2015). In addition, the construction sector is plagued by sexual harassment at all
199 levels (Whittock 2002; Madikizela and Haupt 2010; Denissen and Saguy 2014), as well as
200 sexually discriminatory attitudes (Fielden et al. 2000; Kaewsri and Tonghong 2014; French
201 and Strachan 2015).

202

203 Furthermore, the access to top positions is often achieved through informal networks and
204 mentors (Lu and Sexton; Galea et al. 2015). Townley (1989) reported that women tend to lack
205 access to informal networks that provide information and links about these opportunities.
206 They are also less likely to have mentors who recognize their potential and provide the
207 necessary support to ensure success. In brief, women must adapt or they are discouraged,
208 excluded, and eventually expelled (Greed 2000; Galea et al. 2015).

209

210 In the construction industry, most of the jobs held by women are clerical and administrative
211 (Fielden et al. 2000; English et al. 2012; Francis and Prosser 2014) or technical (Fielden et al.
212 2000; Menches and Abraham 2007; Bilbo et al. 2014) in nature. Very few women work at the
213 operational level, and data on these women is scarce or nonexistent (Byrne et al. 2005; Ness
214 2012; Jaafar et al. 2014). That is, women entering the construction industry as professionals
215 tend to fill technical specialist positions rather than general management positions (Bennett et
216 al. 1999; Menches and Abraham 2007; Bilbo et al. 2014). It seems that the nature of
217 fieldwork is an overwhelming barrier for women (Byrne et al. 2005; Dainty and Lingard
218 2006; Ness 2012), and therefore women may lack the kind of work experience that leads to
219 career advancement (Arena et al. 2015; French and Strachan 2015). Interestingly though,
220 Choudhury (2013) states that sometimes male workers “envy” female workers because their

221 managers appear to prefer them over male workers; additionally, Cheung et al. (2016) assert
222 that some women do try to influence their colleagues at work using specific job attitudes.

223

224 As shown, the topic of barriers that qualified women face in order to enter and advance in the
225 construction industry is still under discussion by the scientific community; no definite
226 conclusions have yet been drawn. Hence, this research summarizes the barriers previously
227 proposed by other contributors (in an isolated or more specific way) in Table 1. They are the
228 variables that are tested by the means of a survey to achieve the goals of this research.

229

230 **Survey**

231

232 The variables displayed in Table 1 were transformed into statements to measure the
233 respondents' compliancy with each. The questionnaire was divided in four parts:

- 234 • Brief explanation of the research and its goals.
- 235 • Characterization of the respondents (13 questions): age, gender, marital status, number of
236 children, plans to have more children, career priority, academic degrees, current work
237 post, part time or full time, years of experience, subsector, number of workers in the
238 organization, and professional associations.
- 239 • Research questions (20) that represent the variables to be analyzed, as enumerated in
240 Table 1 (second column). To determine the influence of each of the 20 variables, the
241 respondents were asked to express agreement or disagreement with the statements,
242 attributing the relative importance of each with a 9-point Liker scale, being 1 “completely
243 disagree” and 9 “completely agree”.
- 244 • Additional comments from the respondents. These comments are later used as verbatim to
245 enrich the discussion of results.

246

247 The questionnaire, designed to be answered in 20 minutes or less, was available on line
248 supported by the software tool Google Drive. The diffusion of the survey was done through
249 emails to members of the Peruvian Institutions of Civil Engineers or Architects, as well as
250 social networks (such as LinkedIn and Facebook) linking the potential respondents to the on
251 line questionnaire. To become a member of the Institutions of Civil Engineers or Architects, it
252 is required to hold a bachelor degree issued by a university officially recognized by the
253 Peruvian government.

254

255 The study population is composed of qualified professionals in the Peruvian construction
256 industry, including Civil Engineers and Architects (both men and women). Even though, there
257 is a lack of detailed statistical information about employment in the construction sector in
258 Peru, the basic general figures are detailed next. The number of Civil Engineers registered in
259 the Peruvian Association of Engineers is 41,770 (CIP, 2016). Gender distribution shows a
260 large majority of male, having only 13.74% of female membership. More than half of the civil
261 engineers' professional members have not more than ten years of experience in the industry,
262 and 58.84% work for companies with less than 10 employees (INEI, 2016).

263

264 For statistical purposes it was considered that the population was infinite. The final sample
265 (after deleting all the incomplete or defective responses) included 429 individuals; this means
266 that the estimated error is 4.7% for a 95% confidence level. Data was analyzed using IBM
267 SPSS Statistics (version 22.0). The statistical analysis undertaken provided results regarding
268 (see Figure 1): (1) a descriptive statistics of the sample in order to achieve the first goal of this
269 research; (2) a comparison between genders for the 20 items of the second part of the
270 questionnaire in order to accomplish the second goal of this research; (3) a principal

271 component analysis (PCA) and a regression analysis in order to fulfill the third goal of this
272 research. These results are summarized in the next section.

273

274 **RESULTS**

275

276 **Statistical Characterization**

277

278 According to their questionnaire responses, the majority of respondents were male (76%),
279 under 40 years old (78%) with a mean age of 33, and single (63%). Regarding the
280 professional characteristics of the sample, a large majority (62%) had less than 5 years of
281 experience in the sector, and only 5% had more than 20 years of experience. Thirty per cent of
282 the respondents worked in organizations with fewer than ten employees, while 23% worked in
283 organizations with more than 200 employees; these organizations were mainly in the public
284 (35%) and building (35%) sub-sectors. Job positions of the respondents were distributed in
285 the following way: technical staff (48%), supervisors (23%), medium management (21%),
286 and top management (8%). A relevant number of respondents (54%) were members of the
287 Peruvian Institution of Civil Engineers, 8% members of the Peruvian Institution of Architects,
288 and 38% did not have any professional membership (it is not mandatory in Peru). Considering
289 the shortage of statistical information about employment in the Peruvian construction
290 industry, the sample analyzed in this paper shows a basic concordance with the above
291 mentioned characteristics of the population.

292

293 Regarding the descriptive results, the greatest agreement among respondents (in the sense
294 expressed by the Likert scale) is found for the following variables: construction jobs are very
295 competitive by nature (V3); construction industry does not have flexible work hours,

296 childcare programs or provisions for career breaks (V9); there is a masculine culture at work
297 (V14); and women face sexual harassment at work (V15). Three variables were not
298 considered as important for the respondents (mean below 5.0): construction industry has a
299 bad image (V1); women have fewer career opportunities than men (V12); and women should
300 adopt male attitudes to be accepted in the industry (V17).

301

302 **Differences between Genders**

303

304 The comparison of the different perceptions that both genders had for each of the 20 items of
305 the second part of the questionnaire was performed using an independent sample t-test. The
306 hypothesis of homoscedasticity (using Levene's test) between both sub-samples was checked
307 for each of the 20 items: it was accepted in 12 of them, but rejected in eight of them. The
308 result of this analysis is given in Table 2, including: means and standard deviations for the
309 whole sample and for each gender, Levene's test (values of the F statistic and its p-value), and
310 t-test information (t statistic, degrees of freedom, and p-value). Statistically significant
311 differences are highlighted in bold when the significance level in the t-test is less than or
312 equal to 0.05.

313

314 <TABLE 2 HERE>

315

316 Specifically, a statistically different perception among male and female respondents was
317 found for variables V8 to V12, V14, V16, V17 and V19. In all cases, women showed a higher
318 agreement than their male counterparts did. This may be because it is women who directly
319 face these barriers. Women expressed greater agreement on the importance of variables V8
320 and V9, which show the typical work-family conflict faced by professional women. These

321 variables can be explained through two lenses: the one of employers and the one of workers.
322 For employers, it is often thought that female workers are more expensive, because women
323 have higher indirect labor costs, as a result of higher absenteeism and turnover due to family
324 obligations (Anker 1997). From the perspective of workers, women take on the majority of
325 the caregiving and household labor (Higgins et al. 2000; Bilbo et al. 2014), even though men
326 and women have a similar desire to start a family and both must balance the demands of work
327 and family life (Dainty and Lingard 2006; Menches and Abraham 2007).

328

329 Women also give greater importance to variables V11, V12, V14, V17 and V19 than do their
330 male counterparts. These variables are related to how the difficulties facing women are
331 manifested: informal networks (V11), masculine culture (V14), need to work harder (V19),
332 fewer opportunities (V12), and male attitudes (V17); these last two were not approved in the
333 survey, but women gave them good scores anyway. These differences between genders also
334 confirm the findings of Dainty et al. (2000b). In overall terms, female respondents have a
335 keener perception of invisible barriers in their career development (V10). This perception is
336 coherent with the existence of a glass ceiling for the professional development of women
337 (English et al. 2012; Fernando et al. 2014).

338

339 **Principal Component Analysis**

340

341 PCA aims to reduce the dimensionality of the data space in order to find the underlying
342 factors that collect the information present in the survey questions. PCA is based on the
343 presence of the correlations between variables, finding a smaller number of dimensions that
344 retain most of the information from the original space. Bartlett's sphericity test (P) and the
345 Kaiser–Meyer–Olkin measure (KMO) were carried out to determine if the input data set was

346 appropriate for PCA (Beavers et al. 2013). Bartlett's sphericity test explores the correlation
347 among variables to verify that inter-correlations are present and, therefore, a PCA makes
348 sense. The purpose of KMO is to evaluate sampling adequacy for PCA. Both tests verified the
349 adequacy of the data set for a PCA ($p = 0.000$ for Bartlett's test and $KMO = 0.872$) (Beavers
350 et al. 2013). Related to KMO, the measures of sampling adequacy for all variables were
351 obtained: all values were between 0.720 and 0.912, confirming the global adequacy given by
352 the KMO. A principal component was considered if its eigenvalue was greater than one. The
353 varimax rotation method was used to minimize the number of variables that had high loadings
354 on each factor. Variables with a weight less than 0.4 were disregarded because they did not
355 have a significant relationship.

356

357 The PCA was carried out without variables V10 and V11. V10 ("Women face invisible
358 barriers in their career development") was discarded because it is the dependent variable that
359 summarizes the problems faced by women during their entry and advance in the Peruvian
360 construction industry: it will be used later for the regression analysis. Variable V11 ("Within
361 the construction industry there are informal networks formed by men") was not considered for
362 three reasons: (a) its factor loadings were widely dispersed among different factors; (b) its
363 removal did not change the composition of the constructs; and (c) its elimination increased the
364 percentage of explained variance.

365

366 The PCA produced five components (Table 3) that explained 57.06% of the observed
367 variability in the input data set. The level of variance explained by the selected components
368 can be considered acceptable in social sciences research (at least 50% according to Beavers et
369 al. 2013). Obviously, the higher this percentage, the better the results; however, the
370 percentage of variance explained by the selected factors is not the unique criteria to take into

371 account. In this case, the good results of the Bartlett sphericity test and the KMO indicator,
372 together with this 57% of variance explained, give validity to these results.

373

374 <TABLE 3 HERE>

375

376 The factor grouping provided the scores for the 18 variables of the five principal components
377 identified in the PCA (see Table 3). Analysis of the factor loading matrix led to a reduced
378 number of components that could explain the underlying factors to professional development
379 of qualified women. The five principal components can be interpreted as follows:

- 380 • PC1, “Male Oriented Labor Market”, accounts for more than 29% of the variability of
381 opinions (Table 2). This component seems to portray that barriers faced by qualified
382 women are related to labor matters: men are more readily accepted on the job than women
383 (V16). Therefore, women work harder to access jobs similar to those of their male
384 counterparts (V19) although they have fewer career opportunities than men (V12). In
385 addition, when women take a break from their career (e.g. to care for young children),
386 they experience a loss in the hierarchical order (V8). Besides, the industry does not have
387 flexible hour works, childcare programs or provisions for career breaks (V9). Finally,
388 respondents perceive a masculine culture in the workplace (V14) that means women must
389 adopt male attitudes to be accepted (V17).
- 390 • PC2, “Detrimental Issues for being a Woman”, contains four variables. This component
391 explains that being a woman can sometimes be a disadvantage (V20), leading to a
392 situation in which men are in the field while women are more often in the office (V13). It
393 is important to note that variable V20 has a negative loading factor, meaning that
394 womanhood is perceived as a disadvantage. Other conditioning factors for being a woman

395 identified in PC2 are the possibility of facing sexual harassment at work (V15) and the
396 greater difficulty in controlling subordinates (V18).

397 • PC3, “Harsh Working Conditions in the Construction Industry”, explains the situations
398 that prevent qualified women from entering and advancing the Peruvian construction
399 industry. This component refers to the tough working conditions and long working hours
400 of construction jobs (V6). In addition, construction jobs can be stressful and demanding
401 (V5), making it difficult to combine work and family life (V7).

402 • PC4, “Unfavorable Perception of the Construction Industry”, is composed of three
403 variables. In this regard, respondents recognized that the construction industry has a bad
404 image (V1), being conflictive by nature (V4) and that the initial expectations of the
405 construction industry change once someone starts (V2).

406 • PC5, “High Competitiveness of the Construction Industry”, takes into account variable V3
407 only, which states that construction jobs are competitive by nature.

408

409 **Regression Analysis**

410

411 The dependent variable V10 (“Women face invisible barriers in their career development”)
412 was used as dependent variable in a regression analysis in order to check its correlations with
413 the rest of the original variables (barriers) as well as with the principal components obtained
414 using PCA. Table 4 contains these correlations; all of them are significant at 0.99, except V1,
415 even though their values are not too high. According to Cohen (1988), for behavioral
416 sciences, a correlation value $r = 0.10$ can be considered small, $r = 0.30$ medium, and $r = 0.50$
417 large.

418

419 <TABLE 4 HERE>

420

421 Later, a linear regression analysis of all variables was performed to study the relationships
422 among variables and to produce a model that explains the dependent variable “invisible
423 barriers women face in their career development” (V10). The forward method was used, and
424 the five factors resulting in the exploratory factor analysis were taken as independent
425 variables. These five factors explain 34.6% of the variance of the dependent variable (adjusted
426 $R^2 = 0.346$), as shown in Table 5.

427

428 <TABLE 5 HERE>

429

430 There is a significant linear relationship and the hyperplane defined by the regression equation
431 provides a good fit: all the principal components were found to be significantly different from
432 zero at $p \leq 0.01$. Table 6 shows the partial regression coefficients that contain all the
433 information necessary to build the regression equation. Among the five significant factors,
434 “male oriented labor market” (PC1) was found to be the main contributor to the prediction of
435 the underlying factors that condition the barriers faced by women in their career development
436 (V10) (standardized coefficient of 0.514, $p \leq 0.000$, according to Table 6). Standardized
437 coefficients show the degree of influence of the different variables on the response.

438

439 <TABLE 6 HERE>

440

441 These non-standardized coefficients are interpreted as follows: the coefficient of 1.099 of the
442 variable “male oriented labor market” (PC1) indicates that, if all other variables remain
443 constant, an increase of one unit in “male oriented labor market” corresponds, on average, to
444 an increase of 1.099 on “invisible barriers” (V10). These coefficients are not independent of

445 each other. Indeed, they are called partial regression coefficients because the specific value
446 for each coefficient is adjusted taking into account the presence of other independent
447 variables. This is why they should be interpreted with caution.

448

449 **DISCUSSION**

450

451 The fact that women work harder than their male counterparts to achieve similar jobs is
452 consistent with previous studies comparing the career advancement of men and women
453 (Dainty et al. 2000a; Hossain and Kusakabe 2005; Dainty and Lingard 2006). In the present
454 study, a young female respondent describes perfectly this obstacle: “The professional
455 development of women in fieldwork requires more effort, dedication and commitment
456 compared to men [...]. The way women can achieve absolute control of the working group is
457 by demonstrating capacity and ability to solve problems; in contrast, men only need to impose
458 their presence and their degree in engineering to be respected.”

459

460 With respect to the different career opportunities for male and female professionals, previous
461 studies have concluded that they are a result of the organizational structure (Dainty and
462 Lingard 2006), training courses dominated by men (Fielden et al. 2000), and the operation of
463 corporate policies and procedures (French and Strachan 2015; Galea et al. 2015). In this
464 regard, the following statement from another young female engineer is strong evidence of the
465 policies and procedures for staff recruitment: “I’ve been rejected when applying for a job just
466 because I am a woman; the manager said it was best to hire a man as he would be more
467 willing to do the work when there is the risk of working at heights.”

468

469 Regarding the work-family conflict, organizations tend to treat family and work as fully
470 independent factors (Fielden et al. 2000; Menches 2007; Malone et al. 2014). This means that
471 women must find their own balance between the demands of work and family. Indeed, it is
472 women who assume most of the family and domestic responsibilities (Higgins et al. 2000;
473 Bilbo et al. 2014). This is even the case when women have a full-time job and share their lives
474 with partners that have a positive attitude towards domestic partnership; a young male
475 engineer gave an example of this: “Working hours can be eight hours for laborers, but many
476 more for managers; this is most noticeable in private companies, which sometimes have night
477 shifts at the construction sites, making it very difficult for women with families to work on
478 these shifts”. A middle-aged male engineer regarded the imbalance with a stronger statement:
479 “The sin of women in the construction industry is being a mother”. A middle-aged female
480 engineer explained her personal situation: “I can work in the field all day and when I get
481 home, I have to do all the household chores. It is difficult to hire domestic assistants to
482 undertake these tasks. My husband is also an engineer and when he arrives home, he expects
483 to be waited on, even on weekends. There is no rest for women.”

484

485 Among the labor issues identified as barriers for qualified women is the masculine culture at
486 work. This is fully consistent with previous research, which described the environment of the
487 construction industry as male-dominated (Gale 1994; Dainty and Lingard 2006; Francis et al.
488 2014). This situation forces women to demonstrate masculine attitudes in order to be accepted
489 in the construction industry and gain leadership positions (Ness 2012; Denissen and Saguy
490 2014). Indeed, previous studies have pointed out that the main reason for a slow and
491 inadequate professional development may be the attitudes of women, rather than their skills
492 (Lu and Sexton 2010; French and Strachan 2015; Cheung et al. 2016). In the current study, a
493 senior male engineer declared that “the construction industry is tough, so competition,

494 character and ability to command and lead are needed”; however, he did not explicitly
495 mention if these are characteristics attributable to men or women. Another middle-aged
496 woman noted: “I see corruption in the construction industry. Professionals, managers and
497 representatives of public organizations often form alliances to develop projects, studies, work,
498 etc. These alliances are supported by participation in soccer games or outdoor drinking.
499 Women cannot access these alliances because they usually do not play soccer and they are
500 usually more reluctant to drink alcohol.”

501

502 The fact that women perform tasks more closely related to office work (Dainty et al. 2000b;
503 Malone et al. 2014; French and Strachan 2015) was described as a benefit by one young male
504 engineer in the study: “Women in the construction industry tend to be in the office, not by
505 their own efforts, but by friendship or other factors”. However, this seemingly innocent
506 benefit actually constitutes a major barrier to women, because it generates a lack of access to
507 other experiences that enable them to achieve their professional development.

508

509 Both male and female respondents in this study agree that sexual harassment is yet another
510 obstacle faced by women in the construction field. Sexual objectification leads to a difficult
511 working environment for women (Byrne et al. 2005; Watts 2007; Denissen and Saguy 2014).
512 These claims are confirmed with evidences given by several respondents. For example, a
513 young male engineer indicated that: “In projects where you need to live in camps, isolated
514 from the population of the city, there is plenty of sexual harassment of the women who work
515 in these projects”. Whereas a senior female professional affirmed that: “In approximately 50%
516 of the jobs I have had, I have been sexually harassed by my bosses and sometimes by
517 colleagues”. The existence of sexually discriminatory attitudes was also revealed in the
518 comments of a senior male manager: “I think there are jobs that women by their nature will

519 not be able to perform adequately. There are secondary factors such as if she is pretty, if she
520 has a nice body, or even if she is ugly [...]. Anyway, everything is disadvantageous for
521 women.”

522

523 Respondents in this study also agree that it is more difficult for women to control
524 subordinates; this has been corroborated by previous studies in developing economies
525 (Kaewsri and Tonghong 2011; English and Le Jeune 2012). Ling and Poh (2004) highlighted
526 the fact that many women felt they were not able to work well with contractors and
527 subcontractors, who were usually men. A young female engineer reported the following: “I
528 have been a victim of sexism from a foreman, who indirectly made derogatory comments
529 towards women engineers and women architects, arguing that women in the field of
530 construction are incapable, impractical, inefficient, and generally do not know anything.”

531

532 **CONCLUSIONS**

533

534 **Contributions**

535

536 This study aimed to identify the key barriers that qualified women face during their entry and
537 advance in the construction industry. Initially, 20 barriers were identified through a rigorous
538 analysis of previous contributions. These barriers composed the statements of the
539 questionnaire survey; data was obtained from 429 professionals of the Peruvian construction
540 industry. Regarding its first goal, this research summarized the variables previously proposed
541 by other contributors (in an isolated or more specific way), and tested them using this survey.
542 All these variables but three were considered relevant by the respondents. They did not fully
543 agree that the construction industry had a bad image. Women deemed the other two variables

544 (women have fewer career opportunities than men and women should adopt male attitudes to
545 be accepted in the industry) as actual barriers, while men did not. This contribution is also
546 linked to the second goal of this research: the different views that men and women have
547 regarding these barriers. The main perceptual dissimilarities found indicate that women place
548 considerable emphasis on the existence of a male culture at work, which is not the case for
549 men. Even though, men interpret womanhood as a form of positive discrimination which, far
550 from being a professional barrier, is considered by them as an advantage. Likewise, women
551 agree that if they take maternity leave, they will suffer a loss in the hierarchical order;
552 furthermore, the sector does not have flexible work schedules, childcare programs, or
553 provisions for career breaks. As the industry is male-controlled so far, the women's vision is
554 not accepted, or even really perceived, by men. This way, no actual means are provided to
555 solve the issues or enhance the current scenario; there is a vicious circle that deters the
556 improvement of this status quo.

557

558 Finally, five underlying factors that condition the barriers faced by women in their career
559 development were extracted from the analysis: "male oriented labor market", "detrimental
560 issues for being a woman", "harsh working conditions in the construction industry",
561 "unfavorable perception of the construction industry", and "high competitiveness of the
562 construction industry". The first (and most influential) factor revealed that men are more
563 readily accepted in the workplace compared to women; furthermore, women work harder to
564 get jobs similar to those of their male colleagues. Also, female professionals have fewer
565 opportunities for promotion than males. Summarizing, women face invisible glass ceilings
566 throughout their careers and have fewer professional opportunities than men.

567

568

569 **Practical Implications**

570

571 The key barrier to address is the male culture at work that includes not only informal
572 networks formed by men but also an absence of flexible work schedules, childcare programs,
573 or provisions for career breaks that deter the compatibility of family and work for women.

574 The recognition of this glass ceiling may allow both public and private organizations to
575 propose actions which guarantee the acceptance and professional development of women in
576 the sector. In this sense, this study informs potential approaches to gender equality. On the
577 one hand, the incorporation of gender equality policies could ensure sustainable development
578 as already proposed by some contributors (French and Strachan 2015; Galea et al. 2015). For
579 companies within the industry, a management system for gender equity (MSGGE) is needed to
580 properly implement the business strategy regarding the management of personnel, bearing in
581 mind the criteria of gender equality as an integral element. From the perspective of female
582 workers' rights, public agencies should foster the mainstreaming of gender in the economy
583 through organizational changes in companies within the sector. One example is a certification
584 program in MSGGE which involves modifying and ameliorating informal practices, workplace
585 procedures and criteria for promotion, as well as structuring the company in order to ensure
586 equality and fairness for all workers.

587

588 On the other hand, it is necessary to devise a strategy that promotes the involvement of
589 women on their own terms, allowing for empowerment processes. The adequate management
590 of diversity in different projects promotes participation. It is necessary to recognize women's
591 status by their work–family roles, as well as their specific career development plans, offering
592 options for flexible work arrangements and childcare support. Women should be seen as
593 active agents of change. Furthermore, as stated by Aguirre et al. (2012), where female labor

594 force participation is low and women are well-educated, they can make a stand, as is the case
595 in the Peruvian construction industry.

596

597 **Limitations**

598

599 The main limitation of this research is that it is focused on one single country (Peru), which
600 may limit the generalizability of the findings. However, the initial barriers analyzed in this
601 study were taken from an in-depth literature review; the original contributors carried out their
602 research in different countries, but mainly in the United Kingdom, Australia and the United
603 States; only one of the barriers came from studies carried out in developing economies
604 (“Women have greater difficulty controlling subordinates than men”). This research
605 nonetheless confirmed most of the findings of previous contributors while summarizing and
606 highlighting the key barriers and different perceptions between genders.

607

608 **Future Work**

609

610 Taking the findings of this research as a point of departure, future research is clearly needed
611 to better understand the development patterns and retention barriers affecting women working
612 as professionals in the construction industry. These studies could also focus on other countries
613 to check the findings obtained in Peru. Furthermore, additional regulations should be
614 encouraged that close the gap between the men and women’s perception of the field; this can
615 lead the way to more women working in the construction industry. Finally, future research
616 should enhance the understanding of the culture in the industry, through an analysis of
617 corruption and how it affects the different stages of professional experience.

618

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622

623 **REFERENCES**

624

625 Adeyemi, A.Y., Ojo, S.O., Aina, O.O. and Olanipekun, E.A. (2006), “Empirical evidence of
626 women under-representation in the construction industry in Nigeria.” *Women in*
627 *Management Review*, 21(7), 567-577.

628 Agapiou, A. (2002). “Perceptions of gender roles and attitudes toward work among male and
629 female operatives in the Scottish construction industry”. *Construction Management*
630 *and Economics*, 20, 697-705.

631 Aguirre, D., Hoteit, L., Rupp, C., and Sabbagh, K. (2012). *Empowering the Third Billion:*
632 *Women and the World of Work in 2012*. Booz & Company. New York, USA.

633 Anker, R. (1997), “Theories of occupational segregation by sex: an overview.” *International*
634 *Labour Review*, 136(3), 315-339.

635 Arena, C., Cirillo, A., Mussolino, D., Pulcinelli, I., Saggese, S., Sarto, F. (2015). “Women on
636 board: evidence from a masculine industry”. *Corporate Governance*, 15(3), 339-356.

637 Beavers, A.S., Lounsbury, J.W., Richards, J.K., Huck, S.W., Skolits, G.J., and Esquivel, S.L.
638 (2013). “Practical considerations for using exploratory factor analysis in educational
639 research”. *Practical Assessment, Research & Evaluation*. 18(6), 1-13.

640 Bennett, J. F., Davidson, M. J., and Galeand, A. W. (1999). “Women in construction: A
641 comparative investigation into the expectations and experiences of female and male
642 construction undergraduates and employees.” *Women in Management Review*, 14(7),
643 273–292.

644 Bilbo, D., Bigelow, B. F., Rybkowski, Z., and Kamranzadeh, A. (2014). "Effects of family-
645 related factors on female project managers' salaries in the construction industry in the
646 United States." *International Journal of Construction Education and Research*, 10(4),
647 255-267.

648 Blackburn, R.M., Browne, J., Brooks, B. and Jarman, J. (2002), "Explaining gender
649 segregation." *Journal of Sociology*, 53(4), 513-536.

650 BLS (2016). Bureau of Labor Statistics. Labor Force Statistics from the Current Population
651 Survey. Retrieved 06/06/2016 from: <http://www.bls.gov/cps/tables.htm#charemp>

652 Braun V. and Clarke V. (2006). "Using thematic analysis in psychology." *Qualitative*
653 *Research Psychology*, 3, 77-101.

654 Byrne, J., Clarke, L., and Van Der Meer, M. (2005). "Gender and ethnic minority exclusion
655 from skilled occupations in construction: A Western European comparison."
656 *Construction Management and Economics*, 23(10), 1025–1034.

657 Carnevalli, J. A., and Miguel, P. C. (2008). "Review, analysis and classification of the
658 literature on QFD—Types of research, difficulties and benefits." *International Journal*
659 *of Production Economics*, 114(2), 737-754.

660 Charles, M. (2003). "Deciphering sex segregation: Vertical and horizontal inequalities in ten
661 national labor markets". *Acta Sociologica*, 46(4), 267-287.

662 Cheung, H. K., Lindsey, A., King, E., and Hebl, M. R. (2016). "Beyond sex: exploring the
663 effects of femininity and masculinity on women's use of influence tactics." *Gender in*
664 *Management: An International Journal*, 31(1), 43 – 60.

665 Choudhury, T. (2013). "Experiences of women as workers: a study of construction workers in
666 Bangladesh." *Construction Management and Economics*, 31(8), 883-898.

667 CIP (2016). Colegio de Ingenieros del Perú. Estadísticas de Colegiados 2015. Retrieved
668 10/06/2016 from: <http://www.cip.org.pe/> (in Spanish).

- 669 Cohen J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd Ed.). Lawrence
670 Erlbaum, Hillsdale, N.J.
- 671 Dainty, A. R. J., Bagilhole, B. M., and Neale, R. H. (2000a). "A grounded theory of women's
672 career underachievement in large UK construction companies." *Construction
673 Management and Economics*, 18(2), 239–250.
- 674 Dainty, A. R. J., Neale, R. H., and Bagilhole, B. M. (2000b). "Comparison of men's and
675 women's careers in U.K. construction industry." *Journal of Professional Issues in
676 Engineering Education and Practice*, 126(3), 110–115.
- 677 Dainty, A., and Lingard, H. (2006). "Indirect discrimination in construction organizations and
678 the impact on women's careers." *Journal of Management in Engineering*, 22(3), 108–
679 118.
- 680 Denissen, A. M., and Saguy, A. C. (2014). "Gendered homophobia and the contradictions of
681 workplace discrimination for women in the building trades." *Gender and
682 Society*, 28(3), 381-403.
- 683 English, J., and Le Jeune, K. (2012). "Do professional women and tradeswomen in the South
684 African construction industry share common employment barriers despite progressive
685 government legislation?" *Journal of Professional Issues in Engineering Education and
686 Practice*, 138(2), 145-152.
- 687 Fernando, N. G., Amaratunga, D., and Haigh, R. (2014). "The career advancement of the
688 professional women in the UK construction industry: The career success factors."
689 *Journal of Engineering, Design and Technology*, 12(1), 53-70.
- 690 Fielden, S. L., Davidson, M. J., Gale, A. W., and Davey, C. L. (2000). "Women in
691 construction: The untapped resource." *Construction Management and Economics*,
692 18(1), 113–121.

693 Francis, V., and Prosser, A. (2014). "Exploring vocational guidance and gender in
694 construction." *International Journal of Construction Education and Research*, 10(1),
695 39-57.

696 French, E., and Strachan, G. (2015). "Women at work! Evaluating equal employment policies
697 and outcomes in construction." *Equality, Diversity and Inclusion: An International*
698 *Journal*, 34(3), 227-243.

699 Gale, A. W. (1994). "Women in non-traditional occupations: The construction industry."
700 *Women in Management Review*, 9(2), 3-14.

701 Galea, N., Powell, A., Loosemore, M., and Chappell, L. (2015). "Designing robust and
702 revisable policies for gender equality: lessons from the Australian construction
703 industry." *Construction Management and Economics*, 33(5-6), 375-389.

704 Greed, C. (2000). "Women in the construction professions: Achieving critical mass." *Gender,*
705 *Work and Organization*, 7(3), 181-196.

706 Higgins, C., Duxbury, L., and Johnson, K. L. (2000). "Part-time work for women: Does it
707 really help balance work and family?" *Human Resource Management*, 39(1), 17-32.

708 Hossain, J. B., and Kusakabe, K. (2005). "Sex segregation in construction organizations in
709 Bangladesh and Thailand." *Construction Management and Economics*, 23(6), 609-
710 619.

711 INEI (2014). *Comportamiento de la Economía Peruana en el Primer Trimestre de 2014*. INEI.
712 Lima, Perú (in Spanish)

713 INEI (2016). *Instituto Nacional de Estadística e Informática 2016*. Retrieved 10/10/2016
714 from: [http:// www.inei.gob.pe/](http://www.inei.gob.pe/) (in Spanish).

715 Jaafar, M., Othman, R., and Jalali, A. (2014). "Main determinations of female entrepreneurs
716 in the construction industry in Malaysia." *Project Management Journal*, 45(1), 76-86.

717 Kaewsri, N., and Tongthong, T. (2011). "An investigation of women engineers in non-
718 traditional occupations in the Thai construction industry." *Australasian Journal of*
719 *Construction Economics and Building*, 11(2), 1-21.

720 Kehinde, J. O., and Okoli, O. G. (2004). "Professional women and career impediments in the
721 construction industry in Nigeria." *Journal of Professional Issues in Engineering*
722 *Education and Practice*, 130(2), 115-119.

723 Ling, F. Y. Y., and Poh, Y. P. (2004). "Encouraging more female quantity surveying
724 graduates to enter the construction industry in Singapore." *Women in Management*
725 *Review*, 19(8), 431-436.

726 Lingard, H., and Lin, J. (2004). "Career, family and work environment determinants of
727 organizational commitment among women in the Australian construction industry."
728 *Construction Management and Economics*, 22(4), 409-420.

729 Lu, S. L., and Sexton, M. (2010). "Career journeys and turning points of senior female
730 managers in small construction firms." *Construction Management and*
731 *Economics*, 28(2), 125-139.

732 Madikizela, K., and Haupt, T. (2010). "Influences on women's choices of careers in
733 construction: A South African study." *Australasian Journal of Construction Economics*
734 *and Building*, 10(1/2), 1-15.

735 Malone, E. K., and Issa, R. R. (2014). "Predictive models for work-life balance and
736 organizational commitment of women in the US construction industry." *Journal of*
737 *Construction Engineering and Management*, 140(3), 04013064.

738 Menches, C. L., and Abraham, D. M. (2007). "Women in construction-tapping the untapped
739 resource to meet future demands." *Journal of Construction Engineering and*
740 *Management*, 133(9), 701-707.

741 MTPE (2016). Ministerio de Trabajo y Promoción del Empleo. Retrieved 06/06/2016 from:
742 <http://www.mintra.gob.pe/mostrarContenido.php?id=148&tip=548> (in Spanish)

743 Ness, K. (2012). “Constructing masculinity in the building trades: ‘most jobs in the
744 construction industry can be done by women’.” *Gender, Work and*
745 *Organization*, 19(6), 654-676.

746 Pellicer, E., Yepes, V., Teixeira, J.C., Moura, H., Catalá, J. (2014). *Construction*
747 *Management*. Wiley-Blackwell, London.

748 Powell, A., and Sang, K. J. (2015). “Everyday experiences of sexism in male-dominated
749 professions: A Bourdieusian perspective.” *Sociology*, 49(5), 919-936.

750 Sospeter, N. G., Rwelamila, P. D., Nchimbi, M., and Masoud, M. (2014). “Review of theory
751 and practice literature on women entrepreneurship in the Tanzanian construction
752 industry: Establishing the missing link.” *Journal of Construction in Developing*
753 *Countries*, 19(2), 75.

754 Townley, B. (1989). “Selection and appraisal: Reconstituting ‘social relations’?” *New*
755 *Perspectives on Human Resource Management*, Routledge, New York, USA, 92–108.

756 Watts, J. (2007). “Porn, pride and pessimism: Experiences of women working in professional
757 construction roles.” *Work, Employment and Society*, 21(2), 219-316.

758 Whittock, M. (2002). “Women’s experiences of non-traditional employment: Is gender
759 equality in this area a possibility?” *Construction Management and Economics*, 20(5),
760 449–456.

761 World Bank (2016). Gender Data Portal. Retrieved 06/06/2016 from:
762 <http://datatopics.worldbank.org/gender/indicators>

763 Wright, T. (2015). “New development: Can ‘social value’ requirements on public authorities
764 be used in procurement to increase women's participation in the UK construction
765 industry?” *Public Money and Management*, 35(2), 135-140.

766

767

768

Table 1. Codes, variables and supporting contributions

Code	Variable	Supporting Contributions
V1	The construction industry has a bad image	Gale 1994; Bennett et al. 1999; Fielden et al. 2000; Kehinde and Okoli 2004; Ling and Poh 2004; English and Le Jeue 2012; Bilbo et al. 2014; French and Strachan 2015
V2	The initial expectations of the construction sector change once someone starts	Dainty et al. 2000b; Fielden et al. 2000; Lu and Sexton 2010
V3	Construction jobs are very competitive by nature	Gale 1994; Dainty et al. 2000b; Ling and Poh 2004
V4	The construction industry is very conflictive by nature	Gale 1994; Dainty et al. 2000b; Menches and Abraham 2007
V5	Construction jobs are stressful and demanding	Gale 1994; Dainty et al. 2000b; Ling and Poh 2004; Ness 2012
V6	Construction jobs involve harsh working conditions and long working hours	Dainty et al. 2000b; Agapiou 2002; Ling and Poh 2004; Watts 2007; Ness 2012; English and Le Jeue 2012; Sospeter et al. 2014; French and Strachan 2015
V7	It is difficult to combine work and family life	Bennett et al. 1999; Dainty et al. 2000b; Higgins et al. 2000; Ling and Poh 2004; Lingard and Lin 2004; Menches and Abraham 2007; Lu and Sexton 2010; English and Le Jeue 2012; Bilbo et al. 2014; Malone et al. 2014
V8	Women taking a break in their career and those taking an extended leave lose ground in the hierarchical order	Gale 1994; Fielden et al. 2000; Whittock 2002; Lingard and Lin 2004; Byrne et al. 2005; Dainty and Lingard 2006; Madikizela and Haupt 2010
V9	The construction industry does not have flexible work hours, childcare programs or provisions for career breaks	Gale 1994; Fielden et al. 2000; Whittock 2002; Lingard and Lin 2004; Byrne et al. 2005; Dainty and Lingard 2006; Menches and Abraham 2007; Madikizela and Haupt 2010; Bilbo et al. 2014
V10	Women face invisible barriers in their career development	Dainty et al. 2000b; Heredia 2004; Ling and Poh 2004; Hossain and Kusakabe 2005; English et al. 2012; Fernando et al. 2014
V11	Within the construction industry, there are informal networks formed by men	Bennett et al. 1999; ; Dainty and Lingard 2006; Lu and Sexton 2010; Galea et al. 2015
V12	Women have fewer career opportunities than men	Gale 1994; Dainty et al. 2000b; Ling and Poh 2004; Lu and Sexton 2010; Kaewsri and Tonghong 2014
V13	Men perform fieldwork whereas women do office-related work	Bennett et al. 1999; Dainty et al. 2000b; Ling and Poh 2004; Hossain and Kusakabe 2005; Kaewsri and Tonghong 2014; Malone et al. 2014; French and Strachan 2015
V14	There is a masculine culture at work	Gale 1994; Fielden et al. 2000; Ling and Poh 2004; English and Le Jeue 2012; Ness 2012; Denissen and Saguy 2014; Francis et al. 2014; Sospeter et al. 2014; French and Strachan 2015
V15	Women face sexual harassment at work	Gale 1994; Dainty et al. 2000b; Whittock 2002; Ling and Poh 2004; Byrne et al. 2005; Dainty and Lingard 2006; Watts 2007; Madikizela and Haupt 2010; Choudhury 2013; Denissen and Saguy 2014; Kaewsri and Tonghong 2014
V16	Males are more readily accepted in the industry than females	Dainty et al. 2000b; Ling and Poh 2004; Choudhury 2013
V17	Women have to adopt male attitudes to be accepted in the industry	Gale 1994; Denissen and Saguy 2014
V18	Women have greater difficulty controlling subordinates than men	Ling and Poh 2004; Kaewsri and Tonghong 2010; English and Le Jeue 2012

Code	Variable	Supporting Contributions
V19	Women work harder to obtain jobs similar to those of their male counterparts	Dainty et al. 2000b; Hossain and Kusakabe; Dainty and Lingard 2006
V20	Being a woman can be an advantage	Choudhury 2013; Cheung et al. 2016

770

771

Table 2. Variances and means comparison for gender

Code	Mean	S.D.	Mean (Male)	Mean (Female)	S.D. (Male)	S.D. (Female)	Levene's test F	p- value	t value	p - value
V1	4.09	2.04	4.036	4.23	2.0086	2.1117	1.341	0.248	-0.888	0.375
V2	5.35	2.05	5.293	5.508	2.0908	1.9508	2.532	0.112	-0.979	0.328
V3	6.59	1.95	6.590	6.574	1.954	1.9452	0.003	0.957	0.076	0.940
V4	5.53	2.06	5.436	5.770	2.0655	2.0319	0.247	0.619	-1.518	0.130
V5	5.54	2.09	5.482	5.689	2.1025	2.0533	0.006	0.939	-0.924	0.356
V6	5.67	2.10	5.58	5.885	2.1365	2.0091	0.899	0.344	-1.358	0.175
V7	5.55	2.31	5.423	5.852	2.3354	2.2256	1.865	0.173	-1.739	0.083
V8	5.47	2.13	5.163	6.246	2.0355	2.1868	0.726	0.395	-4.866	0.000
V9	6.22	2.13	6.016	6.738	2.1289	2.0562	5.715	0.017	-3.245	0.001
V10	5.47	2.14	5.065	6.475	2.1502	1.7402	13.726	0.000	-7.062	0.000
V11	6.03	1.97	5.860	6.443	2.0556	1.6912	14.646	0.000	-3.021	0.003
V12	4.74	2.25	4.446	5.475	2.1312	2.3714	2.644	0.105	-4.367	0.000
V13	5.40	2.22	5.430	5.311	2.1138	2.4666	9.438	0.002	0.467	0.641
V14	6.11	1.97	5.860	6.754	1.9712	1.8105	11.898	0.001	-4.498	0.000
V15	6.10	2.01	6.029	6.279	1.9891	2.042	0.030	0.863	-1.163	0.246
V16	5.80	2.18	5.430	6.721	2.1627	1.9296	13.144	0.000	-6.037	0.000
V17	4.80	2.23	4.564	5.410	2.1704	2.2845	0.475	0.491	-3.589	0.000
V18	5.29	2.24	5.352	5.131	2.1648	2.4222	5.112	0.024	0.877	0.382
V19	5.61	2.24	5.111	6.869	2.1084	2.0528	6.097	0.014	-7.941	0.000
V20	5.57	2.03	5.494	5.708	2.0351	2.0134	0.006	0.938	-0.525	0.600

Note: Variables in **bold** show statistically significant differences between genders

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Table 3. Principal components and rotated loading matrix of the factors

Code	PC1	PC2	PC3	PC4	PC5
V16	0.739				
V19	0.735				
V12	0.714				
V8	0.576				
V9	0.548				
V14	0.538				
V17	0.483				
V20		-0.725			
V13		0.719			
V15		0.605			
V18		0.542			
V6			0.812		
V5			0.811		
V7			0.547		
V1				0.813	
V2				0.595	
V4				0.508	
V3					0.809
Eigenvalues	5.319	1.462	1.387	1.090	1.012
Variance (%)	29.553	8.122	7.708	6.056	5.622
Cumulative variance (%)	29.553	37.674	45.383	51.439	57.061

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778 **Table 4. Correlation between V10 and the original variables and principal components**

V1	V2	V3	V4	V5	V6	V7	V8	V9	V11
0.113*	0.261**	0.192**	0.256**	0.157**	0.280**	0.327**	0.358**	0.285**	0.265**
V12	V13	V14	V15	V16	V17	V18	V19	V20	
0.422**	0.219**	0.421**	0.270**	0.432**	0.344**	0.280**	0.515**	-0.197**	
PC1	PC2	PC3	PC4	PC5					
0.514**	0.182**	0.152**	0.124**	0.133**					

779 **Correlation significant at 0.99; * Correlation significant at 0.95

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Table 5. Regression model

Predictive Variables	R	R²	R² adjusted	Standard Error
Constant, PC1, PC2, PC3, PC4, PC5	0.595	0.354	0.346	1.728

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Table 6. Partial regression coefficients

Model	Unstandardized coefficients		Standardized coefficients	T	Sig.
	B	Standard error	Beta		
(Constant)	5.466	0.083		65.519	0.000
PC1	1.099	0.084	0.514	13.160	0.000
PC2	0.389	0.084	0.182	4.656	0.000
PC3	0.326	0.084	0.152	3.898	0.000
PC4	0.265	0.084	0.124	3.171	0.002
PC5	0.283	0.084	0.133	3.392	0.001

Dependent Variable: V10

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788 **LIST OF CAPTIONS**

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791 **Figure 1. Research process**

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