

WORK- LIFE BALANCE AS AN INSTRUMENT OF SOCIAL INCLUSION OF FEMALE ENGINEERS

INTRODUCTION AND ACKNOWLEDGEMENTS

Gender equality and work-life balance in the field of engineering are the principal objectives of this informative guide, which is part of the project "Work-life balance as an instrument of social inclusion of Female Engineers"; funded by the Women's Institute - Ministry of Health, Social Services and Equality - through a call for research projects 2012 (ref 80/12.).

This research project provides a more detailed understanding of what happens in the careers of female engineers; and how the reconciliation of work and personal lives - or appropriate work-life balance - is shaping up as one of the tools available to companies for improving the equality of opportunities for women working as engineers. In addition to receiving a national research award, this project has led to 11 conference presentations and the publication of one article in a scientific journal and several more articles still under review. This guide to the study's results aims to promote the dissemination of the study data in a

simple and informative way; in order to transfer the knowledge generated by the project to society at large.

We wish thank all the engineers of both genders who participated in research which has allowed us to determine what actions to take to improve the quality of life (professional and personal) of a highly trained professional group that contributes in a decisive way to improving the competitiveness of their companies and our country.

We also want to especially thank the full time support provided by the Association for the Rationalization of Spanish Working Hours (ARHOE) and the Engineering Institute of Spain (IIES) for their collaboration in raising awareness of the research project via its newsletter and the webpage link provided to the survey.

We also appreciate the collaboration of various engineering colleges in Spain for their dissemination of the survey to their respective members.



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RESEARCH
METHODOLOGY

Research methodology

The data presented in this guide, "Work-life balance as an instrument for the social inclusion of Female Engineers" are derived from a quantitative study, the methodology for which is described below.

Survey Universe

The study sample was drawn from the population of degreed, active engineers -- both male and female -- aged 30 to 45. The age range was set based on two factors: the intensity of work related to childcare and the steps in the progression of professional careers suggested by the relevant literature.

Questionnaire Description

For the purposes of data collection, a multidisciplinary team designed and developed a questionnaire with 34 questions. The questionnaire is divided into different sections: general respondent data (age, gender, marital status, children, title and engineering branch, etc.), current professional situation (position, company, previous work, dedication, workload, etc.), role conflict (from work to private life, private life to work), organizational behaviour variables (commitment to the company, desire to leave organization, etc.) and life satisfaction (social inclusion, family satisfaction, etc.).

Data Collection

Data collection took place between late 2013 and 2014, and concluded with a total of 846 valid questionnaires. The confidence intervals and validity of the data have been verified with satisfactory results in each area. The sample size obtained in this research is quite significant in that it is larger than that of many projects undertaken in the field of engineering, (Lingard et al., 2012), where many research projects use case studies or interviews with small samples of engineers. (Valk and Srinivasan, 2011; Hatmaker, 2013; Kaewsri and Tongthong, 2013).

Descriptive analysis of the sample

The sample is composed of 846 cases. The descriptive data presented in the table below provide a sample overview. The sample is composed 72.7% of men, a proportion similar to that found in the registration data for engineering studies, according to the Institute of Women (28.47% of the graduates in the academic year 2013-14 were women). Seventy percent of the sample are married and 55% have dependent children. Regarding their current employment,

approximately 20% of the sample occupy middle and senior management with the most frequently reported position being associate architects. The data on qualification versus current job post is notable, where almost 34% of respondents say their position is below their qualifications and experience - or they are overqualified for their current position.

SAMPLE CHARACTERISTICS	
PERCENTAGE MALE	72,7%
AVERAGE WORKER	38 Age
FEMALE ENGINEERS	- Associate Engineers 53,9% - Senior Engineers 46,1%
WORK CATEGORY	- Employee 84,8% - Freelance 15,2%
MARITAL STATUS	70,7% married 26,8% single 2,4% separated or divorced 0,1% widow or widower
NO CHILDREN AT HOME	45,3%
SIZE OF COMPANY	- Large (250 or more employees): 46,8% - Medium (from 50 to 249 employees): 22,2% - Small (from 11 to 49 employees): 14,2% - Micro business (up to 10): 16,8%
TYPE OF COMPANY	- Private: 73% - Public: 27%
PROFESSIONAL CATEGORY	- Senior management 7% - Middle management 14,2% - Department heads 13,9% - Associates 55,6% - Administrative 2,4% - (other 7%)
QUALIFICATION VERSUS CURRENT POST	2,1% working above qualification. 63,9% working at qualification level. 33,9% working below qualification level.

Source: Primary Research Data.



**FEMALE ENGINEERS
IN SPAIN**

Female engineers in Spain - Current situation

Currently in Spain, the number of women completing university studies annually is greater than that of men. According to data provided by the Institute for Women this is a durable trend and also reflects a clear gender distribution in the different branches of education.

We found that in the fields of Engineering and Architecture only 28,47% of graduates in the academic year 2013-14 were women. In other fields of study the percentage of women completing university studies was superior to men in every field.

WOMEN STUDYING AT UNIVERSITY LEVEL AS A PERCENT OF TOTAL GRADUATES BY FIELD.				
ACADEMIC FIELD	2013-14	2012-13	2011-12	2010-11
TOTAL	58,01	57,27	57,58	59,15
SOCIAL AND LEGAL SCIENCE	63,71	63,40	63,83	66,24
ENGINEERING AND ARCHITECTURE	28,47	28,33	28,69	30,11
ARTS AND HUMANITIES	63,99	64,60	64,37	65,15
HEALTH SCIENCES	72,63	73,14	73,76	75,59
SCIENCES	55,43	56,95	58,61	59,57

Source: Women's Institute, based on data from University Student Statistics Ministry of Education Culture and Sport.

Differences in career orientation for different types of careers reflect a gender bias. Although we found some fields where the ratios are not as low; in the case of engineering studies, on aggregate the presence of women is very low. Specifically in the academic year 2013-14 the percentage of female students enrolled in Engineering and Architecture was only 26,14% of total enrolment. However, in other branches of university education the percentage of female students is slightly higher than that of men.

Only 26,14% of Engineering and Architecture Students in 2014 were women.

WOMEN ENROLLED AT UNIVERSITY AS A PERCENT OF TOTAL ENROLMENT BY FIELD				
ACADEMIC YEAR	2013-14	2012-13	2011-12	2010-11
TOTAL	54,38	54,23	54,07	54,35
SOCIAL AND LEGAL SCIENCES	60,35	60,61	60,75	61,53
ENGINEERING AND ARCHITECTURE	26,14	26,26	26,54	27,28
ARTS AND HUMANITIES	61,49	61,83	61,68	61,80
HEALTH SCIENCES	69,64	70,20	70,43	71,15
SCIENCE	51,59	52,58	53,61	54,75

Source: Women's Institute, based on data from University Student Statistics Ministry of Education Culture and Sport.

This has meant that the predominant sector in which male and female engineers work (the industrial sector) is composed mostly of men. This has made the industrial sector, and the working environment within this sector, very masculine.



The sector's characteristics, coupled with the preponderance of men in engineering positions, means that the levels of reconciliation of work and personal life are well below the levels in other sectors where there is a greater numerical equality between men and women in the same professional category or with equal qualifications. This is due to the fact that reconciliation measures are developed and promoted in businesses mainly as a result of demand for them by women. As a result, women in the field of engineering confront the relative lack of these measures more directly and this situation affects their social inclusion as well as the entrepreneurial variables critical to business success such as motivation, commitment, productivity, etc.

Next, we'll delve into some aspects that help us better understand the situation of female engineers in Spain.

“ The work sectors with a low female presence have lower levels of work-life balance. ”

Work - Life Balance

"The ability of individuals, regardless of age and gender, to find a rhythm of life that allows them to combine work with other responsibilities, activities and aspirations" (Felstead et al., 2002).

The lack of balance between work and personal life gives rise to so-called role conflict and happens primarily when the demands of time required to properly fulfil job responsibilities negatively affects the fulfilment of non-work responsibilities (family, leisure, professional training, etc.) or vice versa.

“ The lack of work - life balance has negative effects on businesses (hurts their results) as well as employees (dissatisfaction, anxiety, stress, etc.). ”

Companies are increasingly aware of the negative effects that role conflict generates on people (stress, anxiety, family problems, dissatisfaction with life, fatigue, etc.); and on company results (desire to leave the business, decreased commitment to the company, job dissatisfaction, lower productivity, worsening of the work environment, etc.). For this reason, companies are beginning to offer their employees the use of certain measures to help restore the balance of roles, or put another way, to reduce the intensity of role conflict.

Work-life balance practices are defined as "those practices (which the company makes available to employees) which improve employee autonomy in the coordination and integration of aspects of working and non-working life" (Felstead et al., 2002).

The research undertaken in this project has found that the main work-life balance practices used by male and female engineers are related to flexible time (flexible holidays, flexitime working hours, intensive workdays and hour exchanges).

“ The lack of balance between work and personal life leads to role conflict. ”

Conversely, the work-life balance measures least used by male and female engineers are those involving absence and salary reduction (unpaid leave, reduced working hours with reduced pay, sick days to care for sick or dependent children, etc.).

However, the analysis of users' work-life balance flexitime practices (flexible holidays, intensive workdays) shows that male engineers use these in greater proportion than female engineers, while work-life balance practises related to absences with salary reduction (absences to care for sick or dependent children and/or reduced working hours with reduced pay) are used more by female engineers.

This illustrates that it's mostly female engineers who make use of part-time contracts -- some 60,6% of the total number of sampled respondents with a part-time contract are women. As a percent of the total sample, 9,8% of female engineers have a part-time contract, while only 2,5% of male engineers are contracted part time.

“ 9,8% of female engineers have a part-time contract, while only 2,5% of male engineers have part-time contracts. ”

Use of time

"Having children is related to greater accountability for, and demand on time; so that families with more children are more likely to experience higher levels of conflict than small families or couples without children" (Innstrand et al, 2010; Mihelič and Tekavčič, 2014).

Next, we examine the data relating to the average daily time the female engineer and her spouse dedicate to both paid work and the care of children and home.

ALLOCATION OF TIME, FEMALE ENGINEERS AND THEIR SPOUSES			
	Female Engineers	Spouse	Difference
Average number of hours per day dedicated to childcare and domestic tasks	5 hours, and 56 minutes	3 hours and 45 minutes	+2 hours and 11 minutes
Average number of hours per day dedicated to remunerated employment	7 hours and 43 minutes	7 hours and 59 minutes	-16 minutes

Source: Research data.

We note that although female engineers spend only 16 minutes less than their partners at paid work, their dedication to childcare and domestic tasks is 2 hours and 11 minutes greater.

|| The greater the number of hours devoted to housework and child care, the higher the levels of work -family conflict in female engineers. ||

As such, the traditional role allocation between men and women1 persists and prevents the balanced distribution of tasks between the people who make up a household, that is, it prevents co-responsibility.

|| Female engineers are faced with low levels of co-responsibility on the part of their partners. ||

Unfortunately, this situation is a reflection of our society, in which the level of co-responsibility among men is far below what would be desirable, with most of the responsibility associated with family / household chores falling on women.

This fact means that female engineers suffer task overload, making them feel more stressed and overworked than men both in their professional activity and home lives. As a result, they 1 The man is the head of household and works to maintain it and the woman should occupy herself with childcare and the home. find it difficult to balance work and personal obligations, even with lower average working hours (Creade, 2001; Galinsky et al, 2001). This lack of balance between work and personal lives is the role conflict referred to above.

|| Time pressure related to dedicating time to both work and home increases the level of work-family conflict experienced by female engineers. ||

The negative effect of the lack of spousal co-responsibility is compounded by the fact that their fellow male engineers not only do not suffer from a lack of spousal co-responsibility; but, in turn, are not co-responsible in their own personal lives (i.e. prioritize their work role over the role of childcare and household). In this sense, male and female professional engineers "compete" under unequal circumstances.

ALLOCATION OF TIME; MALE ENGINEERS AND THEIR SPOUSES			
	Male Engineers	Spouse	Difference
Average number of hours per day dedicated to childcare and domestic tasks	4 hours and 4 minutes	6 hours and 39 minutes	- 2 hours and 35 minutes
Average number of hours per day dedicated to remunerated employment	8 hours and 36 minutes	5 hours and 30 minutes	+ 3 hours and 6 minutes

Source: Primary Research Data.

The average number of hours the male engineer dedicates to the care of children and home is 2 hours and 35 minutes less than the time spent by their spouses. In turn, the male engineer spends a daily average of 3 hours and 6 minutes more dedicated to paid work than his partner.

So, if we compare the respective average daily time allocation of female engineers and their male counterparts, we can see that male engineers spend 53 minutes more per day on paid work than female engineers, and 1 hour and 52 minutes less per day dedicated to childcare and domestic tasks.

This difference of 53 minutes does not contribute to a reduction in the intensity of work-family conflicts for female engineers due to two factors. First, the conflict is intensified by work pressure (fulfilment of professional obligations in less time than their male counterparts); and, second, because when she is not at work she is working at home (and thus spends over 1h. 52 minutes more than male engineers on housework and childcare).

“ Female engineers' personal and professional lives will be conditioned to a great degree by the lack of co-responsibility and comparative recompense (in the use of time) suffered by the female engineer in relation to her male counterparts. ”

ALLOCATION OF TIME, MALE AND FEMALE ENGINEERS			
	Female Engineers	Male Engineers	Difference
Average number of hours per day dedicated to child care and domestic tasks.	5 hours and 56 minutes	4 hours and 4 minutes	1 hour and 52 minutes
Average number of hours per day dedicated to paid work.	7 hours and 43 minutes	8 hours and 36 minutes	53 minutes

Source: Primary Research Data.



Career Development

Based on the analysis of the data provided above, one would expect a very negative impact on the careers of female engineers as they would not be considered for project leadership positions, promotions or raises, prizes or incentives, etc. However, when analysing the distribution of male and female engineers by professional category, we still see female engineers in visible positions within engineering companies. We do not see a negative effect on female engineers' career development in companies. This, despite less time devoted to paid work, their greater use of part-time contracts and those work-life practices involving absences and salary reduction. However, we observe a slight disadvantage in female presence in upper management positions; and, as a percentage of their population, a higher proportion of women in technical and administrative positions compared with male engineers.

“ No significant gender differences can be observed in career progression of engineering in companies. However, small differences put women at a disadvantage compared to men in relation to positions of leadership and responsibility. ”

If we analyse the aggregate data we see a proportion similar to that found in the registration data for engineering studies (between 26% and 27%) and to the composition of the study sample (72,7% men and 27,3% women). We can see that the distribution of male and female engineers by professional categories does not differ too much. While male engineers in the professional technical categories above total 39,7% of all male engineers; the female engineers in the professional technical categories above total 31,8% of all female engineers. For example, we observe that 76,2% of senior management or management positions are occupied by male engineers, while 23,7% of such posts are occupied by female engineers.

GENDER COMPOSITION OF RESPECTIVE PROFESSIONAL CATEGORIES (AGGREGATE DATA).		
	Female	Male Engineers
Upper management or management	23,72%	76,27
Department, section or unit management.	19,16%	80,33%
Head of section, unit or shift.	22,88%	77,18%
Associate Engineer	27,23%	72,76%
Administrative Post.	45%	55%

Source: Primary Research Data.

“ The distribution of male and female engineers by professional categories does not differ greatly. ”

In relation to department, section or unit management positions, the gap between female engineers and male engineers is greater. In this case some 80,3% of these posts are occupied by male engineers, and 19,1% of these posts by women.

In the professional category of head of section, team or shift, 77,1% of the posts are filled by male engineers and 22,8% by female engineers. In the category of Associate Engineers 72,7% and 27,2% respectively.

DISTRIBUTION OF MALE AND FEMALE ENGINEERS BY PROFESSIONAL CATEGORY		
	Female Engineers (as a percentage of total Female Engineers)	Male Engineers (as a percentage of total Male Engineers)
Upper management and/or management.	6,9%	7,6%
Department, section or unit management.	11,4%	16,5%
Head of section, team or shift	13,4%	15,5%
Associate Engineer.	63,6%	58,3%
Administrative post.	4,4%	1,8%

Source: Primary Research Data

Number of children

Finally, an analysis of the the average number of children reveals that while male engineers have an average of 0,86 children, female engineers have an average of 0,76 children. This figure is far from the birth rate required to ensure generational replacement.

“ The female engineers who reach the top in their professional careers do so by sacrificing their family life, something that does not happen with male engineers. ”

At the aggregate level, the data for children among female engineers is slightly lower than those for male engineers. This may suggest that career development among female engineers demands greater family sacrifice than for male engineers.

In addition to the above, if we examine the professional category "senior management" the data illustrate an even sadder reality. In the sample obtained, a male engineer who holds a senior management position has on average 1,3 children, while a female engineer holding senior management position has an average of 0,57 children. This could indicate that to progress professionally, women are giving up a full family life, something that does not happen to their male counterparts.

“ To reach senior management positions female, not male engineers have to sacrifice having children. ”

This result is consistent with the literature, which states that women are postponing marriage and children in order to consolidate their professional careers beforehand. In addition, MacInnes (2005) states that 25% of couples have fewer children than desired due to the difficulties of coordinating their work with childcare.

Therefore, in general, limited co-responsibility and the lack of a culture of reconciliation of work and family life in Spain has negative consequences for society. For example, the country has one of the lowest birth rates in the European Union. Additionally, it should be noted that existing barriers to female engineers' professional development has costs for society as a whole; the investment in training and preparation of this human capital and its underemployment supposes a significant loss of talent (Olga Pons-Peregort et al., 2013).



Wage gap

The research findings indicate that although female engineers occupy professional positions similar to male engineers, there is wage gap between them.

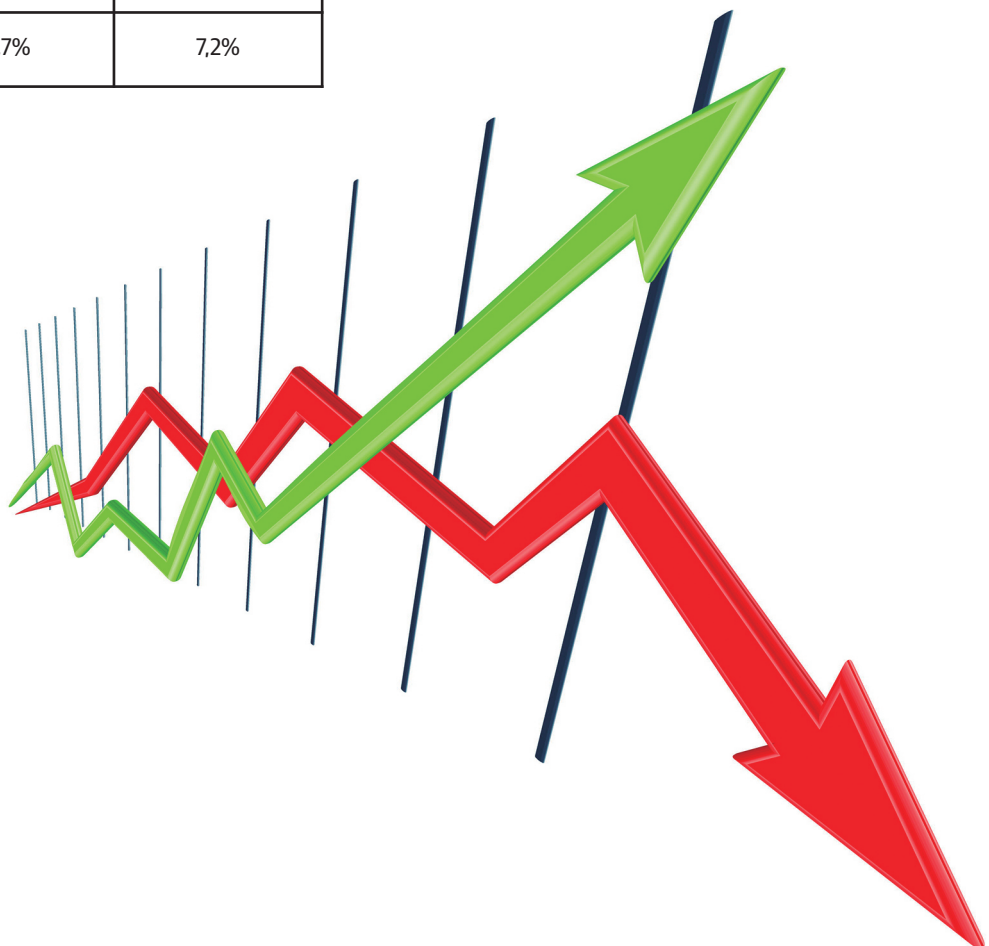
One would expect that female engineers in positions of a similar professional category to male engineers would have a similar monthly salary. Unfortunately, aggregate data gathered in the research does not confirm this. Instead, the data show that the average salary level of female engineers is lower than male engineers for Department, Section or Unit Managers and Associate Engineers.

As we have seen in Table 7, the people included in the categories of Department, Section or Unit Management and Associate Architects categories represent a total of 74,8% of the sampled male engineers and 75% of sampled female engineers. Since the study data indicates that there is statistical evidence of a wage gap, we could deduce that 75% of female engineers are paid less than their male counterparts.

75% of female engineers are paid less than their male counterparts in the same professional category.

NET MONTHLY REMUNERATION		
	Female Engineers	Male Engineers
<1.000 €	9,7%	5,4%
1.000€ - 1.999 €	68%	58,6%
2.000€ - 2.999 €	20,4%	28,7%
>3.000 €	1,7%	7,2%

Source: Primary Research Data.



Fitness for Position

"Job fitness refers to the essential and desirable skills that are required for people to successfully perform their job" (Erdogan et al., 2011).

According to various authors, when there is coherence between a worker's skills and job demands there is a positive impact on company performance (Saravanabawan and Uthayatharshika, 2014).

“ Low job fitness increases the desire among male and female engineers to quit their jobs. ”

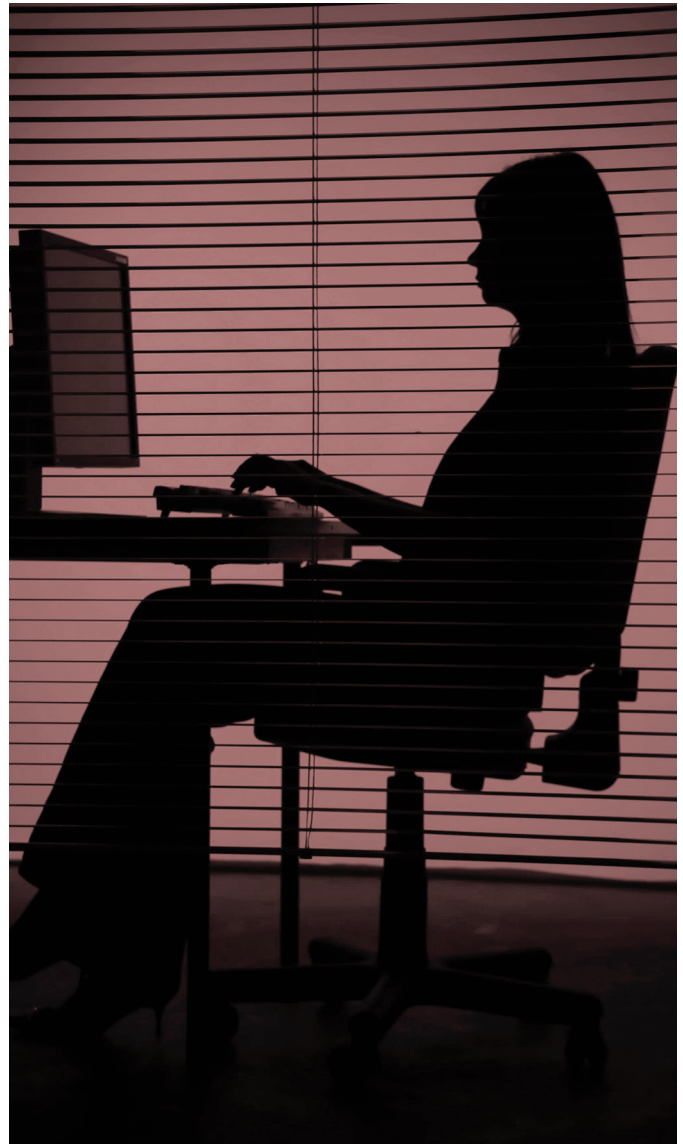
Nevertheless, this project's research data show that 36% of respondents do not feel that their job is appropriate to their skills (2,1% feel that their work exceeds their qualifications and 33,9% feel that their work is below their qualification).

The research project's data confirm that over-qualification in the workplace affects both male and female engineers. Based on the data, we can say that over-qualification in the workplace is associated with a greater desire to leave the company, less commitment to work and lower career satisfaction.

“ Both over-qualification and under-qualification for a given job reduce the level of commitment of both male and female engineers to their companies. ”

Overqualified workers will feel undervalued and underpaid (Feldman, 1996), which negatively affects their perception of career satisfaction. If employees are overqualified, they can easily get bored with their jobs (Peiró et al., 2012), and this decreases career satisfaction.

“ Failure to adapt to the job generates greater dissatisfaction with the career of engineers and engineers. ”



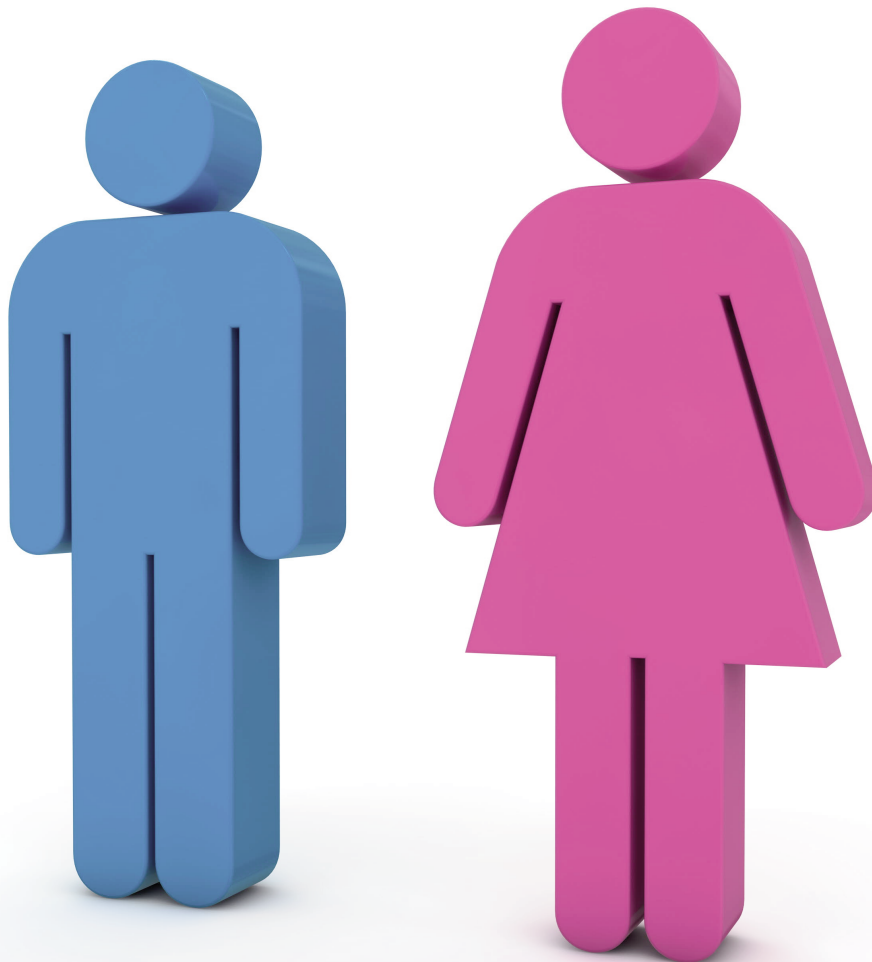
Since one of the objectives of Human Resources management is proper career monitoring that permits employees to be working in posts for which they are appropriately qualified, qualifications for current employment positions is one of the variables to consider in the analysis.

Conclusions from the analysis of female engineers' current situation in Spain

The consequence of all this translates into a very discouraging outlook for female engineers; since, in order to develop a full career on an equal footing with men, female engineers are often forced to give up a significant part of their personal and family goals. While it is true that the scenario is the same for male engineers, it is also true that in our society, the level of coresponsibility of men is far below what would be desirable, with most of the responsibility associated with household and domestic tasks falling to women.

“ The outlook for female engineers is discouraging since, to develop a full career on an equal footing with men, they are required to give up a significant part of their personal and family goals.

”



This very evident social reality, together with the lack of successful women of reference in this professional field, has the effect of discouraging many women from pursuing careers in engineering and orienting their training toward other fields.

“ The messages of low job satisfaction and high personal sacrifice on the part of female engineers are some of the reasons that make engineering careers less attractive career options among women. ”

We are therefore faced with a situation in which highly trained professionals who develop their career in a demanding and competitive environment obtain professional promotion at almost an equal rate to their male counterparts. However, the conditions under which they develop their careers are not the same as those of men. Female engineers spend, on average, 53 minutes less at paid work; suffer wage inequality, low levels of co-responsibility at home and make a greater sacrifice in their personal lives (often forgoing motherhood) to be able to progress professionally.

Thus, society and particularly women receive the messages of job dissatisfaction and high personal sacrifice which, coupled with the high demands and commitment required by engineering studies, make engineering careers less attractive options among

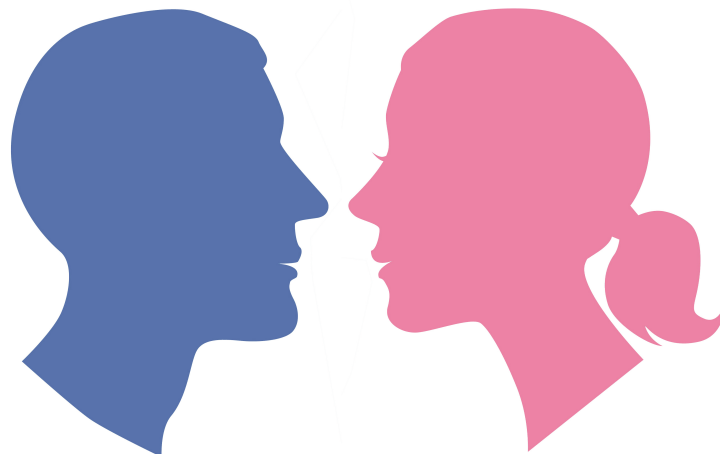
women. In conclusion, it is not surprising that after conducting research we can say:

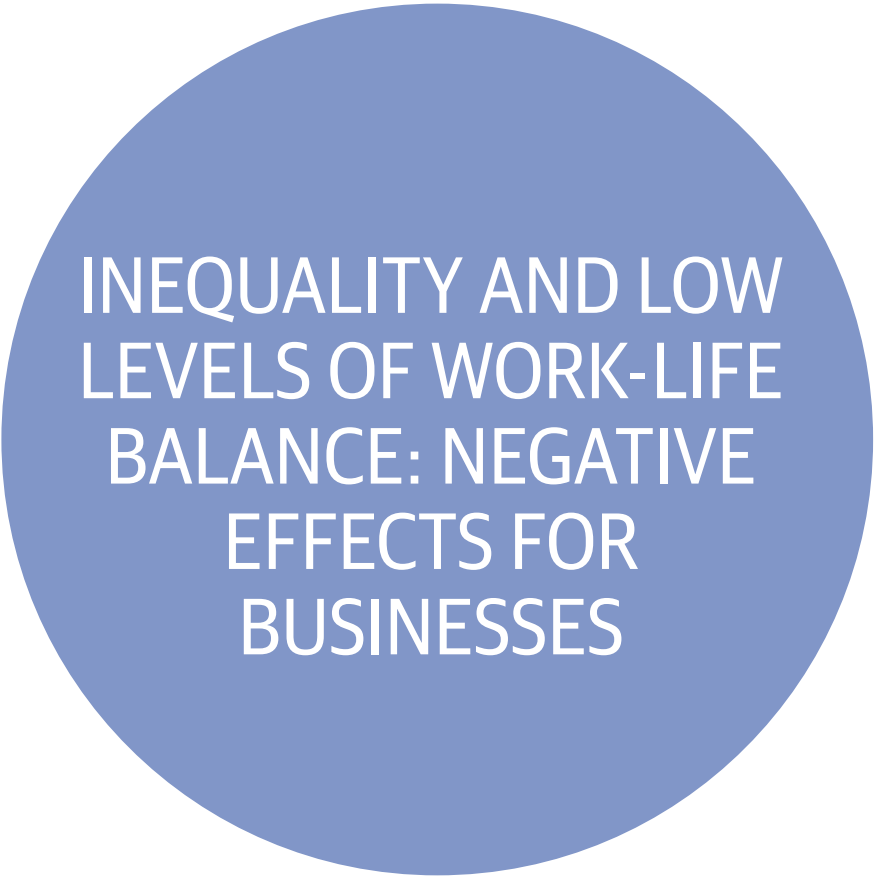
"Job satisfaction among female engineers is lower than among male engineers".

"Female engineers have a more negative perception of the labour market than male engineers."

"Female engineers' level of personal wellbeing is lower than male engineers".

This research has allowed us to determine the main measures that can be taken to reverse this situation. We present these measures in this document in order to raise awareness. We also want to inform management teams, human resource managers, engineering professionals and society in general how, through a culture of support for the reconciliation of work and personal life, economic and social value is generated via improvements in competitiveness and the creation of quality jobs.





INEQUALITY AND LOW
LEVELS OF WORK-LIFE
BALANCE: NEGATIVE
EFFECTS FOR
BUSINESSES

We might think that the situation described above only has negative consequences for female engineers and their families. If that were the case; society, governance and the private sector -- motivated by the existence of an unacceptable situation of social injustice -- should react urgently to correct this situation.

However, the negative consequences of this unjust situation directly affect society as a whole (including the state, enterprises and national economy)

■ The research conducted reveals a situation that affects a very specific professional group. But it reflects a situation which, according to numerous investigations, occurs widely in Spanish society. ■

The weak culture of work-life balance as well as the low levels of co-responsibility in Spain causes women to delay having children, or to have fewer children than they might otherwise. As a consequence, Spain has one of the lowest birth rates in Europe, jeopardizing generational renewal. This will have dramatic consequences since, if it's not addressed, will mean living in a country with a large elderly population where social security contributors may not be able to maintain our "welfare state".

One need not look even to the "near future" to be alarmed. Currently, highly trained women who bring great value to the business community and our economy are systematically "expelled" from the labour market in Spain. Professional women are forced to leave or "park" their professional careers to care for children and the home, as a result of low levels of coresponsibility and work- life balance. In our opinion, neither the companies nor our economy can afford to lose this talent.

From the perspective of a company, the negative consequences have been extensively studied and proven in countless studies which can be found by reviewing the scientific literature.

In the particular case of this research, we have also obtained empirical evidence of the negative effects on companies which arise from the situation that female engineers are subjected to. These adversely affect business performance through variables critical to human resource management such as the desire to leave the company, levels of commitment to the company and the career satisfaction of female engineers.

Below, we these highlight the relationships identified in this study in greater detail.



WORK – FAMILY CONFLICT

"A form of role conflict in which the overall demand for time spent at work and the tension created by the workplace interferes with the ability to adequately meet personal or family responsibilities and vice versa" (Netemeyer et al., 1996, p. 401).

The literature indicates that this conflict works two ways. On the one hand, work-life conflict is rooted in work and affects the private sphere (e.g. leaving work late means the employee cannot help their children with homework). On the other hand, the domestic sphere can affect the company (e.g. a doctor's appointment for a sick child causes one of the parents to be absent from work).

From the business standpoint, it makes sense that companies prioritise work-family conflict since trends indicate that it is actually going to have an impact on organizations. However, recent research has shown that the aspects of work-family conflict suffered by people eventually affect businesses through the so-called Boomerang effect (Sanchez et al., 2011).

Reduction in Work- Life Conflict:

- Improves Commitment.
- Reduces personnel turnover.
- Generates Greater Job Satisfaction.

As such, reducing role conflict is key to improving the human resource variables above. If companies are able to meet the needs and expectations (of female engineers and male engineers) they will attract and engage the best professionals; achieve increased productivity and performance (Greenhaus et al., 1990; Igbaria, 1991), reduce staff turnover (Laschinger, 2012) (and save the cost of replacing employees) and improve service because of greater worker satisfaction, commitment and success. Thus, employees become sources of competitive advantage (Aryee and Chay, 1994).

In our research, we have seen how work-life conflict experienced by female engineers affects three fundamental variables of human resource management:

- Desire to leave the company, staff turnover.
- Level of commitment to the company.

- Career satisfaction.

1.- The reduction of work-life conflicts diminishes female engineers' desire to leave their company.

The desire to leave the company is a variable that has received a lot of attention in research in recent years since it is key for the retention of talent. Although staff turnover can be positive because it helps to bring new knowledge to companies; when turnover rates are very high they can reduce organizational efficiency. The costs of employee turnover include: the loss of knowledge and know-how, costs associated with the reassignment of existing employees and their tasks after an employee leaves; employee error, unattended areas. Other costs include those associated with the recruitment and selection process of new candidates, the training and the adaptation period of new workers where they do not perform optimally (Gray et al. 1996).

2.- The reduction of work-life conflict increases female engineers' commitment levels towards the company.

Company employees' commitment is a fundamental variable from a business standpoint.

Specifically, this commitment means that the workforce has a positive feeling about the company, is more loyal to the organization, feels proud to be a part of it, and would be willing to do more to achieve business goals. Consequently, when a company has highly committed workers they are more predisposed to work hard to achieve the goals set by management and feel more connected and loyal to it.

In addition, according to Iverson and Buttigieg (1999), high levels of employee commitment result in low rates of absenteeism and turnover, employees accept changes positively and strongly adhere to the objectives and values of the company (Mowday et al. 1979), achieving better results (Mathieu and Zajac, 1990).

■ ■ A committed workforce performs better. ■ ■

Conversely, low levels of organizational commitment or feeling emotionally exhausted by their work makes employees likely to seek another job and leave the company with the intention of improving their job and professional satisfaction.

3.- The reduction of the work-life conflict generates greater career satisfaction among female engineers.

Greenhaus, et al. (1990) define the concept of career satisfaction as "The balance that individuals expect from their professional development and advancement through jobs and the overall achievement of their professional goals."

According to research by Mignonac and Herbach (2003), one of the most important goals in companies with engineering professionals in their workforce is to design a career management system adapted to a flexible workforce. This system must satisfy career values and aspirations of engineers, as well as allowing the company to achieve important organizational results derived from career satisfaction, such as productivity and flexibility, among others.

■ Career satisfaction has a positive impact on employee performance. ■

At the individual level, engineers improve their performance at work through satisfaction, commitment, reduction of stress at work, etc. Therefore, career satisfaction has an influence on employee performance especially in professional posts as well as in the performance of an organization which confirms its business relevance (Mignonac and Herbach, 2003).

These benefits justify company investment in career development for human resources as a way of obtaining competitive advantage; especially in organizations that carry out engineering activities. Thus, firms that provide adequate training and motivation in order to generate better performance and increase lateral or upward mobility (Mignonac and Herbach, 2003) improve engineers' ability to change, stay up to date and improve.

In this research we have seen that those engineers - both male and female - who reduce their work life conflict improve their desire to remain in the organi-

zation, increase their commitment and their career satisfaction.

■ These data demonstrate that work-life balance measures should not be oriented to women only, men also need and value them since role conflict affects key variables of organizational behaviour (desire to leave the company, commitment and career satisfaction). ■

In addition, according to the literature, offering work - life balance measures for men is one of the keys to achieving greater equality of opportunity in the workplace, since men will have more options for increasing their co-responsibility at home.

■ Male and female engineers who reduce their work-life conflict, improve their desire to remain in the organization, increase their commitment and career satisfaction. ■



SUGGESTIONS

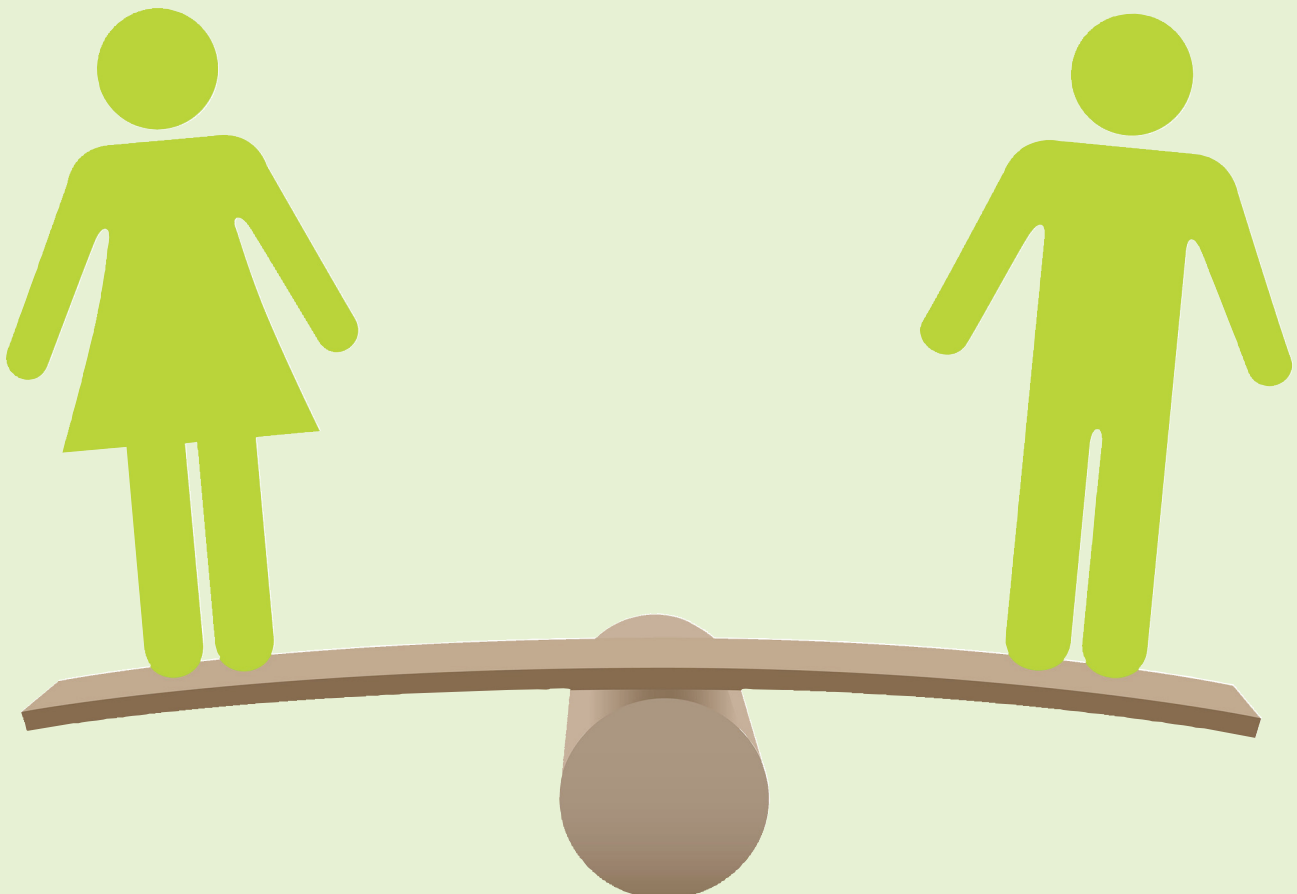
MEASURES TO ACHIEVE GREATER GENDER EQUALITY IN ENGINEERING.

Within the scope of this study, achieving greater gender equality implies working to reduce the intensity of the role conflict that female engineers currently experience.

As we have seen, low levels of co-responsibility, remuneration inequality and a weak culture of work-life balance are some of the reasons that help us to understand the difficult situation facing female engineers in Spain.

Next, we propose some measures that contribute to the achievement of greater gender equality in engineering.

It should not be forgotten that men in engineering suffer from greater levels of role conflict than men working in other sectors since the percentage of women in a sector indicates the development and implementation of work-life balance practices in companies. For this reason, taking steps - and changing values - aimed at increasing the benefits of work-life balance measures for both women and men in sectors where there are fewer female employees will result in improvements in the redistribution of time and work for both genders. Overall for dual-income couples, since gender co-responsibility is fostered through a more equitable sharing of household tasks.



WORK – LIFE BALANCE MEASURES

Encourage the use of work – life balance practices among engineers.

The first recommendation deriving from the research is the need to encourage the use of worklife balance practices for all engineers.

These practices can be key to reducing the intensity of the level of role conflict, increasing career satisfaction, commitment to work and reducing the desire to leave the company. Additionally, allowing a balance between work and personal life will permit female engineers occupying the highest professional categories not to have to give up motherhood, as indicated by the data obtained in this study.

■ ■ If the aim is to achieve gender equality, work-life balance practices should also be geared to male engineers. ■ ■

Although work- life balance measures should be directed to all company employees, regardless of whether they have family responsibilities or not, when making recommendations, we place special emphasis on families due to the strong impact they have on female engineers' time – obliging them to fulfil the responsibilities of family and domestic care.

Therefore, it is important to emphasize that company management should not conceive the reconciliation of work and personal life practices solely to help mothers who have to take care of their children (Fleetwood, 2007). Rather, the objective must be that these work- life balance practices are oriented towards families – mothers and fathers -- so that in the family sphere, domestic responsibilities can be attended to equally (housework, children, other dependents, children's education) (Olga Pons-Peregort et al., 2013).

Obligatory paternity leave with a similar duration to maternity leave.

Secondly, we recommend establishing mandatory and non-transferable paternity leave for men with a duration similar to that assigned to women.

Various studies have shown how increasing paternity leave allows parents to take equal responsibility from the birth of a child, taking on a series of work-sharing patterns in couples that become permanent over time, increasing co-responsibility (Mundy, 2013, Ladge et al., 2015, p.166).

■ ■ The sharing of family responsibilities between men and women from the birth of a child enhances present and future co-responsibility, as well as equal opportunities in the world of work. ■ ■

Another advantage of promoting paternity leave in Spain would be to reduce the penalty that women suffer in the labour market as maternity affects their access to employment and is seen negatively in business as a possible source of problems (absences, delays, etc.).

The sharing of family responsibilities between men and women from the birth of a child enhances present and future co-responsibility, as well as equal opportunities in the world of work. It is therefore not surprising that countries such as Iceland -- where equal, nontransferable birth leave periods for women and men are established – has one of the highest rankings in the Gender Gap Index (the indicator of reference for gender equality), (Global Gender Gap Report, 2014).

■ ■ Mandatory and non-transferable paternity leave with a duration similar to that of maternity leave. ■ ■

Flexitime and Adaptable Schedules

There is another series of work life balance measures that reduce role conflict and promote balance between professional and personal lives. Among the multitude of work- life balance measures, flexitime practices are most notable for their beneficial effect on workers and their low organizational costs.

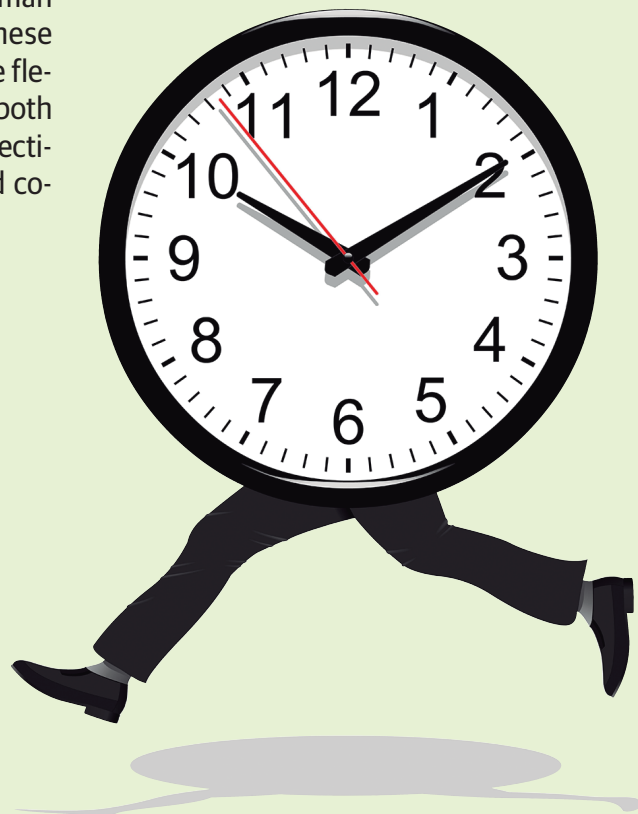
We highlight flexitime (allowing some autonomy in fixing working hours), annual hours (fixing a few hours of work a year with flexibility in their time distribution) or the compressed working day (which allows grouping working hours, reducing time for lunch and allowing free time in the afternoon).

■ ■ Some of the measures that have the most beneficial effects for workers and companies include: flexible hours, annual hours, compressed workdays and adaptive scheduling. ■ ■

Based on this research we believe that Human Resource departments should encourage these types of measures above others since the simple flexibility and rationalization of work schedules for both male and female engineers is one of the most effective practices for improving worklife balance and co-responsibility.

Although we also find other work- life balance practices which reduce the intensity of role conflict in female engineers, such as flexible space practices (combining face-to-face work with working from home via telework).

Regarding work time reduction measures, as we have seen above, female engineers use them in greater proportion than their male counterparts. One desirable trend would be for male engineers to increase their demand for these types of measures or that female engineers decrease their use. This would indicate a higher level of co-responsibility on the part of men.



A CULTURE OF SUPPORT FOR WORK-LIFE BALANCE.

"Shared assumptions, beliefs and values with which an organization supports and values the integration of work and family life of their employees" (Thompson et al., 1999).

According to different studies, a culture of support for work-life balance is essential to ensuring that staff use work-life balance practices in companies without fear of professional reprisals.

■ The existence of a culture of support for work-life balance in a company reduces the level of work-family conflict among female engineers. ■

A culture of support for work-life balance has several benefits for the workforce: it improves their quality of life and levels of satisfaction, increases motivation and commitment (Allen, 2001; Hughes and Bozionelos, 2007; And Krone, 2002), and even improves employee health (Hammer et al., 2011). As a result, benefits are also generated for organizations, such as the retention of skilled workers (Cappelli, 2000), knowledge creation and exchange, cost reduction through productivity and efficiency improvements (better service to clients) and an increase in profits (Hughes and Bozionelos, 2007).

■ The culture of support for work-life balance is the tool that facilitates agreement with and corresponding application of work-life balance practices. ■

As such, the existence of a supportive culture for the use of work-life balance practices when necessary is essential to avoiding guilt, uncomfortable situations and or discrimination against male or female engineers who choose to use work-life balance practices.

Workers tend to experience a lower level of work-family conflict when they believe that their organization is supportive to families (Lapierre et al., 2008).

■ The measures applied in each company must be the result of an in-depth analysis of the reality of each company and of the people that it comprises. ■

However, although a culture of support for work-life balance practices is fundamental, it is also very difficult to achieve in a company since, in very masculine sectors, there is a great lack of awareness about work-life balance issues. Again, it is essential that support for work-life balance is manifested toward the male staff. That is, the first step should be to work in order to generate a favourable culture towards the work-life balance for men and women.

This proposal must be led and encouraged by company management, since it should drive a change of culture. It must be proactive, actively involved and communicate actively with its workforce.

Fortunately, in Spain we are seeing how big industrial companies are leading very interesting initiatives in this area. These initiatives are providing them with significant economic results and enormous competitive advantages derived from having a satisfied, motivated, committed and highly productive workforce.

■ Management's attitude towards work-life balance is a key factor in the existence of a culture of support towards these practices. ■

However, small and medium-sized enterprises must also face the challenge of adopting a culture of support for work-life balance, since in SMEs, the poor retention of talent can have a devastating effect on their competitiveness. Therefore, management's attitude towards work-life balance practices is a key factor in supporting and promoting a work-life balance culture in small organizations (Cegarra et al., 2012).

In order to generate a culture of conciliation originating from company management to the rest of the organization, management can begin by transmitting its interest among its closest collaborators and by training all staff in this material. This is achieved through the organization of seminars and workshops aimed at all workers (including, of course, management positions) where work-life balance

problems are explained and the work-life balance practises available in the organization are offered and publicized so that male and female engineers can reduce the intensity of their work- life conflict.

In our view, the availability of work-life balance measures in a company must respond to the specific needs of the people within that company. That is to say, there are no standardized solutions that apply to every company. Rather, the measures applied in each company must be the result of a deep analysis of each company's reality as well as those of the people that it comprises..



COMPENSATION EQUALITY

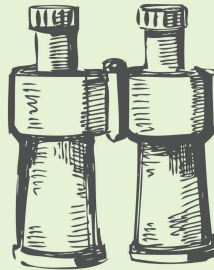
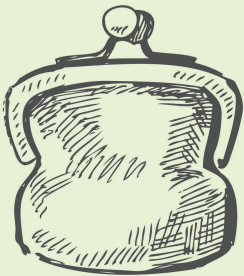
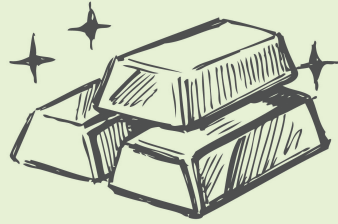
Companies' Human Resource Departments must be aware of the importance of establishing a fair, widely-known and well-enforced compensation policy.

“ Companies must guarantee a fair compensation policy and avoid gender wage gaps. ”

The analysis of internal and external compensation equity is one of the measures to be promoted in organizations. In order to achieve equitable internal compensation, professional unbiased analysis of the contribution of each position in the company to the overall company objectives and goals are assessed. The specific factors (knowledge, skills, experience and attitudes) required for each job should also be included in such an analysis.

The pursuit of transparency as one of the objectives of business excellence will also help reduce the current wage gap between men and women in engineering. A clear and public wage policy must be communicated and promoted within organizations.







CONCLUSION

CONCLUSION

The proposed objectives of this research project were a diagnosis of the state of gender equality in the field of professional engineering because of its great value from the point of view of human capital. Furthermore, to promote and encourage necessary solutions to ensure that female engineers can fully satisfy their professional needs without giving up personal and/or family goals.

Data collection was carried out nationwide with a final sample of 846 respondents. Satisfactory scores on both reliability and validity scales for the sample has allowed us to conduct solid analysis and draw firm conclusions about the group studied.

We found that the percentage of female engineers reaching senior management positions is similar or slightly lower than that of male engineers. However, they do so at the expense of giving up an important part of their personal and family life (renunciation of motherhood for women in senior management posts), Female engineers pay a high price and experience comparative unfairness since male engineers do not sacrifice having children to reach senior management positions.

Lack of co-responsibility also puts pressure on female engineers to reduce their paid work time and increases their working time at home. This means that female engineers experience greater role conflict; a reduction in career satisfaction a more negative perception of the labour market, as well as feeling greater pressure at work and lower levels of well-being overall. Added to these factors is the fact that 75% of female engineers are earning less money than male engineers for similar work (a wage gap in the category of associate engineer and the category of department / section / unit head).

Given this situation, work-life balance practices, and real support for them through an organizational culture which favours them, emerge

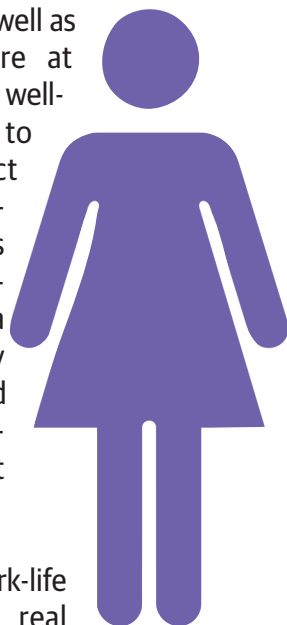
as potential solutions to this problem. Worklife balance practices allow female and male engineers to improve their distribution of working time, promoting harmony between the professional and personal aspects A key aspect in this regard is orienting work-life balance practices towards both women and men; since, if we pursue gender equality in the workplace, both female and male engineers should benefit from these practices.

At legislative level, initiatives such as mandatory, non-transferable paternity leave of a similar duration to that of women is crucial for the sharing of family responsibilities. Co-responsibility from the birth of a child is more egalitarian, improving present and future co-responsibility and as a consequence, equality of opportunity in the working world. In this way, women will not be penalized in access to employment and career advancement because of maternity.

Furthermore, from the point of view of Human Resource Management, it should be assumed that work-life balance practices improve equality in the company while they have a positive impact on the values of vital importance to organizations such as commitment to the company, job satisfaction and desire to remain with the organisation.

The road to achieving equality that lays ahead is still long and difficult. Equal opportunities in engineering must be based on full awareness of the problem at the levels of national government and company management.

These two actors should promote and encourage work-life balance measures and change the values that surround these practices. Only by reducing role conflict and promoting equal working conditions for engineers will we be able to achieve greater equality and efficient management of human talent.





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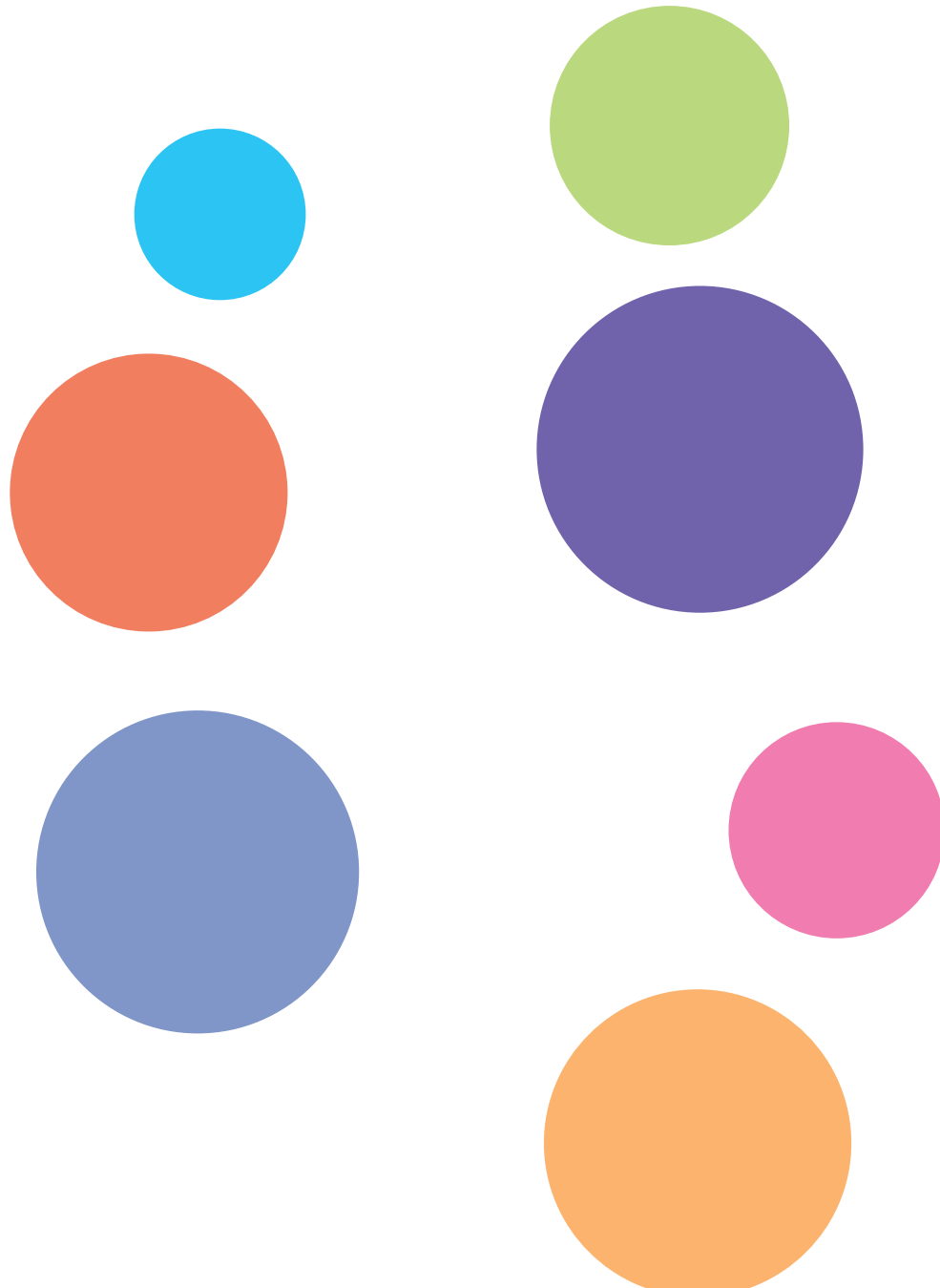
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