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# STATUS OF WOMEN IN THE IT BETWEEN 2000 -2014

Literature review

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## Abstract

*The 20<sup>th</sup> century was marked by the revolutionary IT industry, reaching billions of dollars in annual revenues. The following article hankers after approaching the IT developing sector from the perspective of women inequity in a man dominated industry. This research describes both the legal and illegal aspects of women implications in the IT industry during the 2000-2014's, focusing on the United States, Eastern Europe and India as local coordinates. Combined, these regions count for the three largest IT outsourcing markets in the world. The analysed period of time refers to the worldwide boom of the “dotcoms” at the end of the 20<sup>th</sup> century until the current year. The authors aim to describe the evolution of employed women in the IT industry and the status of women who are victims of cyber bullying and terrorism or, on the contrary, the ones bullying.*

*As a result, cyber bullying stands for a main concern nowadays, with women often being bullied over the Internet, or easily becoming victims of identity theft. Women also face an unequal position to men in the IT industry across the studied regions.*

## Introduction

The 21<sup>st</sup> century is seen as the world of speed, information, and, above all, the world of high technology. With IT companies gaining world revenues of around 0.8 trillion USD per year, it comes as no surprise that millions of workers seek their own fiscal paradises under the umbrella of large international IT companies. Giants like Google, Deloitte, PricewaterhouseCoopers and Amazon gained annual revenues larger than most world countries' GDP: in 2013 Google reported revenues worth 59.83 billion USD and PricewaterhouseCoopers counted for 34 billion USD (Statista, 2013). IT degrees are sought more than ever as a promise to a land of high salaries and bilateral motivational packages. But even under these circumstances women continue to step aside from the big IT&C pie, counting for less than 30% in the total number of global workers in the tech sector (European Commission, 2013). Moreover, lack of equal high education chances, preconceptions and gender inequalities determine women to have an entirely different dimension of the IT sector in particular and the tech industry in general. As a result, although the raw number of women and men using the Internet is similar, most women only see the Internet and the tech industry in particular as a means to staying in touch with friends and relatives, seeking potential love matches on matrimonial websites and purchasing goods. On the other side, men are more anchored in reality, keeping in touch with IT novelties and job opportunities, leaving leisure Internet-related activities aside.

## Theoretical background

The computing field is presented to children, from early stages of their lives, as male territories. At each step, from early childhood through college, computing is both actively claimed as "guy stuff" by boys and men, and passively ceded by girls and women. Careful observation shows that disinterest and dissatisfaction are neither genetic or accidental, nor inherent to the field, but are the bitter fruit of many external influences (MIT Press 2003). Although women surf the Web in a similar percentage as men and lead the market of online purchases, few of them are actually involved in the design and creation of new technologies. It is mostly men whose perspectives and priorities inform the development of computing innovations.

The burning issue in this field is the lack of reliable data on the figures of women activating in technical positions. The governments have the data but they refuse releasing it publically. Similar, most of the big companies deprive institutions and researchers of relevant data. The main reason behind this strategy could easily be a PR nightmare for the companies in question if they were shown not to respect gender equality.

The available data on tech and gender is delicate because, regularly, the organizations (i.e. US-centric data from the National Centre for Women and Computing and the Anita Borg Institute) do not differentiate between various departments and roles within organizations: A woman in the HR department at Cisco will typically be counted as a "woman in the computing field", whereas a woman software engineer at an investment company will not. It is for this cause that NCWIT suggests women hold more than 25% of "computing occupations", whereas Tracy Chou, a software engineer, collected data on how many women engineers work at 84 different tech companies (To collect the data, company employees have been performing internal head counts, and most contributors have identified themselves openly, though Chou invites anonymous submissions via email. Contributions have also come from people who are manually counting the number of women on companies' team profile pages. Chou has focused her efforts on women engineers, defined as "women who are writing or architecting software, and are in full-time roles.") and concluded with strikingly different results. According to her study, while smaller companies have 50% or more women in their teams, bigger companies tend to hire a lower percentage of women (Bacon, 2013).

It is generally accepted that the pipeline in computer science continues to be a big issue. In the United States, for instance, not enough girls are taking Math and Science classes in elementary school. Even fewer are enrolled in computer science classes later, when they reach high school. By the time they enrol into college, women will count for less than 12% of the total number of persons graduating with Computer Science majors. The number of Bachelor's degrees in computer science, awarded by U.S. schools, increased by 10.5 percent in the 2010-11 academic year. Total PhD production in computing programs remained steady in 2010-11, with 1,782 degrees granted (Zweben, 2012). In Europe, the region with the largest number of women enrolled in STEM degrees is the Eastern side. Only 8.13% from 56% women in tertiary education in Eastern Europe (2011) enrolled in a STEM (Science, Technology, Engineering and Mathematics) degree, and that counts for the highest score. The situation is even more pessimistic in the Benelux and Baltic regions (UNESCO, 2011). As only a small fraction of high school and college computer science students are females, the field is likely to remain a male territory without major changes in the near future. From 1000 women holding a bachelor degree in the UE 27, only 29 hold on to a degree in IT (compared to 95 men). Out of these 29 women, only four actually get to work in the ICT sector. Statistics show that only 19.2% of the ICT-sector workers

have female bosses, compared to 45.2% of non-ICT workers (Bezuhanova, 2014).

While companies do talk about their initiatives to make the work environment more female-friendly, or to encourage more women to pursue a career in computing or to remain faithful to it, there is no way of saying whether they are successful or worth mimicking since there are no success metrics attached to any of them.

Female participation in the ICT sector is higher in Southern (35.6%) and Eastern Europe (34.3%) than in Western (29, 4%) and Northern countries (28.6%) (Southern Europe: Southern: Greece, Spain, Italy, Malta, Portugal, Slovenia ; Eastern Europe: Bulgaria, Hungary, Poland, Romania, Slovakia (Czech Republic not included in the original data sources) ;Western Europe: Belgium, Germany, France, Luxembourg, Netherlands, Austria, Switzerland ,Northern Europe: Northern: Denmark, Estonia, Ireland, Latvia, Lithuania, Finland, Sweden, UK - according to European Commission, 2013). Historical and cultural issues seem to represent the predominant reason for variations across Europe. For example, the socialist era has left a powerful imprint on Central and Eastern European countries, particularly with regards to the inclusion of women in the labour market. State socialist societies have gone further than most Western welfare states in expanding the female role beyond that of a family caregiver, encouraging women to join the labour force. They even militated for women's economically independence, and for them to actively participate in society, outside the private sphere. However, social policy goals have been inclined primarily to satisfy the extensive demand for labour, while ideas about women's emancipation have played a subordinate role. Conservative Western states were encouraging a traditional division of labour, based on a male breadwinner and a female homemaker, during the 50s and the 60s (Schmitt & Trappe, 2010).

If one compares the demographic characteristics between females in the ICT versus the non-ICT sectors, one can clearly see that in the former, women are younger, and their educational level is obviously higher. Women are highly represented in non-ICT sectors (in every group of European countries, although more so in Northern and Eastern Europe), whereas its incidence in ICT sectors is much smaller.

Women are still underrepresented in the ICT sector. They are also particularly underrepresented in managerial and decision-making positions. Although this is a general problem, the percentage of female bosses in ICT is much smaller than in other sectors: 19.2% of ICT sector workers compared to 45.2% of non-ICT sector workers have female bosses (European survey on Working Conditions, 2010).

One of the reasons might be the leaky pipeline, a widely revised and mentioned phenomenon in the existing literature, both in Europe and the US (Gras-Velazquez, Joyce, & Deby, 2009; Griffiths & Moore, 2010; Hunt, 2012). It is linked to maternity. When it comes to considering the participation of women with ICT-related bachelor degrees in the ICT workforce per group of age, 20% women younger than 30 years works in IT, 15,4% women between 31 and 45 and only 9% women over 45 years (European Labour Force Survey, 2011).

### **Legal aspects of Women representation in the IT industry:**

Misrepresentation of women in the IT&C field is scattered throughout the world. The European Union IT&C job market consists of over seven million occupied jobs, out of which only nearly 30% are occupied by women (Digital Agenda for Europe 2020). Moreover, not only women are misrepresented in the IT sector, but the entire industry lacks women especially in key-managerial positions.

Far from being the only problem, women continue to suffer from discrimination forms in the working field even in the most civilised countries. Disparities are even more consisting within the emerging countries, especially in those with a high rate development of the IT&C sector. The International Monetary Fund agrees that, besides the striving projects aiming to enforce a gender-equity on the global labour market, "large gender gaps remain". Women continue to earn less than their male counterparts in similar working positions and are less economically productive than male throughout the entire world (World Bank 2012).

In India, the tenth-largest economical power of the world, the drama consists of only 29% women of the age of 15 and above working. With an industry that reached \$100 billion in revenues in 2012, India represents one of the most competitive global markets in terms of technology and outsourcing possibilities. And while in other global emerging areas, such as Eastern Europe, the tendency is for women to work more in the urban area, India shocks by having half as many working women in the urban areas by comparison to the rural ones. Similar to other recognizable patriarchal economies, like Turkey, India does not seem to invest too much in educating young women to become economically independent, and make a career of their own. Abroad work relocation for three years or more represents another index showing India's defective perspective towards women labour.

However, women aspire for the same leading positions in the IT&C sector as men, including for CEO positions even though only 18% of the women working in the tech field are relocated

abroad with their jobs. Women in the IT&C Indian industry also lag substantially when it comes to pay checks, earning \$6,000 less per year than their male counterparts in similar working positions (Catalyst, 2014). Similar, women here start at lower positions within the tech industry, striving, on average, 34 months longer to reach a competitive working position. According to the same Catalyst report, women in India receive fewer acknowledgements for their work, as well as fewer developmental opportunities. Combined with a higher responsibility when it comes to their private lives, it leads to a severe lack of potent females in senior level positions in the technology sector.

As for their job responsibilities, women were also less likely to have predominantly line roles – only 38% of them as opposed to 48% of men. In other words, women were considered less potential to perform intellectual and risk tasks and were rather given minor responsibilities and positioned in support functions. But even in these circumstances, women working in the Indian IT&C sector are more likely to remain loyal to a certain organization, company or job, while 58% of their male counterparts tend to leave their jobs for greater financial rewards and compensations. What is even more surprisingly is that 44% of the women activating in the tech industry are dissatisfied with their salary progress, yet remain faithful to a company and do not tend to rush into new job opportunities. Statistics seem rather fair if we take into consideration the fact that only 23% of the total number of women in India has access to Internet and around 19% of the total female workforce is distributed in the IT&C sector. Most of these women are found in service industries such as banking, insurance, information processing and in outsourcing call centres. In fact, call centres have a lot to do with the integration of women in the Indian IT&C market, annually employing over one million women to serve as “desk assistants” in externalized IT companies (Kinkini Dasgupta Misra, 2004).

### **Illegal aspects of Women representation in the IT industry**

But the implications of women in the IT industry do not necessarily restrict to the labour market access. Apart from their constant struggle to suppress the worldwide male domination in the IT&C sector, women also confront with another 21<sup>st</sup> century, post-dotcom concern: cyber terrorism. The informatics attacks as an ultimate form of terrorism represent an upcoming threat not only to public institutions and international organizations, but to individuals as well. According to Gabriel Weimann (2006) the concept of a “cybernetic terrorist attack” was almost inexistent at the beginning of the 2000s. In 1998, for instance, less than half of the 30 foreign terrorist organizations

had their own websites, or were active on the Internet.

Janczewski (2005) considers terrorism is a misinterpreted concept by the stereotypical population. According to them, the classical terrorist profile does not go far from an Arab bearded man holding explosive in his hands and manifesting against capitalism. However, the mere concept of cyber terrorism proves that terrorists can dress up in several forms, including in bad-intended persons aiming to harm other individuals for their own pleasure or for economical purposes. The author holds on to three possible types of terrorist actions against the IT sector: the direct attacks upon IT gadgets, equipments and technologies, the collateral IT damages resulted from these attacks, and the use of IT technologies and equipments within the active terrorist cells and organisations to deliberately hurt others.

The “milder” side of cyber-terrorism involves actions particularly started by individuals or small crime groups targeting the safety of personal data, including credit card numbers, social security numbers or addresses. Although most of this information is used to hack bank accounts and “empty” people from their financial assets, some cyber criminals take this to the next level and “steal” identities. Unsurprisingly, this happens most often in the United States of America, where more than 60% of the population holds on to one or more credit cards and bank accounts. Cyber criminals target both men and women, regardless of their sex, education, race, age or occupation. However, the most targeted group of persons is the one with annual incomes above average, who possess significant amounts of money and goods in their bank accounts. As previously stated, women make no exception from the cyber crime and cyber fraud worldwide pool, with over 17,600 new identity theft accusations claimed and proved in the United States in 2013 alone.

According to the Federal Trade Commission, 2014 marked the 15<sup>th</sup> year in a row that identity theft counted as the number one most popular type of consumer contempt, with around 19.5% of the complaints throughout the United States related to identity theft. The same commission suggests that women continue to be up to 30 times more likely to become the victims of identity theft or other forms of cyber crime. However, “low-tech” theft methods remain popular among occasional thieves, with almost half of the total number of identity theft incidents linking to stolen wallets and lost credit/debit cards.

Cyber bullying goes hand in hand with the concept of cyber crime, especially when it comes to women. Again, women are more vulnerable and prone to become victims of cyber crimes or cyber bullying through all media and Internet channels available. The literature in this area of interest is

insufficient and rather vague in terms of conclusions – while many of those interested in the subject agree that women are easier targets to cyber bullying and cyber crime, there are no official statistics supporting these claims. Cyber crimes against persons can include the transmission of child pornography, harassment, and cyber stalking (Alice Munyua et al). The anonymity of the Internet provides the propitious space for bullies, most of them seeing women as far more reachable targets. A cyber stalker's identity can be easily concealed or hidden by using various nicknames and fake identities, which usually boosts the stalker's self esteem and makes him or her become even more dangerous. Often enough cyber harassment against women takes sexual, racial and religious forms and it represents a severe violation of a woman's privacy. Unfortunately, social media networks and the worldwide spread of the Internet have made it even easier for bad-intended persons to cyber stalk women all over the globe. With a simple, unverified social media account one can stalk the activity of anyone who is willing to share personal information and moments of their lives over the Internet, determining stalkers to know exactly where their victims is, with whom, and what is she/ he doing at a precise moment.

The most alarming element of this entirely uncomfortable situation is that state stalking laws require the stalker to make an actual threat over their victim's life, implying the use of physical force or the near proximity to the victim. This means that cyber threats are still taken easy and considered as plain rage backwaters, determining women to feel uncomfortable and even unsafe when sharing anything personal over the Internet.

And while overall accepted definitions of cyber stalking are yet to be found, most sociologists and psychologists sustain that there are numerous similarities between online and offline stalking. However, the main difference between these two types of stalking rises from the fact that offline stalking is permitted and even encouraged by a sicken society eager to know one's every step and movement. Each status and comment posted on a social media platform makes it easier for women to be followed by cyber stalkers, whether we talk about jealous ex-boyfriends, former friends, etc. Moreover, a cyber stalker does not necessarily have to physically confront his victim, becoming easier to conceal himself and remain in the shadows.

In India, the first case of cyber stalking ended with prosecution happened in mid 2000, while the United States continues to have a global leading position in filed and prosecuted cybercrimes. The first successfully convicted cybercrime against women in the United States took place in 1999. Most of these cybercrimes refer more to an identity theft rather than a "usual" cyber stalk with criminals impersonating their victims in various

online environments and spreading out personal information in malicious purposes (Gupta, 2007). Although informational security has massively improved since the beginning of the 2000s, most cybercrime initiatives tend to focus on child protection more than on women protection. Both represent vulnerable groups, but worldwide governments are more preoccupied into keeping children safe, reducing child pornography exposure and child exploitation.

A United Nations report (2006) struggles to catalogue all forms of crime against women, including cybercrimes in the repertory, along with its derivations like cyber stalking and identity theft. Even so, the international governments' response is rather slow and ineffective. Major issues of cybercrimes against women reclaim lack of on-date and relevant data and statistics. What is even more concerning is that the cyber feminism movement, en-vogue in the past few years, has not yet introduced cybercrimes against women in its agenda, allowing millions of women worldwide becoming victims of cyber bullying and cyber stalking every year.

The reverse facade of the phenomenon is that women started turning from the ones being bullied to bullies themselves. Most cases of Internet bullying actions conducted by women count for violence threats, cyber stalking and creating fake accounts on social media platforms for defaming purposes. According to zeenews.india.com, an Indian female student was arrested and sent to judicial custody after she created a fake social media account posting pictures and abusive comments in the name of a colleague. The scarce statistics in the field surprisingly show that most women cyber bullies transfer their rage towards other females, and not on men. However, cyber bullying by women represents a rarity even at a global scale with few investigations from international organizations, scholars and statisticians.

## Conclusions

As this study reveals, women do not choose ICT studies, and they are underrepresented in the workforce of the sector. They leave the sector at early stages of their careers and do not achieve managerial positions at the same level as their male counterparts. Despite the evidence which proves that women's access to an ICT career is essential for the sector's long-term growth and the sustainability of the European economy, there remains a large gender gap in Europe's ICT sector. A similar situation is encountered both in India and in North-America, with American gaps being slightly smaller in terms of gender equality in the IT&C sector. However, India, as a developing country, is only confronting itself with a technological wave for less than 10 years, with

numerous international companies relocating part of their productions and services here. With numerous new openings from the international IT&C companies, India requires a huge labour force and is willing to hire just about anyone who knows something about computers, networks and client support services.

Women are under-represented at all levels in the ICT sector, but especially in decision-making positions. Getting women to enter and remain in the sector is essential when it comes to filling this gap.

Additionally, one of the most important, and worrying, phenomenon in the sector is the so-called "leaky pipeline", defined as women abandoning the sector mid-career. The leaky pipeline represents a widely revised and mentioned phenomenon in existing literature, both in Europe and the US. It is usually linked to maternity, as women of all careers (including top managerial positions) continue to abandon their jobs in favours of having a family. Where there is not the case, women choose long pre-natal and post-natal programs, making it even harder for them to come back in the working environment after one-two years breaks.

Also, women who address the IT&C sector strictly on a personal matter tend to be easier targets for tech crimes, and are generally at a higher risk than their men counterparts. Most tech crimes committed against women count for identity theft, stalking and bullying, and it is generally men those who address the crimes. Women-on-women tech and Internet crimes are quite rare, but they often happen out of romantic reasons and target a specific individual.

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