



WORLD  
MANUFACTURING  
FOUNDATION

# BACK TO THE FUTURE

---

## EMERGING TOPICS FOR LONG-TERM RESILIENCE IN MANUFACTURING

### WOMEN IN MANUFACTURING

---

Group Leader

**Cristina Oyón**

Director of Technology, Innovation and Sustainability

SPRI - Business Development Agency of the Basque Government

October 2021

# CONTRIBUTORS

---

**Guillermo Amann**

Senior Advisor to the President, Velatia

**Rhonda Barnett**

President and COO, AVIT Manufacturing

**Luciana Ciceri**

CEO, Ciceri de Mondel

**Chiara Cormanni**

Business Controller, PPInox

**Roberta Gagliardi**

Deputy Secretary-General, Confartigianato Lombardia

**Felipe Gómez del Campo**

Founder and CEO, PLC Plasma Solutions

**Ainara Isasa**

Managing Director, Basque Trade and Investment Italy

**Judith Kirton-Darling**

Deputy General Secretary, IndustriAll

**Syed Munir**

Chair, the Institute for Policy, Advocacy and Governance IPAG

**Linda Pittenger**

Associate Professor & Director of Faculty Development, Embry-Riddle Aeronautical University

**Laura Rocchitelli**

CEO, ROLD

**Irene Roda**

Assistant Professor, Politecnico di Milano

**Alina Sorgner**

Assistant Professor, John Cabot University

**Cecilia Ugaz**

Director of Gender Equality & Empowerment of Women Office, UNIDO

**Lucía Velasco**

Director, ONTSI

**Ramón Vivanco**

Coordinator, CosmeReg

**Fiona Zhao**

Associate Professor, McGill University

**Giulia Artibani**

Head of Communications, EFFRA  
Member, Young Manufacturing Leaders

**Tommaso Catalini**

Digital Process Graduate Program, Ariston Thermo  
Member, Young Manufacturing Leaders

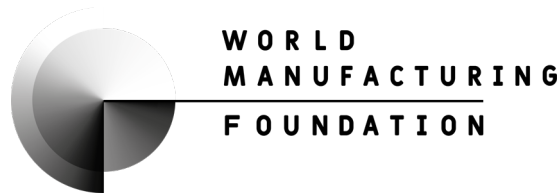
**Faraneh Torabi**

MSc. Student of Management Engineering, Politecnico di Milano  
Member, Young Manufacturing Leaders

---

**BACK TO THE FUTURE**

**EMERGING TOPICS FOR LONG-TERM  
RESILIENCE IN MANUFACTURING**



This whitepaper, published in October 2021, is part of the “Back to the Future: Emerging Topics for Long-Term Resilience in Manufacturing” initiative, promoted by the World Manufacturing Foundation, a non-profit organisation with a mission to spread industrial culture worldwide. The initiative involved global focus groups, each exploring a relevant theme for building a resilient manufacturing sector. Each focus group developed a whitepaper identifying key propositions to enable the manufacturing community to thrive in the long term.

The views and opinions expressed by whitepaper contributors are given in their personal capacity and do not necessarily reflect the views of the organisations for which they work or committees of which they are members.

For more information on the project and to read other topic-focused whitepapers that are part of the initiative, please visit <https://worldmanufacturing.org/report/back-to-the-future-emerging-topics-for-long-term-resilience-in-manufacturing/>

## INTRODUCTION

Increasing the rate of women in companies improves performance, as it implies higher productivity, better decision-making, different risk-management strategies, more innovation, creativity, and increased efficiency<sup>1</sup>. Hence, gender equality no longer remains just a matter of human rights, but a fundamental question to ensure competitiveness and economic recovery.

The manufacturing industry, as an important engine of the global economy both in terms of employment and wealth creation, needs to seriously address gender equality if it wants to play a key role to overcome the economic disruption the COVID-19 crisis is imposing.

The aim of this whitepaper is to provide precise recommendations and measures to reduce gender barriers and abolish the gender stereotypes that keep women away from a new manufacturing industry that generates economic, social and environmental value. This manufacturing industry has the opportunity to lead the incorporation of gender equality policies in the global economy.

## CONTEXT

What is good for gender equality is good for the economy as well as society. These data should be a call to action:

- The gender gap has a **direct effect** on the productivity of companies and, consequently, **on the Gross Domestic Product (GDP) of countries**. By 2050, improving gender equality would lead to an increase in EU GDP per capita of 6.1% to 9.6%, which amounts to €1.95 to €3.15 trillion<sup>2</sup>.

- Improvements in gender equality would lead to an additional **10.5 million jobs in 2050**, which would benefit both women and men<sup>2</sup>.
- Closing the gender pay gap could **boost female earnings across the OECD by over US\$2 trillion per annum**, an increase of 22%<sup>3</sup>.
- Diverse companies are more likely to financially outperform their peers. Companies in the top quartile of gender diversity on **executive teams were 25 percent more likely to experience above-average profitability than peer companies in the fourth quartile**. This is up from 21 percent in 2017 and 15 percent in 2014<sup>4</sup>.
- The correlation between women at the C-suite level and a firm's profitability is demonstrated repeatedly, and the magnitude of the estimated effects is not small. **A profitable firm at which 30 percent of leaders are women could expect to add more than 1 percentage point to its net margin** compared with an otherwise similar firm with no female leaders<sup>5</sup>.
- Across all industries, women currently make up on average 33% of junior level staff, 24% of mid-level staff, **15% of senior level staff and 9% of CEOs**<sup>6</sup>.
- Women make up about 47% of the labour force, but only **20% of the manufacturing workforce**<sup>7</sup>.
- **Three-quarters of the female population don't even consider manufacturing as a potential career**. Women do not feel attracted to such a career path because of stereotypes that prevent them from envisaging themselves in such positions<sup>8</sup>.
- **Only one in three** manufacturing professionals and **one in four manufacturing leaders are women**<sup>9</sup>.

## BACK TO THE FUTURE

- Even before the pandemic, women on average spent 6 more hours than men on unpaid childcare every week. During COVID-19, women have taken on a greater share of the increased burden. Women now spend 7.7 more hours per week than men on childcare. This ‘second shift’, **adding up to 31.5 hours per week, equates to almost an extra full-time job<sup>10</sup>**.

During 2020, the Women in Manufacturing expert group analysed the pre- and post-COVID situation of women in the manufacturing industry. As a result of this reflection process, the “*Women in Manufacturing*” whitepaper 2020 was drafted as a contribution to the “*Back to the Future: Manufacturing Beyond COVID-19*” project. The Report included an analysis of the impact of COVID-19 on women, as well as an identification of **three areas of strategic action: access, thrive in and lead the manufacturing industry**.

The Women in Manufacturing expert group is composed of 20 highly qualified people of 13 nationalities, representing international organisations, public administrations, academia and manufacturing companies. During 2021, the group has carried out an in-depth analysis of the insights contained in the 2020 whitepaper with the aim of identifying precise measures that would help to close the gender gap in the manufacturing industry.

## RECOMMENDATIONS

The Women in Manufacturing Expert Group has identified **1 Transformation Imperative, 8 Game-Changing Actions and 3 Building Blocks** to foster women’s access to the high added-value manufacturing industry, as well as the chance to thrive and lead there,

## 1 TRANSFORMATION IMPERATIVE: Cultural transformation within organisations

To attract and retain women in the manufacturing industry, it is essential for companies to consider the interests and rights of half the population in an industry, which was designed by men, for men and to keep women out.

To this end, we need to overcome many cultural barriers at domestic, policy and company level. Gender-based discrimination starts in early childhood and continues at school, university and then at the workplace. Family is the main influencer for girls, while media is for boys, in choosing their field of study. For a future where leadership is not associated with any gender, education, training and professional opportunities must empower girls and boys, women and men.

The manufacturing industry must foster a culture where all employees work towards recognising and minimising gender biases, ensuring equal opportunities, and prioritising work-life balance to lead the process of reducing the gender gap. The labour market needs a complete redesign to be able to attract female talent, promoting supportive environments where women feel safe, valued, respected, and comfortable.

Technological developments within the manufacturing sector may further exacerbate gender inequality, unless the existing digital gender gap and limited access to Science, Technology, Maths and Engineering (STEM) disciplines are urgently addressed.

## 1 TRANSFORMATION IMPERATIVE:

### BACK TO THE FUTURE

### **Key ideas to promote a cultural transformation within manufacturing companies**

- *Promotion of gender equality in the work environment by senior leaders.*
- *Internal systems to support the promotion of gender equality in the recruiting and selection process.*
- *Inclusive work environments that ensure a more balanced division of family responsibilities, with the same conditions for both women and men, such as paternity and maternity leave.*
- *Supportive environments where women feel safe, valued, respected and comfortable.*
- *Gender-inclusive business diagnostic assessments.*

- Women- and industry-**related forums and industrial associations** that advocate for the cultural transformation within their industrial associates.

The charts contain the **concrete recommendations** that have been identified to encourage the relevant allies to put the 8 game-changers into practice:

- 1. Engage girls in STEM**
- 2. Increase women employability**
- 3. Promote female entrepreneurship**
- 4. Equitable work environment**
- 5. Equal pay for equal value**
- 6. Gender equality plans**
- 7. Women participation in decision making**
- 8. Women on boards**

## **8 GAME-CHANGING ACTIONS**

Cultural transformation is the basis for strengthening the role of women to access, thrive and lead in the industry. To achieve this change, the Women in Manufacturing Expert Group proposes 8 game-changing actions that can only be accomplished with the involvement of the relevant stakeholders. Therefore, **alliances have to be built in order to engage with:**

- **Industrial policy-making debates** promoted by international organisations, national and local governments, that mainstream gender issues at policy level
- **Links with** university programmes and initiatives from **educational centres** like schools, universities, research centres, and think tanks.

### **BACK TO THE FUTURE**

ACCESS	POLICYMAKERS: international organisations, national and local governments...	EDUCATIONAL CENTRES: schools, universities, research centres, think tanks...	INDUSTRY AND INDUSTRY-RELATED ASSOCIATIONS
<b>1. ENGAGE GIRLS IN STEM</b>	<ul style="list-style-type: none"> <li>Support, guide and advocate for action on STEM gender equality.</li> <li>Update educational curriculum that encourages scientific and technological vocation among girls and young women.</li> <li>Provide tools, information, contacts to educational centres and families.</li> </ul>	<ul style="list-style-type: none"> <li>Create alliances with industrial stakeholders in order to attract women.</li> <li>Provide mentorship and internship programmes.</li> </ul>	<ul style="list-style-type: none"> <li>Provide mentorship programmes, role models and showcase the attractiveness of a new manufacturing model.</li> </ul>
<b>2. INCREASE WOMEN EMPLOYABILITY</b>	<ul style="list-style-type: none"> <li>Suitable measures and actions to increase the share of female workers in manufacturing: benefits, a less risky and more flexible work environment, easy access to these jobs.</li> <li>Economic responses and recovery plans with gender lens.</li> </ul>	<ul style="list-style-type: none"> <li>Develop gender-specific career paths that support women's childbearing and childcare scenarios.</li> <li>Concrete analysis and data provision: advantages or challenges of women's participation in the manufacturing industry.</li> </ul>	<ul style="list-style-type: none"> <li>Promote gender equality in recruiting and selection processes.</li> <li>Build an outreach campaign to attract women into the manufacturing industry with university career centres.</li> </ul>
<b>3. PROMOTE FEMALE ENTREPRENEURSHIP</b>	<ul style="list-style-type: none"> <li>Dedicated tools: tax support, funding programmes, infrastructure, networking.</li> </ul>	<ul style="list-style-type: none"> <li>Support early-stage women entrepreneurs (increase their performance and growth potential through entrepreneurial education and training).</li> </ul>	<ul style="list-style-type: none"> <li>Guidance and training to women entrepreneurs (especially from associations).</li> <li>Develop government and private sector funded incubators to mentor and financially support the female funded startups.</li> </ul>
THRIVE	POLICYMAKERS: international organisations, national and local governments...	EDUCATIONAL CENTRES: schools, universities, research centres, think tanks...	INDUSTRY AND INDUSTRY - RELATED ASSOCIATIONS
<b>4. EQUITABLE WORK ENVIRONMENT</b>	<ul style="list-style-type: none"> <li>Public childcare strategies: paternity and maternity leave.</li> <li>Shared care responsibility within the family, leaving behind the traditional division of tasks.</li> <li>In alliance with the private sector develop a binding legal framework that can promote work-life balance for both women and men.</li> </ul>	<ul style="list-style-type: none"> <li>Data and research: gender bias in the manufacturing industry.</li> <li>Build a benchmarking model on equity and inclusion best practices for the manufacturing industry.</li> <li>Develop training for male employees focused on unconscious bias and emotional intelligence.</li> </ul>	<ul style="list-style-type: none"> <li>Provide supportive environments where women feel safe, valued and respected.</li> <li>Leaders to assess current work culture and adjust it to promote a fair and equitable work environment.</li> <li>Shift from a "presence-driven" culture to a "results-driven" culture.</li> <li>Offer family-friendly tools and solutions for both men and women.</li> </ul>
<b>5. EQUAL PAY FOR EQUAL VALUE</b>	<ul style="list-style-type: none"> <li>Mandate that companies publish gender pay bands for work categories.</li> <li>Establish goals for gender representation and payment at all levels and track their progress.</li> </ul>	<ul style="list-style-type: none"> <li>Data and Research.</li> <li>Gender pay gap report.</li> </ul>	<ul style="list-style-type: none"> <li>Analysis of gender gaps in pay and career advancement and implementation of actions.</li> <li>Promote company HR executives to analyse internal pay differences and make adjusted plans to achieve comparable amounts for men and women.</li> <li>Have associations sponsor a pay survey that focuses on gender differences.</li> </ul>
<b>6. GENDER EQUALITY PLANS</b>	<ul style="list-style-type: none"> <li>Financial support for companies that have specific programmes that support the presence, advancement and promotion of female workers.</li> <li>Promote, develop and implement gender equality legal instruments.</li> </ul>	<ul style="list-style-type: none"> <li>Integrate gender equality into academia and research.</li> <li>Develop a toolkit for mainstreaming and implementing gender equality plans within the manufacturing industry.</li> </ul>	<ul style="list-style-type: none"> <li>Commitment from leaders to develop and promote gender-inclusive policies and practices.</li> <li>Create company mentorship programmes that align female workers with high performers.</li> </ul>

## BACK TO THE FUTURE

### EMERGING TOPICS FOR LONG-TERM RESILIENCE IN MANUFACTURING



LEAD	POLICYMAKERS: international organisations, national and local governments...	EDUCATIONAL CENTRES: schools, universities, research centres, think tanks...	INDUSTRY AND INDUSTRY- RELATED ASSOCIATIONS
<b>7. WOMEN PARTICIPATION IN DECISION MAKING</b>	<ul style="list-style-type: none"> <li>Set a standard of minimum level of participation of women in every decision-making process.</li> <li>Provide financial incentives to companies that demonstrate a minimum level of participation of women in different decision-making processes.</li> </ul>	<ul style="list-style-type: none"> <li>Provide women with the training needed to support their growth on fundamental leadership skills, hard skills, soft skills, digital skills in alliance with industry and related associations.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure equal consultation with women and add weight to women's priorities in decision making.</li> <li>Create a campaign with key associations that has the goal of placing women in senior positions and on boards, and have member organisations be held accountable for moving the needle forward.</li> </ul>
<b>8. WOMEN ON BOARDS</b>	<ul style="list-style-type: none"> <li>Develop legislation on company board representation.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement training opportunities: leadership training in alliance with industry and related associations.</li> </ul>	<ul style="list-style-type: none"> <li>Allow and increase gender diversity in boardrooms and take into account women's role as corporate social change agents.</li> </ul>

### 3 BUILDING BLOCKS

The success in implementing the actions proposed depends on 3 building blocks that may allow the manufacturing industry to pave the way towards a jobwise gender equality, based on equal job, risks, benefits and salaries.

#### Data & Research

The world of work needs a wholesale redesign led by data. It is not possible to know whether an organisation is successful in terms of gender equality unless success is clearly defined and measured. Detailed gender-disaggregated data are still rarely available, particularly for the manufacturing industry. It is therefore fundamental to track and analyse the access, advancement and leadership of women in the manufacturing industry to have a clear picture of the current situation and ensure future progress.

An in-depth analysis would show the type of access to the industry that women have, their job promotions, the gender pay gap situation, as well as the incentives that encourage their participation in the manufacturing industry's leadership positions. It is important to identify and select the appropriate variables such as age, studies, or family situation for the purpose of monitoring and carrying out

periodic reviews that would allow the adoption of concrete measures, taking into account the fact that women are not a homogeneous group.

#### Key messages for building data & research-related actions:

- Research and analysis on gender inequality in STEM education.
- Analysis of gender pay gaps and women's career advancement in manufacturing companies.
- Tracking of women's and men's career patterns in terms of access, advancement, and leadership.

#### Making manufacturing attractive for women

The path to equality will only materialise if the industrial sector attracts women. The digitalised and environmentally sustainable manufacturing industry that will lead the economic recovery has to be shown as an attractive place of work that recognises and values the contribution of women.

Cultural beliefs influence relevant career decisions and lead to gender differences in the choice of whether to persist in a STEM path or not. STEM careers are still

#### BACK TO THE FUTURE



perceived as male studies and girls are tracked away throughout their education, limiting their training and options to access these fields as adults<sup>11</sup>.

Fewer women studying and working in STEM fields means the continuity of male-dominated cultures that are not able to support or attract women. In 2018, only 24 out of every 1,000 women with a tertiary education degree had studied an ICT-related subject, and only 6 continued working for the digital sector. The European Commission study 'Women in the digital age (2018)' confirms this trend and warns of a decrease in this number compared to 2011.

Another driver for the defeminisation of the manufacturing sector is the economic growth and job creation outside the sector, in less risky and more flexible environments such as services.

To reverse this situation, schools and universities should adopt policies that address gender stereotypes and prejudices to ensure equal participation without discrimination. Furthermore, businesses should be more welcoming to women and try to empower women in the workplace. At the same time, manufacturing-related curriculums should be updated to match what is truly going on in the industry.

#### **Key messages for making manufacturing attractive to women:**

- *Change the perception of STEM careers.*
- *Update manufacturing-related curriculums.*
- *Promote new leadership models.*
- *Redefine workplaces and women's empowerment.*

## **Female role models**

Women's contribution to the industry is already significant, but it is still notacknowledged. When it starts to get recognition, it will attract other women to the industry.

Role models are fundamental from the beginning of the education process. "If you can see her, you can be her". Seeing other women accomplish ambitious goals and participate in relevant tasks is what helps inspire young women. We need strong role models and pioneers willing to prove what can be achieved. Exposing girls to examples of successful women in STEM fields traditionally represented by men contributes to increasing girls' interest in them.

Female role models and mentoring programmes within companies are a valuable tool for promoting women's talent and leadership. Women represent 50% of society and, thus, 50% of the available talent. Role models can fuel a girl's or woman's energy to remain and thrive in the manufacturing industry.

#### **Key messages to promote female role models:**

- *Develop ambassador programmes: female STEM undergraduates giving talks at high schools and middle schools.*
- *Design mentorship programmes for women at the beginning of their career in the industry.*
- *Provide STEM mentorship delivered by successful leading women in the industry*

## **BACK TO THE FUTURE**

	8 GAME-CHANGING ACTIONS	3 BUILDING BLOCKS		
<b>ACCESS</b>	1. Engage girls in STEM 2. Increase women employability 3. Promote female entrepreneurship	<b>1. DATA &amp; RESEARCH</b>	<b>2. MAKING MANUFACTURING APPEALING</b>	<b>3. FEMALE ROLE MODELS</b>
<b>THRIVE</b>	4. Equitable work environment 5. Equal pay for equal value 6. Gender equality plans			
<b>LEAD</b>	7. Women participation in decision making 8. Women on boards			
<b>1 TRANSFORMATION IMPERATIVE: CULTURAL TRANSFORMATION WITHIN THE ORGANISATIONS</b>				

## CONCLUSION

The COVID-19 crisis has evidenced the remarkable role of women leaders managing the pandemic. Forbes described female leaders as truthful, decisive, and clear but also loving, oriented towards children, empathic and caring<sup>12</sup>; these abilities are also fundamental when responding to the challenges faced by companies. Accordingly, the manufacturing industry should do everything necessary to attract, retain, and advance women, as gender diversity benefits a manufacturing firm through an improved ability to innovate, obtain a higher return on equity and increase profitability<sup>13</sup>.

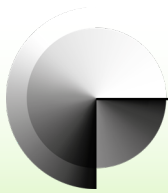
If there was ever a time to strengthen role of women in manufacturing, that time is now, and we cannot miss the chance to make the most of it. **Now it is time to claim the space.** To that end, the Women in Manufacturing Expert Group proposes **1 Transformation Imperative, 8 Game-Changing Actions and 3 Building Blocks to foster access, thriving and the leadership of women in the competitive, resilient, high added-value manufacturing industry of the future.**

## BACK TO THE FUTURE

# REFERENCES

---

1. UNIDO. Inclusive and sustainable industrial development: the gender dimension.
2. EIGE. (2017). Economic Benefits of Gender Equality in the European Union: Overall economic impacts of gender equality.
3. PWC (March 2021) Women in Work 2021. The impact of COVID-19 on women in work.
4. McKinsey&Company. (2020, May). Diversity wins How inclusion matters.
5. Marcus Noland, Tylor Moran, Barbara Kotschwar. (2016). Is Gender Diversity Profitable? Evidence from a Global Survey.
6. World Economic Forum (2016) The Industry Gender Gap Women and Work in the Fourth Industrial Revolution.
7. International Labour Organization. ILO. January 2021.
8. UNIDO. Nelson, Judy. (2020, November 10). Why We Have Gender Inequality in Manufacturing.
9. Deloitte. Women in manufacturing study. Exploring the gender gap.
10. PWC (March 2021) Women in Work 2021. The impact of COVID-19 on women in work.
11. American Association of University Women (AAUW). The STEM Gap.
12. Forbes. What Do Countries With The Best Coronavirus Responses Have In Common? Women Leaders
13. Deloitte. Women in Manufacturing. Stepping up to make an impact that matters.



**WORLD  
MANUFACTURING  
FOUNDATION**

**World Manufacturing Foundation**  
Via Pantano, 9 - 20122 Milano, Italy  
[worldmanufacturing.org](http://worldmanufacturing.org)