

Women in Manufacturing: A Gender Gap to Innovation



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Interview Transcript:

Donna: Hello and welcome. My name is Donna Milgram, Executive Director for the Institute for Women in Trades, Technology & Science, and I am so excited to welcome you to this session of the STEM Success for Women Telesummit, funded by the National Science Foundation. We have an interview today with a very special guest.

Our guest today is Chandra Brown—the Deputy Assistant Secretary for Manufacturing from the U.S. Department of Commerce, International Trade Administration. And I was so excited to hear Chandra’s keynote address at the National Science Foundation’s Advanced Technology Education conference this past October. Her talk was on competitiveness and she made the point that the gender gap for women in manufacturing is hurting innovation in the United States. As Deputy Assistant Secretary for Manufacturing, Chandra oversees a broad portfolio of programs aimed at increasing the international competitiveness of U.S. manufacturers. Welcome Chandra and thank you for joining me for the STEM Success for Women Telesummit.

Chandra: Thank you for having me. I am so happy to be here and talk about one of my favorite subjects.

Donna: I wondered if you were willing to start out by sharing with our listeners your own background in manufacturing.

Chandra: Absolutely, I would love to share my story. I was born in Chicago, Illinois and I come from a family—from a grandfather who worked with the steel companies to aunts and uncles and brothers who built things with their hands—and I grew up with a great appreciation for how we manufacture things in this country. And I will say I didn’t know when I was young, people always ask, “Did you grow up and know you were going to be a woman in manufacturing?” And the answer is no, I did not. I kind of pursued the traditional path. I went to high school, I went to college, I ended up getting a degree—an MBA in International Business—and I was basically 21 and starting my career. I went back to Chicago and started working for an international shipping company and then I moved to Portland, Oregon.

The first job I got there was with Oregon Ironworks—a fantastic manufacturing company—and when I started working there I realized that this was my calling. It turns out that I am more a tactile person—there’s nothing more satisfying to me than how we build boats and bridges and aerospace work. To actually be able to see a drawing, see a print, watch it in progress as its being built step-by-step on a factory floor, and then you have this incredible finished product that you can drive over the bridge or ride on the street car. I just realized this was an incredible opportunity. Basically, you see something and now

you know this is what I want to be. I don't want to do coding and I don't want to do some of the other service type industries—which are absolutely critical and wonderful. I actually wanted to be a part of building things.

Donna: That is so interesting that your family came from this background and so obviously you had a lot of information about the manufacturing industry—you had some role models. I'm curious, were you the first in your family to be a woman in manufacturing?

Chandra: Yeah, I guess I probably would say that. My mother and one of my grandmothers were both teachers. Which again, I have such great respect for the teaching industry as well. Yeah, I probably was. I come from a big family, so I don't want to say that no one in my family has done manufacturing, but I think I probably was one of the first. I have to say your question is so great because I didn't know at the time, even though I saw these things, knew people who worked with their hands, and I respected it as a career. I don't know at the time that I was aware of how great that was.

My appreciation grew and grew as I got older and then when I went to work at a manufacturing company that's when it all came back around full circle and you're like wow—I get this. I get this great pride in building things.

Donna: And I hear the excitement in your voice as you describe that process. I'm curious to know, why do you think so few women choose manufacturing as a career pathway?

Chandra: Well, you know I think there are always a lot of reasons why we do or don't go down certain paths. I think with manufacturing in particular it's obviously been a very male-dominated profession to date. And so I think there haven't been the role models and they haven't seen or heard women talking about it—how it's great, how it's wonderful, how they can succeed in it. So I think there are a variety of things that could be—lack of mentorship, the organizational culture that they assume it is, and I would say even things like industry bias towards men for a leadership positions.

Manufacturing is also so broad and sometimes I think women are thinking about manufacturing as a career, but they might just not call it a manufacturing career. It's a career in an individual industry sector, if you will. So I think it's also a definitional item as well.

Donna: I want to talk a little bit about that. First I want to approach it by saying that I think that when most people think about manufacturing, they are thinking about the auto manufacturing plants and the fact that a lot of them are closing down and they see manufacturing as a dying industry. Now I know that's not the case, but I think many would say why would we get women into an industry that is in decline? I'm sure you hear this all the time. What is your response to that?

Chandra: I absolutely say it is not an industry in decline. And as you can even see from the numbers, we have been adding manufacturing since the downturn and we've seen new things happening, such as the reshoring and jobs coming back to this country because we have such a great climate here both from an energy cost standpoint, an intellectual property standpoint, and we still are the most innovative and most productive workforce in the world. So manufacturing is not in decline—in fact it's an absolutely critical piece of this country. One of the reasons why I left my last manufacturing job to take this job is because I

believe so strongly that manufacturing is the basis of the middle class for this country, so we must have it. When we think about the importance of manufacturing to a growing middle class, let's think about women. So women—we represent almost half or around 47% of the total U.S. labor force. But, we only make up less than a third, around 25% of the manufacturing workforce. So we know that manufacturing needs to grow and needs to continue growing. We know there are worker shortfalls coming in the future. We know we are half of the workforce. We must be involved and participate in the manufacturing workforce as well.

Donna: So there's an almost 25% gap between the percentage of women in the workforce and in manufacturing. I'm wondering, if I was a young woman in college and especially if I was in a two-year college—because that is a lot of our listeners—and I was thinking about a career pathway in manufacturing, what would those job titles and careers look like?

Chandra: This is actually a hard question in a good way because there are so many different paths. When you think about manufacturing it's so broad. Everything from sewing and manufacturing a shirt or fabric, to welding and fitting, to machining of metal parts, to assembling complicated engines. There are so many different things that we make in the United States and each one of these industries have lots of different titles and ways of going into it. So what I would say, is you really need to figure out which kind of path that you want to go down and then we can look at all the different career descriptions and what they have available. So for example—some of the STEM things: If you love robotics, then I would advise one of these career paths, there is first robotics then robotics and manufacturing engineering classes. Those are some big overarching ones that cross-cut industries. If you want to be more hands on, then not just the engineering classes, but reading plans and blueprints is a great skill set particularly at our wonderful community colleges. I called the welders that used to work for me in a company I was at previously, basically artists. You can call them welders, but they were artists and there's many welding, machinist, or electrical classes. It really depends, there are so many options for women that they can really customize it to what they are interested in. One other recommendation I make is get out there and try things, so you can figure out what really is your passion.

Donna: I'm a big proponent myself of doing internships and more and more you're seeing those available. I also wonder in the manufacturing industry, are there possibilities for summer jobs or part-time jobs for students to try these careers out?

Chandra: Absolutely. Apprenticeships are a great path. As you probably know, it's been one of the new initiatives in the Obama administration that we've been working on—increasing the percentage of apprenticeships and funds that are flowing into apprenticeship programs as well as community colleges and training up that generation of workforce. So I think there is a lot of even national and federal programs and some of the large corporations have been leading the way for internships and on job training. Again, I think that most are coming from small manufacturing companies. I think there are many opportunities right down the street. There is so much manufacturing and small business manufacturing going on around this country that if you just for example, went to a local manufacturer and said you were interested in a summer internship, I think you would probably be surprised at the level of welcomness that you would have when you do that.

Donna: I think that the educators who are listening are themselves thinking, “I wonder if I would be able to connect with the manufacturing industry to set up these kinds of internships—these kinds of programs?” I wonder if there is any connection that you can direct educators to go to make that kind of connection. Is there anything that is set up?

Chandra: Well, there are honestly a lot of different organizations. So let’s talk a little bit about there’s all these associations and again—because manufacturing is so diverse—there are lots of different ways to plug in. So talking to the educators, there are organizations like the Manufacturing Institute (<http://www.themanufacturinginstitute.org>), and that’s a part of the National Association of Manufacturers (<http://www.nam.org>). So they have an institute that really has a whole focus and subset on women. They have the [Women in Manufacturing STEP Awards](#). They produce some reports with Deloitte. I think every industry also has organizations such as the Association of Women in Metal Industries (<http://www.awmi.org>), for example. They work with internships and setting them up with their companies. That’s another kind of specific. If you’re interested in international trading companies that are manufacturing to exports, there is the Association of Women in International Trade (<https://www.wiit.org>) and they also have programs. So really, you can go to so many different organizations. For automotive, there is a Southern Automotive Women's Forum (<http://www.southernautowomen.org>). I can probably go on and on with this. There are a lot of places you can go.

Donna: That actually raises another question in my mind which is, are there areas of manufacturing that you see more women in? Areas of manufacturing with more women that might be for women who are interested in maybe not being the only trailblazer, where would that be?

Chandra: You know, I would give you some industries that have traditionally had a slightly higher percentage of women. Those are things like life sciences and medical devices. So for example, the manufacturing of medical devices, retail, clothing, technology, media, and sometimes transportation can be an area where we have more women. But again, unfortunately it’s still small. And still not enough of what we need. And there are very big gaps in some other areas, obviously you have heard about the computer side and some of the other engineering disciplines where women are definitely underrepresented. There is a great report and actually credit to the National Science Foundation and it’s called “[Women, Minorities and Persons with Disabilities in Science and Engineering](#)” and again for the educators and other folks out there, it is a great report that goes into detail about where women are working and where they are not working. So I recommend that as well.

Donna: So you mentioned a number of different associations specifically for women in manufacturing. Is there one place to look for these associations of women in manufacturing? Or what would you recommend if you were a woman wanting to connect with other women in manufacturing?

Chandra: Unfortunately, I wish the answer to this question was yes—there is a huge master database of all the resources for women in manufacturing and these various organizations—but there isn’t, at least not that I have been able to find. So if anyone out there is listening and they want to do this and they know about it, I would love to be educated myself. There is, like I said, the Manufacturing Institute and the National Association of Manufacturers—which is a very large overarching manufacturing organization.

That's probably one of the best overarching women in manufacturing sites, but really as I kind of went through the variety of different industry sectors, each one of those has a slice of women in manufacturing specific to their area. So I would say one piece of advice would be once you kind of find a general area that you like, or that you might be interested in, so for example if you are interested in the manufacturing of textiles, when you look that up you'll find a variety of textile associations that are working on innovative and potential apprenticeships and other areas for women. Certainly in metal and machinery, I listed off several of those. If you are interested in welding or machining or robotics, then there are a whole bunch of other associations. Sometimes you can get really great attention and focus when you go to some of these smaller organizations that are more focused on a career path where they really need workers. Again, if we make up 50 percent of the population, we must be participating in these workforces, especially with an upcoming shortage of manufacturing workers.

Donna: In my experience, the associations for women can really be a great resource as you were saying. You can look for internships and in local areas educators can do a search for the different areas or sectors of manufacturing as you described. Of course with the web presence, it's easier and easier for you to make contact with these types of associations that are often run on volunteer efforts. But something you just said—which is the upcoming shortage—brings me to another question. **Are there particular areas of manufacturing that are for lack of a better term, really hot? Areas where there is a shortage coming and/or that pay more than other areas? I'm wondering if that is true for robotics, for example. What are the most exciting areas if you are considering a career pathway in manufacturing?**

Chandra: Well, there are so many exciting pathways to take. One of the things I would tell people to look at it—so when you look at the latest and greatest coming down the pipeline—is that we now have a national network of manufacturing institutes. There have been a variety of these institutes set up around the United States and these are cutting edge R&D public/private partnerships that have companies and universities and various academia, all coming together around some various topics. So for example, the first one was kicked off in Youngstown, Ohio called American Makes (<https://americamakes.us>). They are focused on the 3-D printing revolution if you will. So that's an example of some cutting-edge areas. Some of the other institutes include one on lightweight metals in Detroit looking at how we are making better components going into the actual materials that we are making things from. How do we make those stronger, lighter, faster? So careers in those areas. Obviously there is a digital revolution and the Internet of everything that needs sensors, of course, and all the various manufactured parts that go with that. So you know if you look at the variety of institutes that are set up and you can see the topics—such as nanotechnology—there's a variety of areas where there are some high-growth potential to be looked at.

Donna: Nanotechnology is also an area that the Advanced Technological Education program within the National Science Foundation has really focused on and 3-D printing I've seen at many two year colleges. These are great ideas for educators that are providing career information to both women and men about the manufacturing industry. Now I want to ask you, do you think it really makes a difference to the industry itself if women are a part of it?

Chandra: I don't know how loud I can say yes! But, consider it shouted. It is absolutely critical. When I say critical, I also mean it up and down the entire chain. So we need more women on corporate boards—

women from the very top all the way down to various women on the shop floor and working to build the products for our next generation. The reality is—if you look at another couple of statistics that I like to throw out—is that 73% of all buying decisions in the United States are made by women and globally women control roughly 12 trillion out of 18.4 trillion in consumer spending. So basically, we control 2 out of every 3 dollars spent in the world. So if we want to be represented in the board room and throughout a company, don't we want to reflect the leadership and the reality of what the stakeholders are doing out in the community? We all know that diversity improves organizational performance. There's a variety of studies on this by McKinsey and others that says it's necessary. If you have gender diverse leadership and in the workforce, you get overall higher return on equity. So you know diversity can overall enhance the corporate culture, the reputation, and the bottom line of companies. So it's really critical that we must have more women throughout and again this includes from corporate and CEO boards all the way on down through it.

Donna: Do we know the percentage of women who are on manufacturing boards right now?

Chandra: We don't, and I personally would love to know that percentage I can tell you. There are a few things we know, but as far as I know no one has taken a study of solely manufacturing boards. I mean, what's a manufacturing company and what's a board? But I am very much for disclosure of diversity statistics. You've seen Google and Yahoo and some of the large tech companies, but it would be great for all companies—manufacturing companies—to be disclosing, "What's the composition of your board? What percentage of women in minorities are on it? What percentage of women and minorities are in senior leadership and what percentage are in the rest of the workforce?" The statistics we do know—which are honestly quite sad—is that if you look at, for example, Fortune 500 CEO positions, things that are fairly easy to count, women hold less than 5% of all Fortune 500 CEO positions. Women hold less than 17% of board seats at Fortune 500 companies and 10% of these Fortune 500 companies have no women on their board at all. I mean that's a pretty sad commentary. Those are some of the statistics we have, but I don't have them specifically for manufacturing companies.

Donna: I am so struck by the mismatch between 73% of the purchasing decisions being made by women and women being such a small percentage of both the executives and board members and actually absent from 10% of all of boards. That is astounding to me that that is the case in 2015. Now we both know, that we do have some women who have excelled in manufacturing. Can you talk a little bit about these women who are still at this point pioneers?

Chandra: Yes, I mean there are obviously some well-known women that head up large corporations—like Mary Berra of GEM and Les Myer. There are some folks that we all know and we've heard the names, but some of the folks I want to talk about we have here at the U.S. Department of Commerce's [Manufacturing Council](#)—a United States manufacturing council—and there are some women on this council. It's open to anyone that is a federal acquisition notice, so if you ever want to be on an advisory committee in the government again encourage women out there to sign up and participate because we have lots of advisory boards in a variety of areas and the manufacturing council is one of them. We have some great women on these boards. One of them I was just speaking to the other day is a woman named Claudine Martinez, who is the president of MCT industries in Albuquerque, New

Mexico, and a smaller firm. She is the Vice Chair of this Manufacturing Council. We were talking about leadership and women and how even in these smaller businesses to uplift their profile. Again, we kind of know the major multinationals that have women at their helm, but I think the key is for all the folks out there at the small and medium sized businesses to be getting out that information on what they are doing. She told me is things are different when you are a woman leader and a woman manager. One of the things I thought was very insightful—and I feel the same way from my time as an executive at a manufacturing company—is women tend to look at things a little more holistically. We are concerned—and these are obviously generalizations as there are wonderful men who do all the same and I want to be sure to call them out and we need them and their help as we move the whole agenda forward—but you know women in general are more holistic. They are looking at the person as a whole and I think that some of the differences in leadership styles from the manufacturing side—setting up various charities, looking more closely at work life balance, at family leave policies, and being more flexible with your workforce—so I think they have a greater attunement to those type of issues as women leaders in manufacturing.

Donna: I also want to talk about the women who are on the manufacturing floor, so to speak, who are actually at the technician level. I myself have met some of these women through the work that our organization has done with community colleges. There is a woman instructor from a community college in Kentucky who I met who teaches welding and she told me that she helped—and she did it in a manufacturing environment—put her daughter through college when she became a single parent by welding on the manufacturing floor. Another woman that I am also thinking about is actually out of a Milwaukee-area technical college and she actually is now the Chair of their Engineering Department. She's a welder and originally worked for Harley Davidson in Milwaukee. This was quite a few years ago and I was actually involved with the whole program that successfully helped get women on the manufacturing floor at Harley Davidson. **And so a big shout out to both women at the leadership level but also women who are on the manufacturing floor. It's such an important opportunity for these women to have satisfying work that is also well paying work and that gives them the opportunity to—as you described for yourself earlier on—be part of a process of making something.**

Chandra: Absolutely, I could not have said it any better myself. Women up and down on all levels. I have to say—again trying not to be biased—women who have worked on the shop floor you know are working often harder and they are really trying to prove themselves. They are usually a minority in the workforce depending on what type of manufacturing plant they are working in, so I mean by default they are incredible leaders and are leading the way for the next generation. I think your point is really great: People who are in manufacturing know it's great. Many—both men and women—who have family members in it especially in the career and trades—and a great shout out to all of our labor friends and the unions that are mentoring and bringing up and trying to increase diversity levels as well—those familiar with manufacturing basically are twice as likely to encourage one of their children to pursue manufacturing. That kind of says it all. People who are doing it know it's great. The reality is for those folks that are going more into the trades—I tell this all the time—you can come out of high school and not have huge college debt, not take years off, and go right into very well-paying skill jobs. You can buy your house quicker, for example, than college graduates can because you don't have debt and are able to go right in and make an absolutely above-average living wage. So I certainly encourage folks to do that and I think you know one of the issues that we need to look at is starting from the public perception issue in the

schools, from the k-12 school system. We need to be encouraging students to pursue careers in manufacturing and particularly women as well.

Donna: Yes, I totally agree. I'm wondering if you have advice for community colleges that want to attract more women to their manufacturing programs and four year colleges as well. How should they go about it?

Chandra: Well, there are a variety of ways. From easier to harder, I guess, or different levels. One, you need to make sure that all of the outreach material is reflective of the diverse workforce that you want to have come and be educated in your various institutions. So people have to look more carefully now. It's amazing to me when you look at pictures of welders, for example, or machinists, 98% of the time they are men. If we would like to attract more women, we need to be showing more women in these various recruitment efforts and brochures and make sure films and clips that are done are representative of the type of diversity that you want to attract in your schools. So I think that's one. The other one is setting up programs: How flexible is the institution? Do they have mentoring circles set up in particular for women? Do they have women manufacturers come as speakers to various events? Are there awards or notices given about that? So I think there is a variety of things that can be done to better help recruit the next generation.

Donna: I'm so glad you mentioned about the outreach materials. We actually tell schools to make sure that it's not just one or two female role models, but 50 percent of the images—whether it's on their website or in their brochures—show females in the industry. Especially in an area like manufacturing where you may have to wear equipment that makes it hard to tell if you are a woman, they need to focus on whether they have the helmet down so that you can see that it is a woman in manufacturing. If you're in a clean room, it can also be hard to tell. I think that is so important. And as you say speakers coming in, the female role model part is critical. Something that you said made me think of another strategy, which is you talked about the handing down in families of pursuing the manufacturing career pathway. I'm thinking how about if there was an initiative where you were not just handing that down to your son, but you were also handing that down to your daughter as well.

Chandra: Absolutely. I think that is a great idea. Again we are so influenced by our families and those around it. The overall perception that needs to be taught to both sons and daughters, if you will, is that manufacturing is a great career choice. It is something that you should be proud of and I think that is a wonderful way to increase outreach. We often also say talk to the guidance counselors and the other folks and high schools and junior highs and the grade schools about the importance of manufacturing as we look forward to the future that there are lots of great paths. The same paths for both boys and girls.

Donna: Now, I'm also wondering what do you think educators can do to prepare women in particular to be successful in a manufacturing career? How do we make sure that they are retained?

Chandra: So that's a good question, how do we retain women in manufacturing? It really comes down I would say support. That's probably the most key word. They need to be supported. Support comes in lots of different ways, right? It means that they have—as we talked about—a flexible workforce, if you will, a flexible path forward where there are sick days if you are having children and you can come back into the

workforce. You need to have mentoring programs. Women in general in manufacturing really respond when there are other women. And by mentoring, we often talk about by mentoring as looking up. I want someone above me to mentor me. Mentoring also means looking back down the chain and helping bring the next generation of women up and showing them the various paths forward. To keep women in manufacturing, they really need to see where do I go from point “A” to point “B” and how do I move forward? How have other women been successful in it? I think active recruiting is really critical. I’ve often said even for things like boards that we need to be interviewing more women to see what do they want? What is it that they need? What will motivate them to make them stay? I mean we obviously already know about pay gaps and the differences in how men and women are paid, but manufacturing is as a whole usually a little better and these jobs are higher paid than the service industry so I think we need to really actively encourage, for example, female students to go into it. We need to then once they go into it make sure the policy that companies have in place are supportive of the things that women need to do. Then we need to really be mentors both up and down the chain.

Donna: I think that one of the most important things that you’re talking about in both the recruitment and retention side is actually one-to-one personal encouragement. Is this something that you’ve considered? Also, being a cheerleader for women along the way, especially if initially there is not that many women in a class. Really letting her know that this is something she can do. That brings up another point of yours, which is connecting with these associations that you talked about for women in manufacturing and connecting also with the institutes that you mentioned because they likely know at least one woman role model in manufacturing that could come in and provide support. Essentially, also provide information about this is how I did it, this is how you can be successful as well. Chandra, I want to ask you one more question before we close. **If you had to pick only one reason why manufacturing is an excellent career pathway for women, what would it be?**

Chandra: Oh my goodness, one reason? That’s going to be really difficult. I would say the reason is because manufacturing is the future of this country and in fact the future of the world. President Obama basically said it the best, he said at one point, “When women succeed, American succeeds.” And I absolutely believe that is true, and that is across all industries and all segments. Manufacturing, as we talked about, is such a critical sector of our economy and the world economy that we must have women in it and involved and participating and going forward. You will make a difference in the future of this world if you are in manufacturing.

Donna: I love that answer. Thank you Chandra so much for joining us and providing us with your unique perspective on the importance of women in manufacturing.

Chandra: Thank you so much. It was absolutely my pleasure.