The Implications of FemTech and its Current Place in Society

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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I. Introduction

The integration of technology in health care has been a prominent topic of discussion for the past two decades. We have seen innovation in the form of robotic machines assisting in surgery, health apps that can track our heart rate and blood pressure through the interface of a smartphone device, and many other impressive feats. However, it can be argued that one branch of medicine has not been receiving the same type of technological ingenuity that has been helping millions of people: women's healthcare (Corey et al., 2020). For thousands of years, women's healthcare has been overlooked and disregarded and this mindset has been upheld by patriarchal tendencies that are still held even today (Hendl & Jansky, 2021). In 2019 only 4% of the research and development (R&D) organizations' worldwide funding went into research explicitly catered toward women's health. (Stefano & Müller, 2021). Because of this neglect of women's healthcare research, women can be subjected to harmful medical practices and diagnoses that have nothing to do with their health issues (Stefano & Müller, 2021).

Recently, there has been a growing movement towards 'FemTech', a term used to describe companies and products that cater to and help women using advanced and modern-day technology and research. Many people believe that if FemTech companies become a substantial force in society, it can lead to countless benefits for women's health care (Hendl & Jansky, 2021) however, others believe that FemTech may be more harmful than helpful (Corbin, 2020). The research topic that will be discussed is the implications of FemTech and its current place in society, including the limitations and setbacks involved with the industry. This report will also argue the impact that FemTech can have if the obstacles that the industry is currently facing can be removed. The report will incorporate actor-network theory (ANT), a theoretical framework that provides a perspective to observe how inanimate objects such as technologies affect and

shape social and cultural settings (Law, 1992). ANT will help to develop a more holistic view of the contribution that technology can make in the healthcare landscape such as in the FemTech industry. In this paper, I argue that FemTech has the potential to drastically improve women's health care; however, it is not receiving the same attention and investment in technology as other branches of medicine and there is a lack of understanding and representation among male investors who create apps that do not adequately address the needs and concerns of women.

Preconceived Notions of Women's Health Deter FemTech from Succeeding

There is a lot of evidence to show how women are constantly disregarded and dismissed when telling doctors about their pain and symptoms, especially in lower-ranking socioeconomic countries. For breast cancer in India, only 1-8% of patients with breast cancer are given a correct diagnosis in the early stages of the disease (Cheney, 2022, para. 1). A startup called Niramai Health Analytics (NHA) is trying to combat these numbers by developing a hand-held device that could potentially diagnose breast cancer cases which could be a momentous technology bringing affordable health care (Cheney, 2022, para. 2). However, their current position for receiving funding and support is facing a lot of obstacles.

The current state of the FemTech industry has a lot of potential for success in fact, analysts estimate that the market will be worth approximately 50 billion by 2025. Even with these impressive numbers, FemTech startups like NHA have an exceedingly difficult time trying to get investments and help from outsiders. Only 3% of digital healthcare deals from 2011 to 2021 catered toward women's healthcare needs (Faubion, 2021). As seen in Figure 1, recent years have seen an overall downward trend in funding. Sources suggest that investing in FemTech could help with fertility, menstruation, and breastfeeding, as well as address chronic

disease management specific to women, urinary health, breast healthcare, and many more topics (Wiederhold, 2021). Investment in these products has the potential to greatly benefit women, but their absence could also harm them. Many FemTech products can provide diagnostic information, and as mentioned before, a lot of women are misdiagnosed when going to their regular doctor. For example, the majority of patients with an autoimmune disease are women, and getting a correct diagnosis for them takes nearly 5 years. That is why Eva Galant, an entrepreneur working in the FemTech industry, created Hashiona, an app that provides a personalized lifestyle for those suffering from the autoimmune disease Hashimoto's based on the users' symptoms (Kent, 2021). Hashimoto's disease can take up to 8 years to diagnose and primarily affects women so the potential that this app has to make a difference in the lives of those affected is compelling. Instead of wondering whether FemTech is necessary, the question should be how quickly we can address the flaws in the industry to prevent more unnecessary deaths.

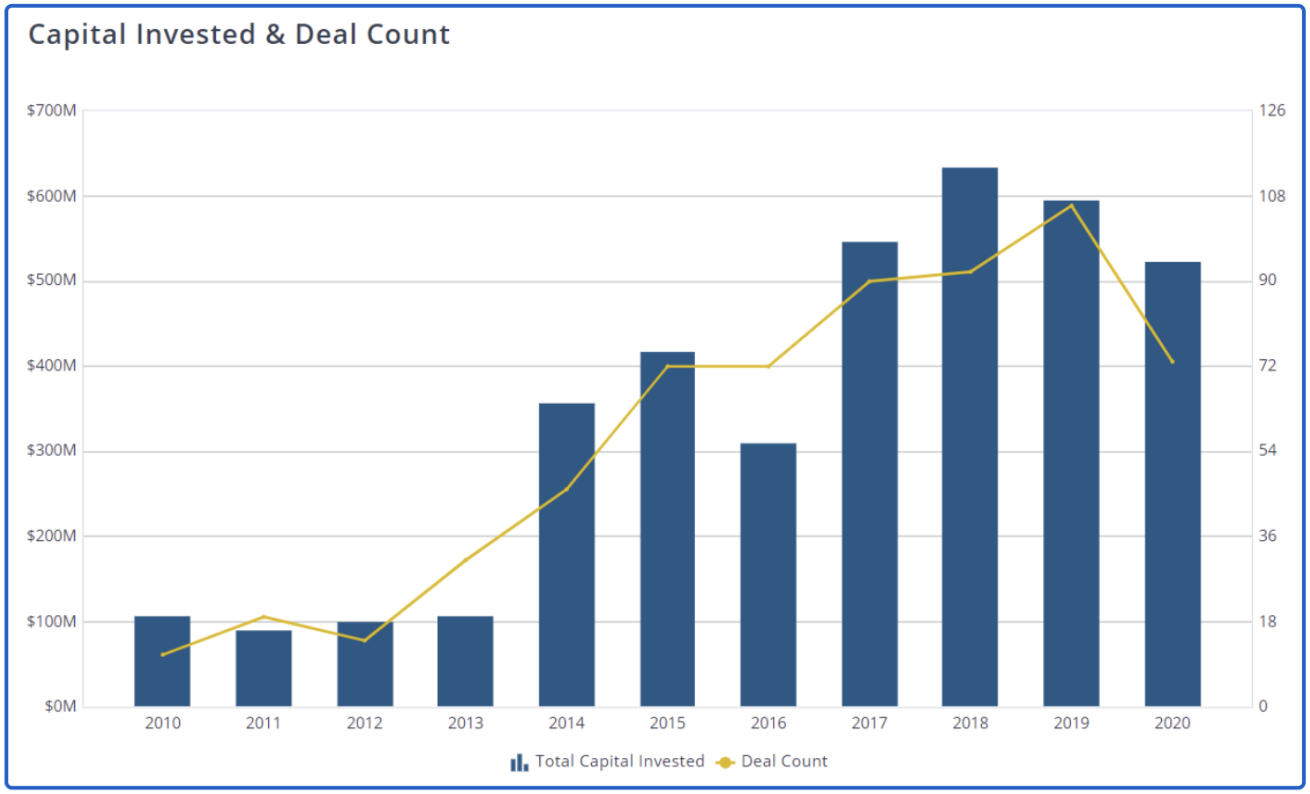

Figure 1. Capital Invested in FemTech & Deal Count. This graph shows the history of capital invested in FemTech products from 2010 up until 2020. Although there is an incline from 2013 to 2018, it drops off and starts trending downwards (Cohen, 2020).

The reason why these startups are having so much trouble getting venture capitalist funding can be attributed to a multitude of factors. The first and foremost factor is the ever-present taboo around women's health care. One reason why these products are not getting enough exposure is because of the lack of access to women's sexual health ads on social media due to their being deemed inappropriate (Cheney, 2022). This simple issue can have a major impact on the visibility of these products. Another issue is the gender disparity in the venture capitalist industry. According to an Axios analysis, 65% of United States-based venture capitalist

firms have little to no female representation (Gompers et al., 2022). As seen in table 1, it is evident that the distribution of women in venture capital firms differs sharply from that of men.

This leads to female-led startups pitching their ideas to men who don't even understand the problems they're trying to resolve. In the case of Eva Galant, she found that many of the men she was pitching to had no understanding of what Hashimoto's disease was, therefore they were not interested in her app (Kent, 2021). Eva even tried to equate the symptoms of Hashimoto's disease to the symptoms of an alcohol-induced hangover to try to relate to male venture capitalists (Kent, 2021). Male investors don't see a profit in topics they don't understand which is what leads to a lot of FemTech companies being underfunded and underrepresented. Many scholars believe that if FemTech companies were able to secure the necessary funding, the statistics around underfunding and underrepresentation of all women-led companies could be improved. However, there is still a lot of uncertainty and hidden doubts surrounding the FemTech industry.

Table 1. Distribution of women in Venture Capitalist Firms. This table documents the number of women that were ever worked at a venture capitalist firm and the number of deals in which they were involved (Gompers et al., 2022, p. 13)

No. of Women in a Firm	No. of Firms	% Firms	% Firms with Women	Total No. of Women at Firms	% Women	No. of Female Deals	% Female Deals	No. o Female Deals After 2nd Woman Joins	% Female Deals After 2nd Woman Joins
0	644	79%							
1	126	15%	75%	126	56%	768	53%	0	0%
2	31	4%	18%	62	28%	437	30%	417	63%
3	11	1%	7%	33	15%	226	16%	215	33%
4	1	0%	1%	4	2%	26	2%	25	4%
Total	813	100%	100%	225	100%	1,457	100%	657	100%

Corbin (2019) argues that the funding for these startups and multimillion-dollar projects comes from the pockets of mainly caucasian men who have little to no experience with what women actually go through and what they need. If a homogenous group of people creates a

product or service, it is likely that the product or service will only cater to the needs and preferences of that specific group, and may not consider the needs and preferences of other groups of people (Bjørn & Menendez-Blanco, 2019). Many scholars are worried that digital products are reinforcing sexist stereotypes and promoting negative ideals through inaccurate information created by misinformed individuals (Hendl & Jansky, 2021). The study done by Hendl and Jansky showed that many well-known, profitable apps such as Clue defined their main user as a young, white, cisgender, able-bodied woman. Femm, another period tracking app, gained controversy for its funders, who included anti-gay and conservative Christian organizations. Those organizations were trying to discourage women from using hormonal contraception methods as if they affected a woman's 'natural cycle' (Mishra & Suresh, 2021). Faubion (2019) argues that this issue goes beyond the lack of inclusive language with another major issue within the FemTech industry being that companies never focus on products that are catered toward aging women. Aging women are often overlooked by the media, digital health apps, and society in general which can be detrimental to their health. For FemTech to overcome its obstacles, it is essential to identify the best methods by which the industry can improve itself. This starts with changing the social stigma and social culture around women's health and then looking at the industry's darker side surrounding societal culture and capital.

III. Supporting Argument No. 2: Actor-Network Theory and Arnold Pacey

Actor-Network Theory (ANT)

This section utilizes both the Actor-Network Theory (ANT) in conjunction with the framework from Arnold Paceys' The Culture of Technology to explain why the FemTech industry has not been able to reach its full potential. ANT is a method in which both human

entities and non-human entities work together to create a structural network that comprises a system (Law, 1992). All the ‘actants’ in a network depend on each other to maintain equilibrium within a system (Law, 1992). By using this approach to interpret networks, the non-human entity can play as significant a role as the human entity, allowing for a broader, more holistic approach to system analysis. ANT also assumes that reality is loosely shaped, meaning that all actants are fluid, relational, and can change at any moment given the circumstances and environment. It is said that an actor can hold multiple states at once and that one state can be spotlighted by changes in the situation. Therefore, networks proposed in the ANT framework are constantly evolving and moving with the motion of societal change. By adopting a fluid and relational approach to studying networks, ANT can help to inform the strategies and decisions of those looking to support the growth and success of the FemTech industry. This approach allows for a more dynamic and flexible understanding of the various actors and forces shaping the development of the industry, and can provide valuable insights for stakeholders looking to navigate the complexities of this emerging field.

How ANT Can Be Applied to FemTech

In the case of FemTech, technology is essential to the industry's operations and social impact. ANT allows the role of technology, including apps and other products that deal with women's health, to be one of the central players in this system. According to ANT, actors can only act in concert with other actors, therefore a technological improvement cannot affect society on its own, rather it must affect society through the human interest it serves. Therefore, many actors contribute to the overall system, as seen in figure 2, including technology products such as

apps like Clue, the venture capitalists that fund the FemTech startups, and the users that make use of these products.

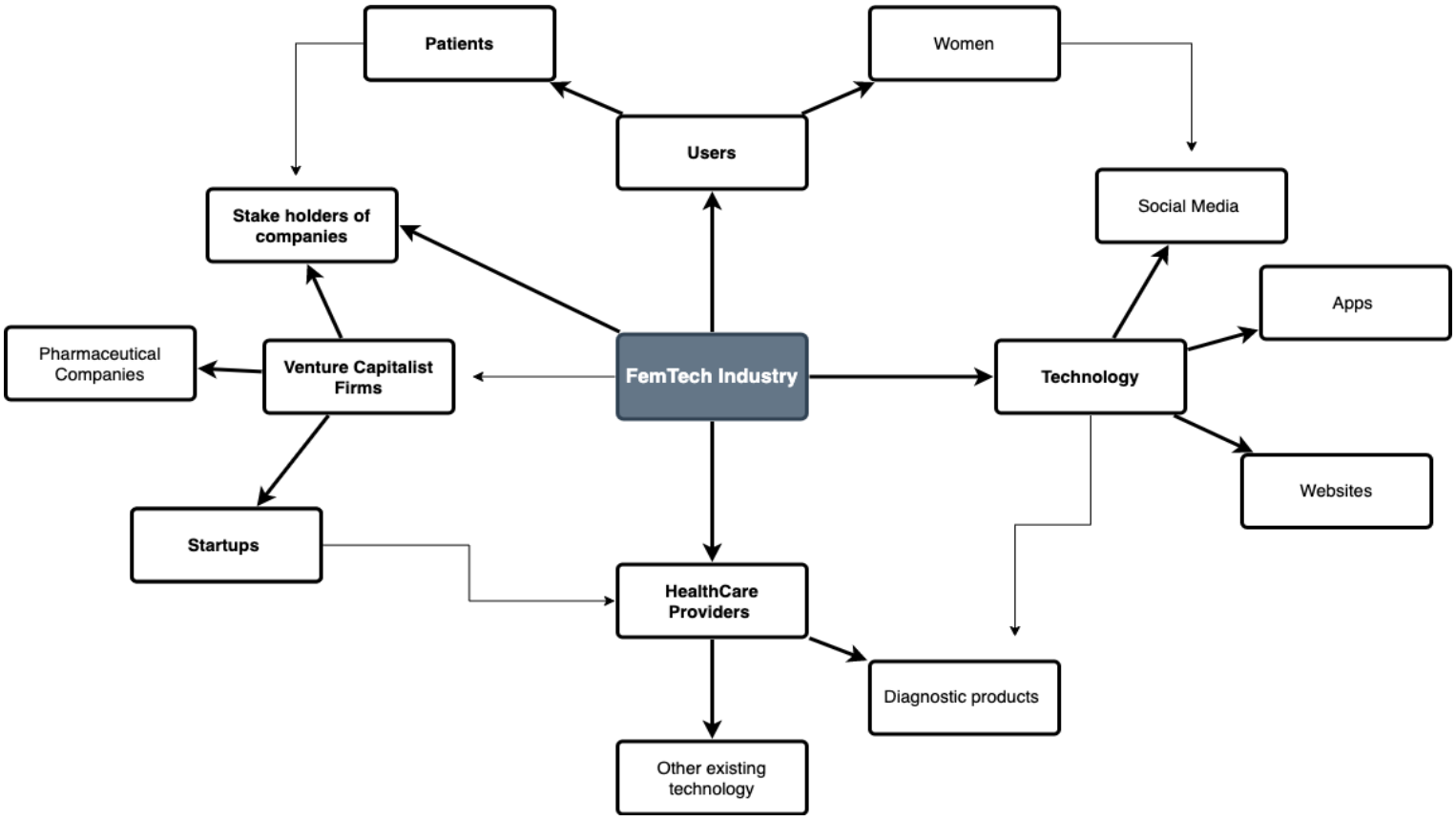

Figure 2: Rough draft of the utilization of actor-network for the FemTech industry with the main components at play being the products, the funding, the users, and the healthcare providers (Made by Author).

When looking at the ever-changing field of healthcare and fast-paced technological innovations, it is important to take into account the fluidity that the Actor-Network theory provides since each actant can change given the circumstances. In the event that a particular technology sees a lot of traction, such as Clue, which now has over 8 million users on the app, then the market will shift, and venture capital firms will begin to take notice. These nuances are

very important when looking at the complexity and fluidity of reality and how it affects the relationships between actors.

The Culture of Technology

The next framework that can be used in correspondence with the FemTech industry is Arnold Paceys' The Culture of Technology. Pacey provides a unique perspective on how society has handled the fast-paced world of technological innovation. He claims that as a society we are racing to invent the newest thing without taking the time to perfect the current technology that exists (Pacey, 1983). Those involved in innovation and invention get distracted by the 'aesthetic of creation' and do not look at the consequences of their product being introduced into society. In Pacey's opinion, consumer needs and ethical and moral obligations are overlooked when financial motivations are at play (Pacey, 1983). A key point he tries to convey is how technology has great cultural, political, and social ramifications and how creating technology without looking at how it affects the multiple realms can have residual effects. Objectification of technology must no longer be the method that creators use, instead, they must discard their tunnel vision thinking and look at the bigger picture. Pacey mentions that the way to achieve progress on a holistic level requires both civilian and creator education in both science and technology, as well as a nuanced conversation between the two parties.

How Pacey's Framework Can Be applied to FemTech

A lot of the problems that arise in the FemTech industry can be traced back to the individuals that fund the companies. As Corbin argued, a lot of primarily male, caucasian men take on the role of investors since they are what make up the majority of venture capitalist firms. This leads to apps that are made for women, being made by men. We can use Paceys' framework to explain why this phenomenon might be harmful in the long run. The problem arises from

investors who focus more on aesthetics and financial incentive than on how the products will affect their intended audiences.

Results

Considering the research and analysis presented above, the FemTech industry is currently characterized by a system in which multiple actors are pushing against one another and creating conflict. In order to address these conflicts, it is important to look at each relationship separately and then as a whole to determine the best step forward. The relationship between startups and venture capital firms is at the forefront of the issue. A significant portion of FemTech startups, regardless of how innovative their product may be, are not able to get the funding that they need to progress further in the field. As mentioned before, this is mainly due to the preconceived notions and implicit bias that people have of women-led companies. It seems as though when people conjure up an image of a successful entrepreneur it is almost always a confident man, promising a high rate of returns and growth.

There are examples of this bias everywhere; even if one searches for ‘entrepreneur’ in Google images, the majority of images will be of men. The relationship between these two parties does not seem to serve anyone as the market has a potential worth of billions of dollars and by 2030 37% of the world's population will be middle-aged and young women while 38% will be older women (Kent, 2021). In order to beat the unconscious bias surrounding female-led startups it first needs to be discussed and talked about. Professionals need to be educated on the idea that their implicit bias is hurting female ambition and opportunity for growth. This goes hand in hand with Paceys’ claims that education is the only method by which technological creation can achieve high moral and ethical standards.

The second relationship that is important to consider is the one between the technology products and their creators/funders. The idea that technology designed for women is being developed by men is an extremely ironic statement, but still a true representation of what is happening. These apps that are created hold more of an impact on socioeconomic and cultural aspects than originally thought. Using Paceys' framework it is evident that there is more than what meets the eye when looking at a technological creation such as a period tracking app. Our understanding of apps as a new form of influencing socio-cultural elements implies that there is an impact on the user from the media elements and the way the app is structured.

Apps are designed and marketed to reach a certain type of user, regardless of who is actually using them and that can be seen in the case of period tracking apps that only focus on the 'normal woman' (Hendl & Jansky). The idea of a 'normal woman' is one that does not have an irregular cycle or missed periods, or have a period if you are a transgender individual. The lack of inclusive language on these apps can be extremely detrimental to young, impressionable girls who are learning about their bodies and even women who just wanted to try out these apps. Although these apps are non-human entities, according to the ANT framework they still work in conjunction with the other actors to create a holistic network therefore they must be considered an active force in creating harmful rhetoric.

There is no single solution to this issue and it will require a fundamental shift in the way society perceives women's health care. As mentioned before in Paceys' framework, there must be a dialogue between the user and the creator to discuss what exactly the user needs are and what the creator must focus on. Users must be able to exercise autonomy in decision making and creators must give them the freedom to do so. As seen in table 2, the questions that are proposed there serve to address each level of the product for both the user and the creator. It is obvious that

both the user and the creator have a different agenda from each other with the creator being more concerned about objectivity and financial gain while the user is more concerned about the quality of their life. In the event that the basic values of a product differ between the consumer and the creator, a harmful sociocultural impact will undoubtedly result. At each level of testing, there must be a conversation between the user and the creator to determine if the product meets the standards of ethical and useful capacity. The design, development, and testing process must be iterative and include user feedback at every point in the timeline. Pacey claimed that there is a need for technological creation without a second thought to the ramifications of creation and that sentiment can be seen in the FemTech industry. There is a rush to push products to the market for more financial gain and that can cause careless errors.

There is also an imperative need for diversity in management teams that create and fund these technologies to allow for all viewpoints to be acknowledged and considered. As claimed by Bjørn & Menendez-Blanco (2019), when a uniform group of people create a product, that product will cater exclusively to its creators' network. Using these frameworks helps us to understand why FemTech is not addressing the full scope of women's needs and what methods we can use to overcome this issue.

Table 2: Representation of the different points of view that arise from technological development. Shows the disparity between what users and creators want (Pacey, 1983, p. 155).

Queries	Expert views	User views
Practical benefits and costs		
What benefits are sought?	Very specific benefits (e.g. control of a particular disease)	Better living standards in general, including health, amenity, housing, jobs
What costs, what risks, and what environmental impacts are perceived?	Cost of implementation; risks as a statistic to be weighed against benefits	Costs in time, cash, amenity, organization, risk, seen in personal and family terms
Who gains which benefits? Who loses?		Lowest income groups cannot afford the cash costs
Status and political advantage		
What is the impact of the project in terms of status and prestige?	Visible progress, good for national prestige Professional advancement for the experts concerned	Status associated with possession of new household amenity
Who gains or loses status, power or influence?	Some strengthening of central government authority	Some loss of control over lifestyle; fear of bureaucratic power
Basic values		
What is the cultural context?	Scientific/technical; the expert sphere	Domestic/traditional; the user sphere
What are the dominant values?	Technical interest and virtuosity; economic values	Need or user values, family welfare

Conclusion

In this research paper, it is clear that Actor-Network Theory and Paceys' The Culture of Technology are adequate frameworks to use when analyzing the inner workings of the FemTech industry. The reality of the industry is ever-changing and evolving, requiring the idea that actors can have multiple states depending on the circumstances. A process design was developed that identified the FemTech actors and analyzed their status through Pacey's lens. The network was then built by identifying the relationships between the various actors and actors. As a final step, each connection between the actors was examined categorically, using Pacey's framework to identify trends and solutions.

These frameworks demonstrate that FemTech has not yet reached its full potential. This is because many people do not realize the consequences of mindless creation and financial motivation without ethical motivation. This study aims to establish a common path forward in determining the next steps for the future of FemTech. The future of FemTech remains up to societies' will to move past their preconceived, outdated notions of women's health care and use the emerging technology for the greater good.

References

Bjørn, P., & Menendez-Blanco, M. (2019). Femtech: Broadening participation to digital technology development. *Proceedings of the 27th ACM International Conference on Multimedia*, 510–511. https://doi.org/10.1145/3343031.3355512

Cheney, C. (2022, January 12). *How technology can revolutionize women's health care*. How technology can revolutionize women's health care | Devex.

Corbin, B. A. (2020). Digital Micro-Aggressions and Discrimination: Femtech and the 'Othering' of Women. *Nova Law Review, 44(3),* 337-364.

Cohen, J. L. (2020, October 27). *Investing in femtech: The case for women's healthcare (part I)*. Medium.

Corey, L., Vezina, A., & Gala, R. B. (2020). Using Technology to Improve Women's Health Care. *The Ochsner journal*, *20*(4), 422–425.

Faubion, S. S. (2021). Femtech and midlife women's health: Good, bad, or ugly? *Menopause*, *28*(4), 347–348. https://doi.org/10.1097/gme.0000000000001742

Gompers, PA., Mukharlyamov, V., Weisburt, E., Xuan, Y. (2022). Gender Gaps in Venture Capital Performance. Journal of Financial and Quantitative Analysis, 57(2), 485-513. https://doi.org/10.1017/S0022109020000988

Hendl, T., & Jansky, B. (2021). Tales of self-empowerment through digital health technologies: A closer look at 'femtech.' *Review of Social Economy*, 1–29. https://doi.org/10.1080/00346764.2021.2018027

Kent, C., & GlobalData. (2021, July 26). *Femtech funding lags behind Media Hype*. Medical Device Network.

Law, John (1992) 'Notes on the Theory of the Actor-Network: Ordering, Strategy and Heterogeneity', *Systems Practice (5)*, 379-93.

Lu, Donna. (2019). The femtech gold rush. *New Scientist*, 242(3232), 20-2. https://doi.org/10.1016/s0262-4079(19)30973-x

Mishra, P., & Suresh, Y. (2021). Datafied body projects in India: Femtech and the rise of reproductive surveillance in the digital era. *Asian Journal of Women's Studies*, *27*(4), 597–606. https://doi.org/10.1080/12259276.2021.2002010

Pacey, A. (1983). The Culture of Technology. *The MIT Press*. 1-160.

Rosas, C. (2019). The Future Is Femtech: Privacy and Data Security Issues Surrounding Femtech Applications. *Hastings Business Law Journal, 15(2),* 319-341.

Stefano, A. D., & Müller, T. (2021, May 17). *The Rise of Femtech: An Analysis of the Femtech Industry and its Female Entrepreneurs' Experiences* .

Ventola C. L. (2014). Mobile devices and apps for health care professionals: uses and benefits. *P & T : a peer-reviewed journal for formulary management*, *39*(5), 356–364.

Wiederhold, B. K. (2021). Femtech: Digital Help for Women's Health Care Across the Life Span. *Cyberpsychology, Behavior, and Social Networking*, *24*(11), 697-698.