RESEARCHING THE BARRIERS TO WOMEN'S TECHNOLOGY ENTREPRENEURSHIP: A SYSTEMATIC REVIEW OF THE LITERATURE

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INTRODUCTION

As Cukier et. al., (2020) have stated, both entrepreneurship and entrepreneurship studies are dominated by discourses and policies that privilege one entrepreneur archetype: the young white male most often associated with the science, technology, engineering and math (STEM) fields. Figures like Mark Zuckerberg, Bill Gates, and Steve Jobs dominate the popular conception of the entrepreneur - and especially that of the technology entrepreneur.

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Women entrepreneur figures are chronically underrepresented. When they are portrayed, they are often highly criticized, a

salient example of which is Elizabeth Holmes (Aidis, 2018). They are often placed on the fringe of "legitimate" entrepreneurship in feminized industries such as home decorating, cooking, self-care, cosmetics and fashion, or shopping (Cukier, this issue; Meliou et al., 2018). They are often labelled with terms like "mompreneur" and "funpreneur" and subjected to "feminine devaluation" (Ronen, 2017, p. 2; Byrne et al., 2019).

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THE ENTREPRENEURSHIP ECOSYSTEM

Cukier et al. (2017; See also Cukier in the introduction to this issue) point to an ecology of barriers that undermine women entrepreneurs and trivialize their use of technology. To effectively understand and assess barriers to diverse women entrepreneurs, scholarship must examine each level of the entrepreneurial ecosystem: individuals, organizations, policies, and cultural norms. Identification and mitigation of barriers at only one level of the ecosystem will only be partially effective, and such initiatives may not endure over time. For example, some scholarship has identified the lack of women in STEM as a possible pipeline issue that impacts the number of diverse women technology entrepreneurs. However, even as numbers of women in STEM have increased, women technology entrepreneurs have still struggled, and numbers have remained low (Cukier et. al., 2020).

To understand the full spectrum of barriers for women entrepreneurs in the tech or ICT space, we wanted to understand if indeed an entrepreneurship ecosystem model is useful. We thus conducted a literature review of the most recent literature, in the hopes that we could determine some opportunities for interventions and highlight spaces that still need attention. We examined the most recent scholarship at the time of writing to see general trends and identify barriers for women entrepreneurs with respect to technology or ICT use.

METHODS

We began with the guiding question: What does the most recent research related to women entrepreneurs and ICT or technology use reveal about key opportunities and barriers? From this question we conducted a systematic review of the recent literature. The literature used in this study was identified through querying the search string (women OR female) "entrepreneurs" AND (technology OR tech OR ICT* OR digital) in the Royal Roads University library database for research published in 2019. The preliminary query returned 435 records. Parameters were set to exclude articles that were not peer-reviewed, which narrowed the population to 236 records. Records were then reviewed for duplication (n=20) and lack of alignment with the research question (n=171). The remaining dataset of 44 articles formed the sample of records that would be coded for this study. We grouped the articles according to broad themes based on any findings or insight into ICT or technology use for women entrepreneurs. We were able to identify three broad themes in the literature:

1. ongoing discussion of who qualifies as a technology entrepreneur;
2. highlights of the benefits and challenges of ICT and tech as they relate to women entrepreneurship; and
3. barriers to fostering women tech and ICT entrepreneurs.

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TECHNOLOGY ENTREPRENEURS, WHO COUNTS?

In an age where crowdwork, the sharing economy, and the gig economy have transformed self-employment, the definition of who counts as a technology entrepreneur has not kept up with the times, and needs to be reimagined (Bogenhold, 2019). The most recent literature confirms that technology still tends to be associated with men as a result of broader (popular) cultural messaging (Wheadon, & Duval-Couetil 2019; Wu, 2019). Additionally, women are still not captured in the broad idea of entrepreneurship generally - male entrepreneurship tends to be reinforced in the media, to the detriment of women. For example, the treatment of women entrepreneurs in tech on the popular show Shark Tank tends to belittle or demean their expertise (Wheadon, & Duval-Couetil, 2019). This doesn't make sense when considered in the context of some of the world's most successful technology firms. For example, Shaw, & Sørensen (2019), note how Amazon is a retail business that is also known as a technology company, Tesla is a manufacturing business that is known as a technology company, and even Walmart is considered to be moving into the technology space. Despite these notable examples (all with Male CEOs), often women-owned businesses that use technology to sell products or services do not count as technology companies (Meliou, Mallett, & Rosenberg 2018). Women often lack perceived legitimacy in the technology entrepreneurship space by virtue of being women (Vershinina, Rodgers, Tarba, Khan,

& Stokes, 2019). Women tend to have less access to programs that can help them grow as technology entrepreneurs (or even entrepreneurs with technology) (Coleman, Henry, Orser, Foss, & Welter, 2019), and as a result women owned businesses are generally smaller and more likely to fail than men's are (Yacus, 2019).

BENEFITS AND CHALLENGES OF ICT USE FOR WOMEN ENTREPRENEURS

For both women entrepreneurs in the technology space, and women entrepreneurs who simply use technology as part of their business, there are many benefits to using ICT in the course of their business. ICT use allows women entrepreneurs to reach a much broader audience than they would otherwise, particularly for those entrepreneurs in rural areas (Kapinga, 2019; Bhattacharya, R, 2019). ICT use can also connect women entrepreneurs from underserved areas with mentorship opportunities they would otherwise be unable to access (Byrne et. al., 2019), increasing women entrepreneurs' social capital, and in particular, bridging social capital (Crittenden, Crittenden & Ajjan, 2019). The integration of ICTs into their businesses also helps women to start businesses with less upfront costs. It allows women who do not have a physical location for their business to increase their reach, and expand their business networks and other opportunities (Matthews, 2019), bridging social and cultural divides to potentially reach new markets for their products and services (McAdam, Crowley, & Harrison, 2019; Pinem, 2019).

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For women who wish to scale their businesses, ICTs can help them do this by providing both access to information and also funding opportunities they wouldn't have otherwise (Pergelova, Manolova, & Yordanova, 2019). Though typically women have a harder time financing their businesses than men do (Cukier, 2017), crowdfunding platforms and algorithmic funding opportunities can level the playing field if gender is left out of the description of the business (Zhang & Chen, 2019; Hervé, Manthé, Sannajust, & Schwienbacher, 2019; Hernandez, Raveendhran, Weingarten, & Barnett, 2019). For women entrepreneurs juggling multiple responsibilities, ICTs and particularly social media can make them, and their labor, more visible. One positive study showed that "work at home moms" receive more acknowledgement for their professional endeavors than they have in the past (Russum, 2019).

The use of ICTs for women entrepreneurs also presents new challenges, however. When women entrepreneurs use social media to reach new markets, they are required to engage in the affective labor of online identity construction and maintenance (Anderson, Warren, & Bensemann, 2019). The use of ICTs can lead to the blending of public and private life and time, which negatively impacts work-life balance, and intensifies work for the entrepreneurs who are using ICTs (Adisa, Gbadamosi, Mordi, & Mordi, 2019; Brydges, 2019; Matthews, 2019). Often the industries that are most likely to have women entrepreneurs with a technology focus are ones that centre on "mompreneurs", "funpreneurs" or fashion and fitness entrepreneurs, which means that the women working in these industries also must undertake aesthetic labor – that is the need to ensure that they personally fit a desirable aesthetic all the time (Brydges, 2019). This means that women entrepreneurs on social media or in the technology space in a visible way are always on display, as their life and lifestyle choices bleed into their business and business promotion more that it would for their male counterparts. (Brydges, & Sjöholm, 2019).

BARRIERS TO DEVELOPING WOMEN'S ENTREPRENEURSHIP IN ICT

> "These male-centric cultures and cultural values mean that women opt out of pursuing the same opportunities as men, meaning that initiatives that could grow the pipeline often fail to do so. This is often due to systemic misogyny issues present in the technology sector, startup incubators, and the business financing sector."

Despite the many benefits of technology for entrepreneurship, recent research shows that men are more likely to be "lead users" of ICT in companies. Men tend to have higher job levels (for example, CEOs are more likely to be men) and are more likely to adopt and guide mobile technology use in companies (Hallikainen, Alamäki, & Laukkanen, 2019). This trend may be due in part to the fact that initiatives to foster women's entrepreneurship, particularly with regards to technology entrepreneurship are still lacking. For example, high-technology incubators tend to be high-pressure, male driven environments with cultures that are at best unappealing and at worst actively hostile to women (Bendell, Sullivan, & Marvel, 2019). While some scholarship suggests that specific personality traits that tend to be associated with men (such as stability, extroversion and willingness to take risks) are requirements for digital entrepreneurship (Bode, Bode et. al., 2019), these are likely the result of gender biased structures that undervalue the input, skills and traits that women technology entrepreneurs possess (Striebing, Kalpazidou Schmidt, & Palmén,

2019). These male-centric cultures and cultural values mean that women opt out of pursuing the same opportunities as men, meaning that initiatives that could grow the pipeline often fail to do so. This is often due to systemic misogyny issues present in the technology sector, startup incubators, and the business financing sector (Hernandez, Raveendhran, Weingarten & Barnett, 2019).

Digital divides still exist for many women entrepreneurs who would otherwise enter into the technology space. For example, entrepreneurs who are themselves in poverty or otherwise limited in resources and cannot access the needed physical technology or reliable broadband internet, cannot experience the benefits of ICTs for their businesses, nor can they start a business that is primarily internet based (Neumeyer, Santos, & Morris, 2019). Finally, for women who speak English as a second language and who come originally from countries that privilege access to education for men over women, coping with technology and conducting business using technology can be a major challenge (Shastri, Shastri, & Pareek, 2019).

IMPLICATIONS

The literature makes clear that, although in some ways ICT creates new and important opportunities for women entrepreneurs to technologize their businesses and create new opportunities, key barriers exist culturally, politically and practically that will first of all limit the number and types of women who choose to start ICT based businesses, and secondly, result in those women who currently have ICT based businesses to choose to drop out, or otherwise experience failure. This is particularly salient during a time when COVID-19 has increased the responsibilities on women for childcare, emotional labour and other work in the home. Importantly, though ICTs present new opportunities for women entrepreneurs, they also amplify some of the challenges women entrepreneurs were already facing, and introduce new ones.

> “The ecological model proposed by Cukier allows us to understand and likely address key barriers for women entrepreneurs in the ICT or technology space. It recommends that initiatives be introduced at multiple levels, so that problems of culture, access to resources, education, and changes in policy are all taken into account.”

The ecological model proposed by Cukier (2017; Cukier et. al, 2020; Cukier, introduction to this issue) allows us to understand and likely address key barriers for women entrepreneurs in the ICT or technology space. It recommends that initiatives be introduced at multiple levels, so that problems of culture, access to resources, education, and changes in policy are all taken into account. The recent literature, taken together, shows that indeed there is an ecology of overlapping barriers at work that may be excluding women in business with an ICT component from identifying as technology entrepreneurs and also from resources that benefit technology entrepreneurs. A 360-degree approach is thus needed to support women entrepreneurs in the technology or ICT space.

In support of women entrepreneurs in Canada, who may represent a wide variety of cultural, geographic, and socio-economic backgrounds (Cukier et. al., 2020), we can learn from the latest scholarship. We must consider how technology and technology entrepreneurship is defined, and how these definitions exclude women. We must aim to build more tools and educational opportunities (such as gender-blind algorithmic funding mechanisms; or woman-friendly incubators) that facilitate equal access, and we must integrate policy changes to provide support for self-employed, gig economy, and social media based small business.

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