

Female Entrepreneurship in the ICT Sector: Success Factors and Challenges

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Abstract

The purpose of this cross-country study is to explore factors that affect the success of women entrepreneurs engaging in ICT-related businesses and identify the major challenges that they face. This study used a qualitative-interpretive research design. Collected data from in-depth interviews with female entrepreneurs in eight non-western countries were analyzed to explore their entrepreneurial experiences. This study focused on success factors and challenges in a multiple-level approach involving macro- and micro-perspectives. This study found that a dynamic interplay of various factors, including environmental factors (e.g., policies of gender equality and female entrepreneurship, ICT infrastructure, and mentoring support) and individual factors (e.g., active use of ICTs, and sound entrepreneurship philosophy), shaped the women's entrepreneurial experiences and influenced female entrepreneurship. Women entrepreneurs experienced various challenges from deep-rooted gendered socio-cultural practices, including the work-life balance. Building on the insights from the dynamic interplay of factors affecting women entrepreneurs' successes and challenges, the present study offers suggestions for creating and fostering an active female entrepreneurship ecosystem in the ICT sector.

Key words

women, gender, female entrepreneurship, ICT, success factors, challenges

Introduction

The field of female entrepreneurship has been continually expanding in the twenty-first century. Studies of female entrepreneurship indicate that it plays an important role in employment, economic growth, and innovation (Brush, Carter, Gatewood, Greene, & Hart, 2006; Brush & Cooper, 2012; Cabrera & Mauricio, 2017; Verheul & Thurik, 2001), particularly in developing countries (Terjesen & Amorós, 2010). Women's entrepreneurship is being increasingly regarded as an effective viable driving force for development in the current social environments facing aging populations and sluggish economic growth (OECD, 2017; Price & McMullan, 2012). Besides, female entrepreneurship enhances the diversity of entrepreneurship and provides women with opportunities for self-expression and self-realization (Eddleston & Powell, 2008). Worth noting is that the recent advancement in information and communications technology (ICT) tools may facilitate female entrepreneurship by creating enabling conditions, such as social media marketing and easier market access (Goswami & Dutta, 2015; Kamberidou & Pascall, 2020; Komunte, 2015).

Despite such potential benefits of female entrepreneurship, women-owned businesses tend to be smaller, less profitable, and slower to grow than men's (Bates, Robb, & Parker, 2013; Wang, 2013). Women are still underrepresented among entrepreneurs, especially in the sectors with high-growth potential (Pascall, 2012; GEDI, 2015). In general, women entrepreneurs are concentrated in the sectors, such as personal service and retailing, which are less profitable and rarely create new values (Bates, 2002; Brush, 1997).

Despite the growing significance of female entrepreneurship and its contribution to economic development, there exists research gaps about female entrepreneurship that need to be urgently addressed. First of all, women's entrepreneurship is still understudied (De Bruin, Brush, & Welter, 2007; Brush, De Bruin, & Welter, 2009). Brush and Cooper (2012) suggested that studies of women entrepreneurs accounted for less than 10% of all studies in the field, calling for more research on the topic. Besides, although studies from Asia, Eastern Europe, and Latin America have started to emerge recently, the vast majority of existing research about women entrepreneurs is still western-centric (Brush & Cooper, 2012). Thus, much less is known about female entrepreneurship in non-western regions. Also, there is a lack of in-depth studies of women entrepreneurs' lived experiences. According to Henry, Foss, and Ahl (2015), the vast majority of studies published over 30 years used quantitative research methods, which indicates a need for more

qualitative studies. Finally, research on how women entrepreneurs doing ICT-related businesses live out their entrepreneurial experiences is also limited. Despite the alleged roles of ICTs in promoting female entrepreneurship, there is unfortunately a lack of knowledge on how women entrepreneurs use ICTs for their businesses in broader contexts.

Set against this background, the research reported here explores the entrepreneurial journeys of eight women entrepreneurs in the ICT sector. These women entrepreneurs are from eight non-western countries, and their businesses are at least moderately successful. Using a qualitative, interview-based methodology, this study provides insights into stories of successful women entrepreneurs in the ICT field with focus on their success factors and obstacles. Research questions guiding this study are:

- 1) What factors affected the success of women entrepreneurs in ICT-related businesses?
- 2) What major challenges did women entrepreneurs face?

Findings of the research on success stories of women entrepreneurs in the ICT sector, a relatively unexplored phenomenon, have implications for both future and current women entrepreneurs looking for guidance in their entrepreneurial activity, for governments seeking to establish policies and programs to promote female entrepreneurship, and for those trying to support women in developing entrepreneurial capacities.

Literature Review

Female Entrepreneurship

Female entrepreneurship is one of the fastest growing entrepreneurial activities in the world (Brush & Cooper, 2012). According to the Global Entrepreneurship Monitor (GEM) 2018/2019 Report (Bosma & Kelley, 2019), the average rate for women's total entrepreneurial activity (TEA) in 59 countries surveyed is 10.2%, representing approximately 75% of men's rate. Compared with that of the period 2016–2017, the rate increased by 1% overall, and the gender gap dropped from 31% to 28%. Significantly, female entrepreneurship rates are generally higher in less developed countries than in developed countries. According to the OECD (2017), the average rate for female entrepreneurship in 10 Association of Southeast

Asian Nations (ASEAN) member states is as high as around 40%, whereas that of OECD countries is 13%.

With the growth of female entrepreneurship, research studies have examined various aspects of that growth, including gender comparisons, motivations, and obstacles. Some studies (e.g., Fagenson, 1993; Sexton & Bowman-Upton, 1990) focused on comparisons of characteristics of male and female entrepreneurs, such as education, prior experiences, entrepreneurial intentions, and personality traits (e.g., risk aversion, self-efficacy, and growth aspirations), and noted gender differences. For example, a cross-country study (Bach, Skok, & Suša, 2016) involving 541 students majoring in ICTs in Croatia and Slovenia revealed that female students had a statistically lower intention of becoming an entrepreneur than male students. A similar study (Bach, Ana, & Skok, 2018) conducted in Slovenia confirmed the findings of work by Bach et al. (2016) regarding the role of gender in entrepreneurial intentions. With regard to growth aspirations, prior research (e.g., Cliff, 1998; Turk, 2006) showed that women entrepreneurs place a lower value on the high growth of their business in terms of size and revenue, prioritizing instead the maintenance of a satisfactory work-life balance and life values. On the other hand, as regards gender differences in personality traits, such as risk taking and autonomy, Poggesi, Mari, and De Vita (2015) reported that research findings were not conclusive, based on a review of 248 studies of female entrepreneurship. Similarly, Malach-Pines and Schwartz (2008) noted that differences between the two groups of entrepreneurs were sometimes minor, compared to differences among women entrepreneurs doing different entrepreneurial activities.

Another strand of research focused on women's motivations to undertake an entrepreneurial path. For examining this topic, the push and pull dichotomy (Dawson & Henley, 2012) has been frequently used as the main theoretical framework. Push factors are those which drive women to start up a business, for example, lower employment opportunities, economic necessities, and glass ceiling problems, whereas pull factors are those which attract women toward entrepreneurship, such as desire for self-realization, independence, and better work-life balance. Push factors are associated with necessity-based entrepreneurship, and pull factors with opportunity-based entrepreneurship. Despite the growing number of studies on this topic, no conclusive results have been provided as to which motivation exerts the greatest influence (Poggesi et al., 2015). Nonetheless, a couple of interesting findings deserve attention. First, women in less-developed countries are generally motivated toward entrepreneurship by economic necessity, that is, push factors, while those in developed countries are more likely to start a

business out of opportunity motivation (Allen, Elam, Langowitz, & Dean, 2008; Brush & Cooper, 2012). Second, a combination of push and pull factors motivates both men and women toward entrepreneurship, but, unlike men, family or children have a huge impact on women's entrepreneurial intentions (Kirkwood, 2009; McGowan, Redeker, Cooper, & Greenan, 2012). In relation to this, a term, *momprenneurship*, has been proposed for women entrepreneurs who desire to achieve work-life balance by combining the roles of mother and businesswoman (Croom & Miller, 2018; Richomme-Huet, Vial, & d'Andria, 2013). Working mothers generally face challenging, competing demands from work and family, and thus often experience role conflicts. Facing such role conflicts, a sizeable number of working mothers are motivated to find mechanisms to resolve the conflicts and choose entrepreneurship. In this case, role conflicts in general, and work-family role conflicts in particular, for working mothers, help to explain motivations for female entrepreneurship to some extent.

Factors that affect female entrepreneurship have been heavily examined as well. To explore factors promoting or discouraging entrepreneurial activities, distinctions between external and internal factors were made in a number of entrepreneurship studies (e.g., Dawson & Henley, 2012; Minniti & Naudé, 2010). External factors emanate from the environments surrounding an entrepreneur, while internal factors are associated with an entrepreneur's characteristics, including motivation, experience, education, and personality. Another approach to explain affecting factors was suggested by Bates, Jackson, and Johnson (2007), proposing the 3M framework, which identifies market, money, and management as critical building blocks for launching and growing enterprises. To launch a venture, an entrepreneur needs access to markets, money, and management. While agreeing on the crucial roles of these three elements for initiating enterprises, Brush et al. (2009) claimed that these three cannot alone be sufficient to explain multiple levels of factors affecting women's entrepreneurship. They thus expanded the 3M framework to the 5M framework by adding two elements: motherhood and meso-/macro-environment. Motherhood refers to family/household contexts in which women entrepreneurs are situated. The macro-environment is the combination of influences from larger social contexts, such as governmental policies, economic influences, and cultural norms, while the meso-environment refers to regional or institutional contexts. Both the 3M and 5M frameworks have been extensively used to illuminate sources of challenges and accomplishments that female entrepreneurs experience.

Finally, research on the obstacles to female entrepreneurship identified various

obstacles faced by women entrepreneurs, such as prevailing gender stereotypes (Field, Jayachandran, & Pande, 2010; Mathew, 2010; Pascall, 2012), traditional family values prioritizing support for men (Ince, 2012), poorer access to finance, resources, and mentors (Aidis, Welter, Smallbone, & Isakova, 2007; McClelland, 2004), lack of experience and social support (Izyumov & Razumnova, 2000), role conflicts between work and family (Croom & Miller, 2018; Kamberidou, 2013; McClelland, 2004), lack of networks (Mathew, 2010), and disapproval of female entrepreneurship by the society (Woldie & Adersua, 2004).

ICTs and Female Entrepreneurship

ICTs have been defined in various ways, but according to Zuppo (2012), “the primary definition of ICTs revolves around the devices and infrastructures that facilitate the transfer of information through digital means” (p. 13). The Internet, web-enabled mobile phones, social media, and, more recently, cloud computing provide good examples of ICTs.

It is alleged that ICTs are having a dramatic effect on all dimensions of economic activity, such as working patterns, production and marketing processes, and market accessibility, while creating new areas for entrepreneurship (Kamberidou & Pascall, 2020; Pascall, 2012). ICTs are indeed regarded as an essential element in the current business world (Goswami & Dutta, 2015). At the same time, ICTs also allow new models of social networking and information access, which enable individuals to overcome their status quo and negotiate their social positioning. These functions of ICTs have significant implications for advancing female entrepreneurship given that women entrepreneurs have traditionally faced various challenges in relation to their comparative marginality and social constraints. UNCTAD (2014) suggested that ICTs, whether traditional or recent, have the potential to promote women’s entrepreneurship, offering new opportunities to start and grow businesses. This claim is supported by prior research. Rabayah’s study (2010), for instance, reported that many rural women attending ICT training saw ICTs as a tool for increasing their economic empowerment. Similarly, Motilewa, Onakoya, and Oke (2015) indicated that female entrepreneurs in Nigeria were aware of new opportunities created by ICTs. These women acknowledged the benefits of ICTs in terms of greater flexibility, time saving, and work-life balance.

Specifically, it is claimed that ICT skills and knowledge are an important catalyst for women’s entrepreneurship in many aspects (Gilmore & Pine, 2000; Goswami & Dutta, 2015; Loane, 2006). First, starting e-commerce is comparatively less cost-

ly than opening a physical store, an important benefit for poor women in developing countries, whose access to financial services is limited by lack of property or collateral. Women entrepreneurs can stay connected directly to markets at regional, national, and global levels and do marketing online. According to Kamberidou (2013), the number of female-run businesses has been increasing due to social media. Furthermore, e-commerce enables women entrepreneurs to bypass middlemen and avoid the negative influences of male-dominated features of traditional economic structures (Suresh, 2011). Martin and Wright (2005) claimed that e-commerce helps to minimize discrimination by making factors such as gender and race invisible and is therefore beneficial for those who are underrepresented in entrepreneurship.

Second, online communication and networking offers women a new dimension of social interaction, significantly expanding their social horizons. Online interaction enables women to share experiences, gain support, and learn from each other (Ukpere, Slabbert, & Ukpere, 2014; Uluma, 2012). Martin and Wright's study (2005) of how ICTs benefited ten women entrepreneurs in the UK reported that online networking through virtual discussion and e-groups helped the women to keep up with current market trends and, eventually, to succeed in business. Online networking opportunities are particularly beneficial to socially isolated women in areas where structured gender norms are strictly observed (Martin, 2001; Martin & Wright, 2005). These findings are in line with the findings of Huo's study (2013) that ICTs played a positive role in social capital development among female entrepreneurs in China. By breaching social barriers, ICTs enabled these rural women to broaden their social networks and build solidarity with others.

Third, ICTs give women entrepreneurs easier access to knowledge (Loane, 2006) traditionally limited to the male domain, such as market values, business trends, and consumer behaviors, and thus contribute to women's market intelligence. Especially in today's information-intensive society, up-to-date knowledge is vital to individual, social, and economic growth. Whereas traditionally women have had limited opportunities to gain knowledge beyond the domestic sphere, the Internet has given them the same informational tools as men to use in their economic activities (UNCTAD, 2014).

Despite such potential benefits of ICTs for women, it is reported that women are underrepresented (McGowan et al., 2012; Pascall, 2012) and confront challenges such as limited use or access to ICT tools and training in the ICT sector (Kamberidou, 2013).

Prior work on both female entrepreneurship and roles of ICTs in female en-

trepreneurship sheds light on several aspects of female entrepreneurship to some extent, but as indicated earlier, in-depth, exploratory studies of the lived experiences of women entrepreneurs, particularly in the ICT field, are limited. The present study was conducted to address this gap by examining the entrepreneurial journeys of successful women entrepreneurs in different contexts. Voices from these women shall provide insights into the women's entrepreneurship process.

Methodology

Participants and the Context

Eight female entrepreneurs in ICT-related businesses from eight countries participated in this study. Three of them are running companies in developing computer software and providing IT consulting services, and five are actively incorporating ICTs into their businesses. Six of them are from Asian countries (Brunei, Japan, Korea, the Philippines, Singapore, and Vietnam), one is from Papua New Guinea (PNG), and one is from Peru, and their ages ranged from late twenties to early forties. Pseudonyms are used for the participants. Detailed information on the participants is presented in Table 1.

Table 1
Information on research participants

Name	Country	Industry	Age
Winna	Brunei	Computer software development	31
Junko	Japan	Online retail store	27
EunMi	Korea	Online fashion platform	29
Angela	Papua New Guinea (PNG)	IT consulting	40
Sophia	Peru	Mobile transportation platform	38
Maria	The Philippines	Online electronic gadget store	32
Rachelle	Singapore	Online education technology platform	39
Nguyen	Vietnam	Computer software development	37

These eight countries differ in various aspects. For example, with regard to gross domestic production per capita, Brunei, Japan, Korea, and Singapore are listed as high-income countries, Peru as a middle-income country, and PNG, the Philippines, and Vietnam as low-income countries (World Bank, 2018). According

to the Global Gender Gap Report 2020 published by the World Economic Forum (2020), the Philippines ranks the highest among the eight countries in terms of gender equality, taking the 16th position out of 153 countries. This country is followed by Singapore (54th), Peru (66th), Vietnam (87th), Brunei (95th), Korea (108th), Japan (121st), and, finally, PNG (127th). Worth noting is that Brunei, Korea, and Japan, which are classified as high-income countries, have relatively low standings in terms of gender equality. The countries also show a large variance in terms of ICT infrastructure. According to the ITU ICT Development Index (World Bank, 2015), Korea is placed first out of 175 countries, followed by Japan (11th), Singapore (19th), Brunei (74th), Peru (100th), Vietnam (104th), and the Philippines (106th).¹ Finally, it should be noted that female entrepreneur rates do not vary immensely among the countries, ranging from 27.7% (Peru) to 16.8% (Korea). Between these two countries lie Vietnam (27%), Singapore (26.3%), the Philippines (25.8%), and Japan (17.3%) in decreasing order (Mastercard, 2019).²

Data Collection

The present study is a part of a larger research study, comprising 24 case studies of successful women entrepreneurs across 21 countries on different continents. This study only focuses on eight women from eight countries, each with somewhat distinct features in terms of technological development and socio-cultural practices as briefly outlined above.

Data were collected over a four-month period in 2017. The principal investigator (PI), who is the first author of this paper, collaborated with eight researchers (hereafter, local researchers) via online discussions and email exchanges. The PI established the overall research direction and methodology, including data collection and analysis, and later modified them based on the feedback from the local researchers. At the initial stage, the research team members tried to ensure that all should develop a shared understanding of the study. For example, the research team discussed and agreed upon criteria for the selection of the target women entrepreneurs. The criteria included present status as a female entrepreneur successfully running an ICT business or actively leveraging ICTs for her business; company longevity of at least five consecutive years; and company success in

¹ Ranking for PNG is not available in this data.

² Rankings for Brunei and PNG are not available in this data.

terms of profits and the number of employees. Each researcher then selected one qualified woman entrepreneur in her country who matched the selection criteria through desk search or information networks. Upon identifying the target woman, the local researcher conducted one to four semi-structured interviews with her in person or online. Face-to-face interviews were conducted in places convenient to the interviewees, such as their offices or coffee shops. Each interview lasted for one to four hours and was guided by the following interview questions: What made you start your business? How did you manage your business, for example, secure human and material resources, and induce investment? What factors contributed to the success of your business? What main challenges have you faced in running your business? How did you overcome those challenges? In addition to these questions, the researchers asked follow-up questions to the participants' responses, whenever necessary. Semi-structured, exploratory interviews with the female entrepreneurs enabled them to give voice to their individual histories and experiences.

All interviews but one were conducted in the women entrepreneurs' native languages, which they shared with the local researchers. The interview with the Japanese entrepreneur, however, was conducted in English as that was the only language shared by the interviewer and the interviewee. All interviews were recorded and transcribed.

Data Analysis

This study explored factors influencing women entrepreneurship in the ICT-related sector within an integrative research design. It adopted an interpretive research methodology as it is appropriate for understanding entrepreneurship as a subjective state and exploring the meanings that entrepreneurs attach to their experiences (Stevenson, 1990).

For the present study, data analysis proceeded in two stages. In the first stage, the local researchers categorized their interview data in terms of success factors and challenges, and identified salient themes related to each aspect, while following the agreed-upon data analysis procedures. The researchers labeled each theme and identified supporting excerpts in the interview transcript(s). The local researchers sent the results of their analyses to the PI, who then gave them feedback for revisions. The number of revision processes varied, ranging from once to three times, which helped to ensure validity of the coding. In the second stage, the PI conducted cross-case analyses, in which she identified themes salient to the

research questions (i.e., success factors and major obstacles) that occurred across the eight case studies, and selected the most representative, appropriate quotes from the women entrepreneurs to illustrate the common themes. Finally, the PI sent the results of her cross-case analyses to the local researchers for their feedback to ensure the validity of the analysis, and then modified the findings accordingly.

Findings

This section presents research findings regarding success factors and the challenges that women entrepreneurs faced.

Success Factors

Data analysis identified two major types of success factors: external factors and internal factors. External factors refer to effects from the environments surrounding the entrepreneurs, while internal factors refer to factors coming from the entrepreneurs themselves. Both external and internal factors are further categorized into sub-factors, which will be discussed below.

External factors.

The eight female entrepreneurs were situated in different social and technological environments, which exerted tremendous influences on their entrepreneurial activities, with the added effects of their gender.

Government policies. Government policies played a key role in promoting women's entrepreneurship. According to Nguyen, who is in computer software development in Vietnam, Vietnam's gender equality legislation supports and facilitates the economic activities of women workers in general, and women entrepreneurs in particular. Junko, who is running an online retail store, described the Japanese government's affirmative action policies favoring underrepresented groups such as females as a resource to boost the national economy. She said, "The government says that females, young people, and seniors should be supported. And so, many banks or investment firms, they want to lend money for young people, women, or seniors" As a female entrepreneur, Junko found that, far from experiencing discrimination based on her gender and youth, she actually benefited from being a young woman when seeking opportunities for funding.

Meanwhile, most of the women entrepreneurs cited government ICT policies as a success factor. They were aware that in the digital age, governments across the world were making efforts to formulate policies relating to ICT developments as ICT holds enormous potential to accelerate growth in the global digital economy. According to Nguyen, for example, the Vietnamese government announced strategic policies to upgrade the economy's ICT infrastructure and to increase the total revenue of the ICT sector. Similarly, Rachele, who is running an online education technology platform company in Singapore, mentioned that the Singaporean government promoted automation at the country level by requiring educational institutions to increase the use of technologies in their operations, which gave a significant boost to her online education technology platform business:

The right government policies help soften the ground to encourage entrepreneurship and innovation. We truly benefited from the vision of the economy's leaders to create a Smart Economy. In place of fear they presented hope of a better economy and lives through the use of technology in areas like healthcare, home, education, and more. They created policies and programs to allow innovators to receive support for dreaming big while starting small and showing results.

Changes in social environments. Changes in the participants' social and technological environments also contributed to their success. Pervasive use of ICTs, including mobile phones, is one of them. Sophia, who is running a mobile transportation platform in Peru, attributed her success largely to factors related to the emergence of the digital economy and mobile environments. In Peru, an ecosystem for supporting startup and innovation emerged and transformed the economic landscape. She explained, "The main success factor is the growth of digital startups, especially in the business sector that I am in now, which is transportation. Technology has opened an important door in our economy."

EunMi, who is running an online fashion platform business in Korea, also benefited from the digital revolution. When EunMi established her company, the mobile environment and culture of sharing information through social networking services (SNSs) were permeating Korean society. Realizing the business opportunities that this technologically rich environment was creating, EunMi launched her ICT-based business.

Similarly, a positive social change in Japan contributed to the successful journey of Junko's entrepreneurship. Previously, young, single women felt pressured to fo-

cus first on finding a good husband and being a good mother and then possibly finding a good career that would not interfere too severely with household duties. However, as society became more open to encouraging women to become entrepreneurs and re-define what happiness means to them, many young women felt free to explore different ways to expand their vision of a happy life. Junko explained, “I think that before, society dictated what makes girls happy, but now girls and women are able to think for themselves and are able to more freely pursue what their definition of happiness looks like.” She further believed that this positive trend in freeing women from previous limiting and patriarchal views would evolve even more in the future.

Support from mentors and families. Mentoring and familial support were also frequently mentioned as success factors. From their mentors and family members, the women received not only emotional support but also advice on how to run a business, and they could expand their business networks. To succeed in the active commercial environment of Singapore, Rachele actively sought guidance from mentors and even hired a life coach. She emphatically highlighted the importance of having a reliable mentor:

The one that made a great difference to my growth was my mentor and life coach...My life coach helped me to learn about myself, my strengths, and also my blind spots. Sometimes she would point me to resources, research, and books that enlightened me on the troubles I faced. Sometimes, just bringing a different perspective and a kind word helped me break out from the dark to find light in hope. Having wise people by your side who believe in bringing out the best in you while being unafraid to tell you the hard truths is a blessing.

EunMi also described the significant role of mentors in her success. When she had only a rudimentary business idea, EunMi was helped by startup incubators and accelerators interested in cultivating entrepreneurship among young aspirants. She met regularly with these mentors, who shared advice on how to make her business idea more sophisticated, what business goals and strategies to set up, and how to attract business investments. EunMi described the benefits she had gained from a meeting with her mentor as follows:

At the beginning of my business, I could not formulate business

management strategies or find out how I could get needed funds...In a meeting with a mentor, I felt like I was being tutored when I was asked about data I could not think of, or when I asked about the meaning of the data. I said to myself, “Oh, I can use this data in this way” and “companies that have been evaluated to be growing have been worried about this point.” After returning from the meeting, I recreated their information in my mind, and from then on, I was able to pick up and develop the data.

Women entrepreneurs, who were well aware of the importance of mentoring, were often willing to mentor other women. Winna, who is running a computer software development company in Brunei, sought to invest time in mentoring young female entrepreneurs within and beyond Brunei as she benefited immensely from her mentors:

I do a lot of mentoring. I try to give back through entrepreneurship networks or organizations, anything that helps with women’s empowerment... Essentially, mentorship is not about giving them something specific but it is about being there for what they need. For example, they need a sounding board for their ideas on what they want to achieve. I am dedicated to helping women to know that they can be entrepreneurs.

Support from family is another important success factor. Rachelle credited her family as being crucial to her entrepreneurial journey in Singapore. When she was young, Rachelle’s parents enabled her to attend computer classes, which stimulated her interest in technology. Maria, who is running an online electronic gadget store in the Philippines, received full encouragement and support from her well-established entrepreneurial family for her business. With family support, she developed her entrepreneurial intentions during her college years and grew to become a successful entrepreneur.

Internal Factors.

Active use of ICTs. Many of the women entrepreneurs in this study cited effective use of ICTs as a critical success factor. Winna was well aware of the benefits of today’s ICTs when she started her virtual company in Brunei. She gave her opinion that “By taking advantage of the Internet, which is the most democratizing

force, and committing to cloud-based software, anyone can be a business person and can be competitive with anyone outside Brunei, with no limitations.” Current technologies and platforms also made it possible for Junko to turn her idea and passion of operating an online retail store into reality quickly, with relatively low risk and investment:

If we didn't have ICT, I couldn't start my business...I have an online store only. I think the Internet has changed the world. Before the Internet, we needed big money to start new businesses, but with the Internet, we don't need big money. We need a little bit of money and a big idea, big action.

In addition to having an online store, Junko actively used SNSs to promote her brand and company. This type of informal and friendly interaction that social media facilitated was an important element contributing to Junko's success as an entrepreneur.

Similarly, Maria, who is running an online electronic gadget store in the Philippines, fully utilized the power of ICTs from the beginning of her e-commerce business. As a digital native (Prensky, 2001), she understood the online environment and used it to ensure that her company was keeping up with the technological trends being introduced in the industry:

It is really important to be one of the early adopters of the newest innovation for the simple reason that technology can do almost everything today. Being one step ahead in utilizing the right advanced technology for your business is when you can say that you're on the right track.

Entrepreneurship philosophy – value addition. The present study found that many of the successful women entrepreneurs adhered to an entrepreneurship philosophy of benefiting diverse groups of stakeholders, including customers, employees, and suppliers. The women recognized that the health of their businesses depended not only on their own economic gain but on the well-being of those the business itself depended on.

Sound entrepreneurship philosophy unfolded in multiple forms. First, the women entrepreneurs focused on customer-centered approaches. For example, when EunMi first started her online fashion platform business, she embraced a vision of

providing fashion information relevant to Korean consumers by staying in tune with current preferences and working hard to constantly tailor her services to meet them. She regarded customers' complaints as useful information, which she immediately shared with all her employees to find effective solutions. Similarly, Winna believed in a user-centered, not an engineer-centered, design process and sought to develop software from Brunei users' perspectives so that her products were user-friendly and relevant to local needs. She highlighted the value of building inclusive, accessible systems as follows:

Not everyone is a young tech-savvy person who works in a company. We want it to be inclusive and accessible, not like, "Oh, you are old. Don't bother to learn." ...This means less time is wasted on training people and less investment made in that. We use the Mom Test: If your mom can use an iPad or app with no issues, why can't they do that at work?

Another facet of the sound entrepreneurship philosophy was adding value to employees. Junko drew on the Japanese tradition of teamwork by encouraging her employees to feel comfortable conferring with her on high-level decisions as well as making decisions independently. These means of distributing power reflected Junko's principle that, as her employees thrived, the company would also thrive. Focusing on employees' empowerment was a core tenet of Junko's successful management style. Like Junko, Maria sought ways to create a balanced win-win-win scenario among her online shopping customers, her suppliers and distributors, and her employees. She maintained good customer service by delivering quality products at the lowest price and high-quality service online, which brought sizeable financial value to her business and her product suppliers simultaneously. She also valued her employees' empowerment by personally attending to their orientation and training and making each feel like they are an important part of the company. Maria commented:

Every businesswoman should know how to value their employees, making sure that they are being taken care of by giving them a holistic approach to growth, not only monetary but for their personal well-being. As the company grows, flourishes, and achieves its set goals, the employees also step up and flourish as well.

Challenges

As with success factors, data analysis identified two major types of challenges that women entrepreneurs faced: external ones and internal ones. External challenges refer to the obstacles originating from the political, economic, and socio-cultural contexts in which the entrepreneurs were situated. Internal challenges are the ones that come from the entrepreneurs, for example, entrepreneurs' personality traits, education, and prior experiences. Data analysis further identified sub-categories of challenges under both major types of challenge.

External challenges.

Gendered social structures and norms. Although operating in different settings, the women entrepreneurs all encountered obstacles arising from deep-rooted gendered social practices and cultural norms, specifically social prejudices against women as agents of change in domains traditionally considered male. Nguyen, for example, claimed that, despite recent progress toward gender equality in Vietnam, many biases against women in general and women entrepreneurs in particular still negatively affected women-owned enterprises. These biases include the misconceptions that women are less suitable for entrepreneurship than men, women have less ability to work under pressure or to work in teams, women lack financial management skills, and women have other priorities such as children and family. Having had to deal with such pervasive prejudices during her entrepreneurial journey, Nguyen called for further change in societal attitudes: "Women should be inspired and mentored to develop their careers. The role of women in society should be improved to wipe out the social prejudices."

As a young female entrepreneur in Singapore, Rachele found it difficult to get people to take her seriously and to secure financing during her startup stage, because "investors prefer to invest in male entrepreneurs, especially in the technology business, as they believe that females are non-aggressive and less ambitious and may not be suitable to grow technology businesses." Thus she had to work doubly hard to convince the investors to fund her business.

Another major challenge was the difficulty of striking a balance between family and business life due to traditional views of gender roles. Referring to Vietnam but speaking for women anywhere, Nguyen commented:

Women are constrained by the burdens coming from their own responsibility in their family such as giving birth, taking care of children and the elderly...In their lives, women must always consider trade-offs between career and other factors, for example, family and marriage, so they could not contribute all their efforts to their careers.

Because of the necessity of dealing with gender stereotypes while managing and promoting their businesses, women entrepreneurs bore a dual burden and had to work doubly hard to prove their entrepreneurial competence.

Lack of mentors. Because mentors and established networks are critical success factors, their lack deprived the women of an important source of support. Angela, who is running an IT consulting company in PNG, commented on the lack of readily available mentors for novice entrepreneurs in PNG as a severe obstacle. Unfortunately, Angela received little professional help with her business planning and strategizing from professionals and thus had to depend on family members, friends, and personal networks. Throughout her entrepreneurial journey, Angela remained in need of experienced and expert mentors.

Similarly, Junko lamented the lack of visibility and accessibility of established female entrepreneurs as role models, saying that “role models of women entrepreneurs are few, and opportunities to meet them personally are too limited. For that reason, I feel that women have no idea of what entrepreneurship is, and that is the main issue.” As a way to improve this situation, she suggested:

We need to make opportunities for girls to meet women entrepreneurs from a young age, such as inviting women entrepreneurs to classes in school instead of relying on only the economy to lead such initiatives. I myself am taking the opportunity to take the initiative to visit schools too.

Aware of the importance of early exposure to role models and opportunities for mentoring, Junko highlighted the need for mentor education starting from school level, and proved her commitment to the idea by visiting classrooms herself.

Limited access to finance. In the literature on women and entrepreneurship, limited access to finance has been well documented (Aidis et al., 2007;

McClelland, 2004; Poggessi et al., 2015). In this study, the lack of access to capital was also a recurrent theme. Winna, for instance, considered that her greatest challenge was getting access to capital in Brunei. She had initially opted to seek a government grant, but encountering many bureaucratic obstacles, she finally decided to start her business using her personal savings. Angela faced similar challenges in Papua New Guinea:

Some of the key challenges include access to funding for innovative product development in the financial sector. For example, banks have no funding categories to support software development of a new product or solution. Also, access to funding was blocked because, as a startup, my company had zero assets in the form of security or collateral.

As described earlier, Rachelle also shared her difficulties as a female entrepreneur raising start-up funds in Singapore. To overcome financial challenges, Rachelle had to rely on her personal savings for launching a business, like Winna.

Lack of ICT infrastructure. The importance to entrepreneurship of a well-established ICT infrastructure cannot be overstated. While many countries are taking strong initiatives in the transition to a digital economy by setting up sound ICT infrastructures, others still lag behind. Winna, for example, was struggling with a deficient ICT infrastructure in Brunei, including high internet costs and a lack of online payment systems, which, when available, were very expensive. These constituted major obstacles for online businesses in her country. These problems posed serious threats to her business, as reflected in the following:

It was a challenge to work with banks to bring down the costs of online payments. To date, there is still a lack of infrastructure in place...There should be more focus on improving the infrastructure for online businesses, for example, to have a policy to keep Internet costs down for businesses...There are certain challenges which would require government help, such as to address the high costs of online payment...

A similar issue is reflected in Angela's comment on obstacles caused by the poor ICT infrastructure in PNG, including low Internet connectivity and high Internet cost, which limited access to the Internet and its use for business.

Internal challenges.

Lack of business skills and knowledge. Some women entrepreneurs faced the challenges of limited business skills and knowledge when they launched their enterprises due to lack of any business experience or training. In addition to dealing with Brunei's deficient infrastructure, Angela reported struggling with her lack of knowledge about bookkeeping, business management, and tax recording, which meant she had to learn how to run her business while simultaneously running it.

Maria underscored the need for relevant knowledge, saying "...commitment to education is very important. The right technology and entrepreneurial knowledge and information can take you where you want to go." Rachele sought to continually improve her business skills and knowledge by taking advantage of relevant online resources and also helped her employees develop skills in technology, budgeting, and communication and become familiar with industry best practices.

Tension from rapid technological changes. Keeping up with new and emerging technological trends was a permanent source of pressure. This resulted in serious tension for some women entrepreneurs as they struggled to adapt to new developments smoothly and leverage new technologies for running their business. Sophia, for example, felt driven by this situation in Peru to implement continuous technological adaptation as she sought to upgrade her technology and improve her business processes. She also trained employees to become resilient to the pressures of change and created an open, flexible organizational culture which could adapt to new social and technological demands:

It is necessary that everybody in my company has the same mindset because priorities change every day and also because this is a very competitive market. So everybody has to avoid frustration and be flexible in adapting to all changes. Only then can the company achieve

a competitive market position.

Discussion and Conclusion

Based on the premise that ICTs have the potential to support women's entrepreneurship in the digital age (Kamberidou & Pascall, 2020; Komunte, 2015; Loane, 2006), this cross-country qualitative study explored the journeys of a group of successful female entrepreneurs running ICT-related businesses in eight countries. The research has provided detailed insights into factors that helped these women run their businesses successfully and the obstacles that they faced.

Consistent with work by Lockyer and George (2012), this study found that government policies supporting female entrepreneurship played a strong role in the women's entrepreneurial journeys. Many of the women in this study reflected on the benefits from government policies supporting ICTs and female entrepreneurship and promoting gender equality. In such positive ecosystems, the women entrepreneurs could venture into and grow their enterprises with confidence. The research also confirmed the findings of studies by Motilewa et al. (2015), Ukpere et al. (2014), Huo (2013), Uluma, (2012), and Martin and Wright (2005), regarding the benefits of ICTs in female entrepreneurship. The women entrepreneurs were situated in social environments where ICTs, including Internet-connected mobile phones, were heavily used, although differences in quality of infrastructure existed. The women recognized the characteristics of the digital economy and the opportunities it created for their business ventures, and actively integrated ICTs into their businesses. They used ICTs for communicating with their customers through SNSs, online marketing, and augmenting their online visibility. Worth noting, however, is that the extent to which the women utilized ICTs varied according to the level of ICT infrastructure and prior experience.

What also emerged from the research was strong evidence regarding the positive role of support from mentors and families. This study found the availability or lack of mentors to be critically significant for the women's business experiences. Some women credited their mentors as being instrumental in their success, a benefit they were willing to pay forward by volunteering to mentor young females interested in entrepreneurship. This mentoring support was particularly beneficial for women generally excluded from the benefits of networking and mentoring. On the flip side of the coin, lack of mentoring meant a severe challenge for women who lacked such support. These findings are in line with the findings of prior work by Surangi (2018) and Price and McMullan (2012) regarding mentoring support

and networking as critical components of women's entrepreneurship. In addition to mentors, family support turned out to be another important success factor, consistent with the findings of Heilbrunn and Davidovitch (2011) and Jennings and McDougald (2007). As the women entrepreneurs needed to deal with traditional domestic expectations while working outside, family support was a significant resource for them. Impacts of family support are also acknowledged in Brush et al.'s (2009) 5M framework, which includes "motherhood," representing the family or household contexts, as a new construct.

As regards challenges, the present study identified both common problems and special obstacles shaped by specific country conditions. The first common challenge is a negative influence of gendered social structures on women entrepreneurs, many of whom faced deep-rooted and widespread stereotypes of gender roles. In fact, even in societies where gender equality was fairly well established, women generally encountered various gender inequalities and social expectations tied to stereotypical gender roles. Because of such gender constraints, these women entrepreneurs had difficulties in starting up a business and attracting investment because they are females, and also confronted difficulties in balancing work and home responsibilities. This finding confirms previous studies stating that social expectations, norms, and stereotypical gender roles are a significant barrier to women's entrepreneurial endeavors (Danish & Smith, 2012; Jennings & McDougald, 2007). In view of the association between social norms and women's propensity to engage in entrepreneurial activities, Kelley, Singer, and Herrington (2016) asserted in the GEM 2015/2016 report that social biases against women and circumscription of their roles need to be properly addressed to promote female entrepreneurship. Making changes in long-standing social biases or roles requires strenuous, long-term efforts, and, as such, calls for government interventions. The importance of the role of government in formulating gender-responsive entrepreneurship policies cannot be overestimated. A gender dimension should be incorporated into all entrepreneurship policies to create an enabling ecosystem that facilitates female entrepreneurship.

Another common problem is lack of access to capital and financial support, whose finding is consistent with work by Aidis et al. (2007) and McClelland (2004). This challenge might also be experienced by men, but it could impose a more severe burden on female entrepreneurs for social, institutional, and personal reasons. Worth noting is that Poggessi et al. (2015) noted differences in access to finance between developed countries where financial discrimination against women entrepreneurs does not exist because of legal restrictions and developing countries

where gender discrimination in terms of financing exists. Given that the participants are from different countries at varying levels of economic development, future studies need to examine closely whether their financing obstacles result from legal and institutional problems or from other problems. As a way to overcome this financing problem, financial support programs should be established for women entrepreneurs. Seed funding or microfinancing can be made available to female entrepreneurs through competitive grants and promotional programs. Financial institutions can also design funding services tailored to women entrepreneurs.

What this study identified as a specific obstacle is, above all, lack of mentoring in some countries. Because of a lack of mentors, the women entrepreneurs made their lonely journeys without professional support, which may have led to missed business opportunities. Given the critical role of mentoring or networking in female entrepreneurship, appropriate action is needed. Mentoring matching programs, for example, need to be arranged so that novice women entrepreneurs as mentees may regularly interact and network with experienced mentors. In the initial stage of their entrepreneurship, novice women entrepreneurs can learn from their mentors' ways to make a business idea a reality and attract investment. Those who have already achieved some entrepreneurial success can, in turn, serve as mentors or role models for other women entrepreneurs. Besides, mentoring programs can be extended to young women in higher education who are interested in entrepreneurship, which will help to further promote female entrepreneurship. Successful implementation of such an extensive, rigorous mentoring system may require an intervention from governments or women's business associations.

Another unique obstacle worth mentioning is the lack of ICT infrastructure and knowledge. The scale of ICT infrastructure varies from country to country, and in countries without sufficient ICT infrastructure, entrepreneurs obviously experience difficulties in business administration, while not taking full advantage of business opportunities that the current digital economy creates. In relation to this, lack of ICT and business knowledge also posed obstacles to female entrepreneurship. Considering the challenges related to lack of business skills and knowledge, it is necessary to provide current and future women entrepreneurs with entrepreneurship training programs covering various topics, including marketing, branding, and online connectivity. In particular, considering the significant roles of ICTs in the current digital economy, particularly for women's entrepreneurship, training on how to use ICTs effectively for entrepreneurship is critical.

These research findings contribute to an enhanced understanding of female en-

trepreneurship, particularly in relation to ICTs, which is a relatively understudied phenomenon. This qualitative study based on exploratory interviews with successful female entrepreneurs in eight non-western countries allowed details of these women's entrepreneurial journeys to be highlighted, with a focus on success factors, obstacles, and the ways that they managed the obstacles. Success stories of women entrepreneurs are a useful resource to motivate and guide other women, and to inform policy makers and program designers.

Despite its contributions to the academic field on female entrepreneurship, this paper should acknowledge a couple of limitations. First, this study presented findings without sufficient reference to cross-country differences in terms of environmental factors, such as gender equality level, female entrepreneurship rates, policy frameworks, and ICT infrastructure. Given the fact that environmental landscapes can affect the path of entrepreneurship and entrepreneurial intention, some findings may not be directly relevant to all the countries. This limitation points to the need for future studies that make cross-country comparisons between female entrepreneurs in the ICT field in order to examine how success factors and obstacles relate to the participants' locations. By extension, a more extensive cross-country study involving non-Asian as well as Asian countries would further contribute to advancing the research on this topic by revealing realities and peculiarities of female entrepreneurship largely shaped by contextual factors.

Second, given that only one interview was conducted for a couple of participants, the amount of data is somewhat limited. Data from more participants, or more interviews, could have made contributions from this study more significant. Future studies need to be designed in such a way to collect data through a sufficient number of interviews with a larger number of female entrepreneurs, so that they can offer more thorough insights into the enabling factors and constraints of female entrepreneurship. Finally, it should be noted that more studies are needed to explore a wider range of issues surrounding female entrepreneurship. Research topics worth investigating include the major motivations for female entrepreneurs to start a business, young women's entrepreneurial intentions, competencies perceived as crucial by experienced female entrepreneurs, the current status of entrepreneurial competencies of current and future women entrepreneurs, and policy recommendations from female entrepreneurs. Such future studies will contribute to expanding the academic field on female entrepreneurship and also to creating sound female entrepreneurship ecosystems by further illuminating the process, enabling conditions, and unique aspects of female entrepreneurship.

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