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Women's Dual Roles and Career Growth: A Preliminary Study of Malaysian Female Talents in Science, Engineering and Technology (SET)

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Abstract. The dual roles of women in managing career and family inherently bring them to a crossroads in seeking a balance between home and work. Early career scientists, engineers and technologists are faced with competing demands of time, effort and responsibilities. In juggling the roles, their commitment to career may somewhat be declining, thus hampering them from seizing the opportunity for career growth. This consequently explains the gender gap at top-level management. In an attempt to understand women's conflicting roles and how they persist in climbing the corporate ladder, semi-structured interviews were conducted with female SET talents from academia and industry. The interviews were structured to discover patterns in women's career growth and how they manage both professional and family goals. The results offer insights on the importance of growth mindset and lifelong learning to capacitate women in realizing their abilities and potential to embrace both professional and domestic challenges. Although some women are capable of making it to the top in a linear path the furthest and in the shortest time, it is equally important for all stakeholders to recognize and appreciate the reality of non-linear SET career trajectories, in which women may experience decelerating or plateau intervals throughout their professional growth. It was discovered that during the decelerating period, lifelong learners among female scientists, engineers and technologists who are bold enough to take the risk in moving forward would enhance their competitiveness and potentially make a difference to rise to the top management level eventually.

1. Introduction

Gender diversity in science, engineering and technology (SET) professions is indisputably crucial for firms to remain competitive in the global economy. Similar to Bansak *et al.* [1] and Widmer [2], in their seminal survey of 679 firms from the 1998 *Fortune 1000* list, Krishnan and Park [3] found a correlation between gender-diverse top management team and organizational financial performance. Besides, the significance of gender diversity also lies in the fact that a greater proportion of females in the management team results in a higher collective intelligence [4] as well as innovative performance [5].



Nevertheless, statistics in recent years have shown that there is a gender disparity at top management pursuits in the SET fields in Malaysia as men advance to leadership roles more frequently and quickly than women [6] [7] [8]. For instance, the shortage of female SET talents has been experienced by at least of 48% of chief information officers in South East Asia, as reported in the 2016 Gartner CIO Agenda Report [7]. This raises a central question of whether the inequality could be traced back due to less female students enrolling for SET academic qualifications, or due to a lower proportion of female SET graduates kicking off the SET careers or due to some proportion of female SET professionals leaving the workforce for career breaks or non-SET career pathways.

According to 2016 Malaysia Educational Statistics [9], female students were indeed less inclined to pursue engineering and technology related academic qualifications. The lack of interest in SET pursuits among female [10] occurred although they outperformed the male counterparts in terms of mathematics and science ability at the university entry-level [11], thus ruling out the gender difference in ability as the main cause of gender gaps in SET professions [12]. Indeed, the percentage of literacy rate for women in Malaysia is almost comparable to the developed countries [14]. Overall, statistics showed the gender gap among SET graduates in Malaysia is still small compared to other ASEAN countries [13].

From the perspective of labor force, female participation rate has increased by 95% between the years 1990 and 2012 across all fields [15]. However, for SET professions, female are still far outnumbered by male, noticeably for graduate engineer and professional engineer positions as shown in Figure 1a [16]. Hence, it can be inferred that the gender disparity at top management is partly contributed due to lower female entry to the SET workforce at the recruitment level. Furthermore, the disparity at top management level is worsened as only a small proportion of female professional persists in the SET career pathway. Indeed, researchers have shown that women SET professionals have a higher probability of leaving the labor force in comparison to women in other professions [17] [18]. According to '2013 Talentcorp-ACCA Retaining Women in the Workforce' survey, Malaysian women professionals tend to opt out along their career pipeline due to familial obligation to take care of children or elderly parents as well as due to work-life balance [19]. Unlike the Japanese and South Koreans women, these career leavers among Malaysian women are less likely to return to the workforce in their later years [20], which further exacerbating the leadership gender inequality.

In Malaysia, the issue of women's attrition from SET professions has received considerable attention due to the growing demand for skilled SET workforces to reach at least 3% of the total workforce by the year 2020 [21]. In comparison to advanced countries that have an average of 30% skilled SET professionals of the total workforce, Malaysia's Year 2020 projection would require an increase from 58 as of 2012, to 70 researchers, scientists and engineers for every 10,000 members of the workforce [21]. In pursuance to achieve the Year 2020 projection and to reduce the gender disparity at the top management level, the purpose of this paper is to provide a preliminary understanding of how women's conflicting roles affect their SET career growth and how they persist in climbing the corporate ladder.

2. Literature review

The existing body of literature on women's attrition from SET suggests that challenges surrounding work-life balance [17] [22] as among the contributing factors [23] [47]. The dual roles of women in managing career and family inherently bring them to a crossroads in seeking a balance between home and work. Early career scientists, engineers and technologists are faced with competing demands of time, effort and responsibilities. In juggling the roles, their commitment to career may somewhat be declining, thus hampering them from seizing the opportunity for career growth. Furthermore, studies have shown that women in SET often work extra hours and are more likely to leave the professions than women in the other fields [17]. This consequently explains the gender gap at top management as some of SET women professionals take a career break and do not return to the SET workforce.

If more women could strike a balance between professional success and commitment to family, then more women could persist in the SET careers pipeline and make it to the top leadership positions. However, the competing commitment to work and family is almost unattainable to pursue simultaneously [24] due to the nature of SET careers that are generally labor and time intensive [25]. Furthermore, the social role theory that outlines the traditional breadwinner and caregiving roles to men and female respectively [26] explains why women perceive themselves as more enforced than men [27] to reduce working hours, to take a career break or to discontinue their careers in providing physical and emotional care for their family, especially in a situation of limited quality childcare or inflexible working hours. Indeed, in Malaysia, the percentage of employers who have childcare support facility policy and flexible work arrangement policy is only 7% and 30% respectively [28].

In most cases, early career scientists, engineers and technologists among the females are faced with a conflicting timing between parenthood and career development. In fact, findings from the '2013 Talentcorp-ACCA Retaining Women in the Workforce' survey highlighted that three out of four respondents claimed that family commitments as the reason for under-representation of women in senior positions as shown in Figure 1b [28]. Furthermore, in their study on the motherhood penalty on women's career, Kahn *et al.* [29] found a stronger influence of children in reducing women's labor participation during their early career than when they are in the 40s and 50s during their mid-career. This period of interruption is perceived as a non-linear or frayed career trajectory [22] [30] for women, which deviate from the ideal linear path that apparently suits men better than women [31].

This paper further illustrates the idea of non-linear career trajectories (see Fig. 2) that consist of three regions of accelerating, decelerating and reaccelerating. During the first few years after graduation, women in SET professions are able to accelerate their career development as furthers and as quickest as possible. The decelerating period is when women's ticking biological clock coincides with career development and they try to fulfill both professional and family goals. Other reasons include childcare responsibilities, taking care of elderly family members or relocation due to spouse's job transfer.

During this decelerating or plateau period, the trajectory diverges into two avenues, whether these female talents choose to persist in SET pipelines probably with much slower career growth (solid line/Path A in Fig. 2), or choose to take a temporary career break or remain in the same position (dotted line/Path B in Fig. 2). The reaccelerating period is when the demands of time, effort and responsibilities towards family goals lessen and women are able to redirect more focus on career growth to reach the top leadership positions eventually. The proposed career trajectories in Figure 2 are in line with Benko and Weisberg [32], who argued that 'today's career is no longer a straight climb up the corporate ladder, but rather a combination of climbs, lateral moves, and planned descents'. Indeed, the traditional perception of successful leaders as the ones who climb up the corporate ladder in a linear path the furthest and in the shortest time has been challenged as no longer practical nowadays [33].

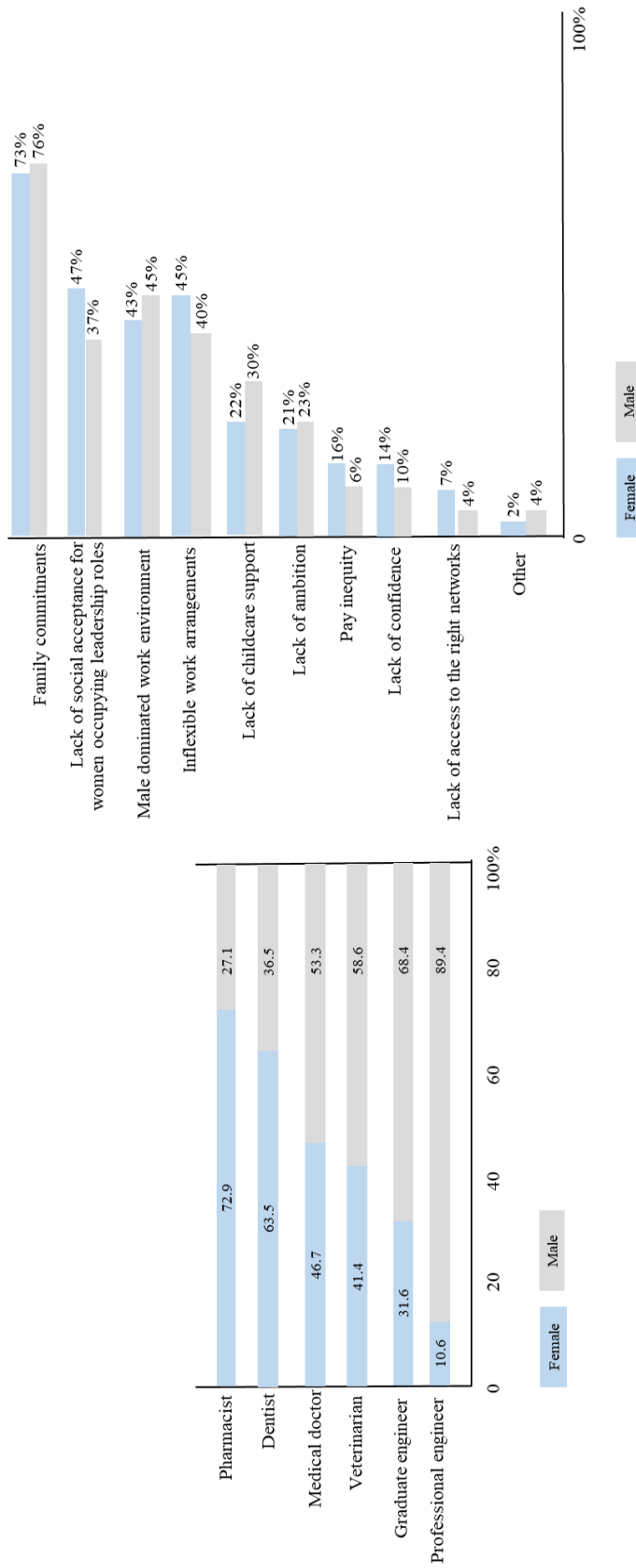


Figure 1.
 a) Percentage of female and male SET professionals in Malaysia as adapted from [16]
 b) Contributing factors to under-representation of women in leadership positions in Malaysia as adapted from [47]

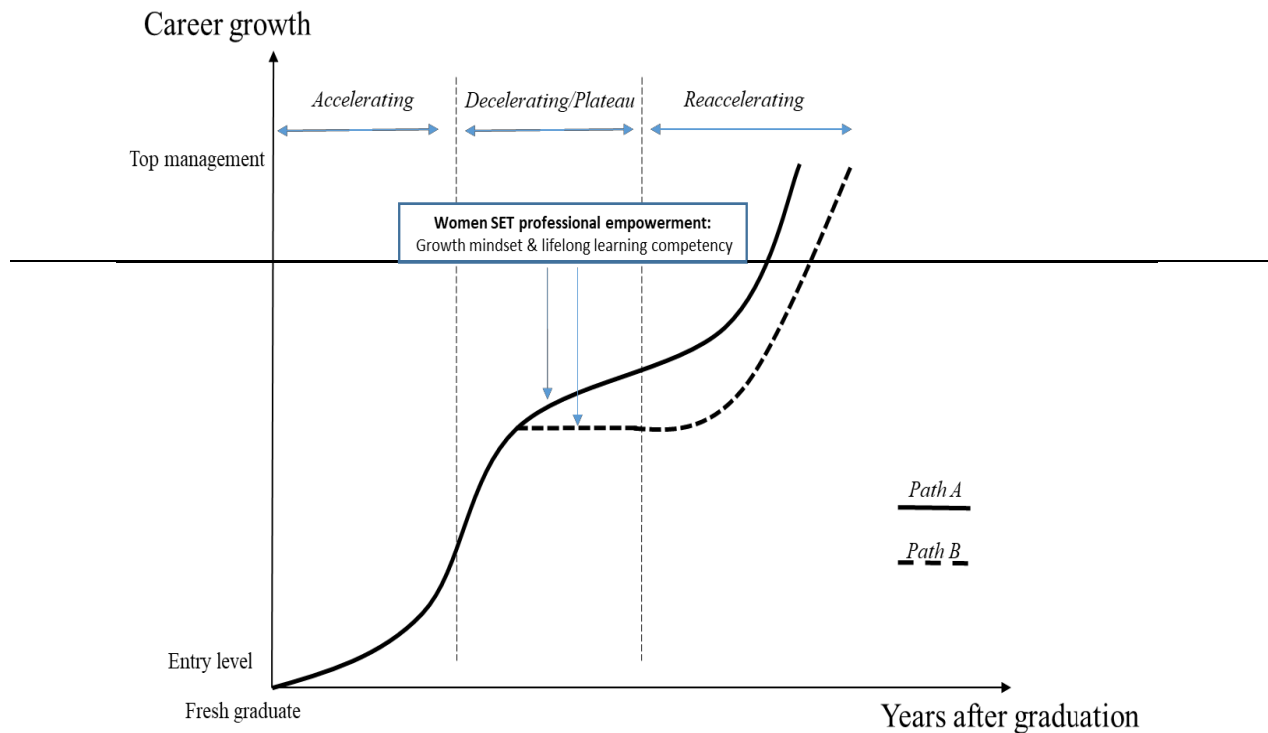


Figure 2. Non-linear SET career trajectories for female talents

3. Methodology

This paper aims to understand how the conflicting roles of female SET talents affect their career growth and how they persist in climbing the corporate ladder. The descriptive nature of this objective led to the use of a case study approach to provide a preliminary description and insights of phenomenon of interest [48] [49]. Semi-structured interviews were conducted with four female SET talents from academia and industry during the period of March 2018 to April 2018. As listed in Table 1, the participants were identified through a purposive sampling among the leaders and senior managements who had significant experiences in their fields. The interview, which took an average 45 minutes to 1 hour, was structured to discover patterns in women's career growth and how they manage both professional and family goals. A semi-structured interview method was adopted as this study aims to attain both specific information and broad views of the phenomenon. Based on the classification derived from content analysis, salient points from four different interview transcripts were compared to answer both research questions.

Table 1. The profile of interviewees

Participant	Position	Affiliation	Years of Experience in SET
A	Technical Manager	Automotive industry	16
B	Dean	Academia (Engineering Faculty)	14
C	Lead Researcher	Telecommunication Research Center	12
D	Assistant General Manager	Oil and Gas Industry	13

4. Findings & Discussion

Despite the unique differences of career backgrounds between each participant, the data analysis revealed some commonalities in their views on the following research questions:

4.1 How the conflicting roles of female SET talents affect their career growth

During the course of the interviews, all participants acknowledged a fewer presence of women in the leadership roles at their organizations in comparison to men. In general, three participants (B, C, D) expressed that family commitment as the common reason that contributes to the gender gap at their workplace. However, in the case of participant A, the gender disparity observed in the automotive industry is due to the nature of job that is generally more appealing to the males. This observation could be explained due to the perception that female leaders are less effective than male leaders notably in a male-dominated organization [50].

In answering the question of how the conflicting roles to manage both family and professional goals affect their career growth, all participants disclosed having had experienced a period of decelerating. As participant B described, “I perceive both goals are equally important. However, during my early academic career, I had just completed my PhD study and I intend to start a family. Therefore at that time, I had to slow down in pursuing my professional goals”. She also expressed her view that individuals may experience their own unique and different path of career growth in which the journey is impeded by other unanticipated familial obligations such as to take care of sick family members.

Similarly, participant A expressed that she had to struggle in managing both career and family commitments during her kids' early years. She further described, “Some of my subordinates who were given unpaid leave due to family matters had to compromise losing the opportunity to get involved in certain projects during their absence. Consequently, their performance appraisals or career growth for that particular year were affected to some degree”. As for participant D, she had to turn down a promotion to general manager position as she intend to prioritize more of her time for family. After 2 years period of ‘plateau’ in career growth, she persisted and climbed back the corporate ladder.

In contrast, although participant C experienced a stagnant career growth not due to family commitment but due to company's policy, she acknowledged having a colleague who eventually managed to reach the top management position at a slightly later of employment period when the kids are all grown up. This is because women with young children perceive work-life balance more important when their children are young and its importance decreases as their children age [51]. All of these cases provide evidence of non-linear SET career trajectories comprising plateau, decelerating and reaccelerating regions as illustrated in Figure 2. The decelerating or stagnant region is deemed as the ‘disruption’ period when women empowerment is essential because this point would dictate whether female SET talents would persist to make progress to the top management position.

4.2 How female SET talents persist in climbing the corporate ladder

The findings of this study signify the importance of empowering female talents with a growth mindset and lifelong learning competency for them to embrace the non-linear SET career trajectories in a way to address the women's attrition from the SET industries:

a. Growth mindset

Defined as ‘good outcomes in spite of serious threat to adaptation or development’ [34], resilience or the ability of women SET professionals to bounce back from the disruption period of their career path and to continue making progress in their professional goals can be nurtured by having a growth mindset. A growth mindset is having a belief that personal abilities such as intelligence and competence are neither inherent nor fixed as they can be developed over time [14]. Most importantly, women SET professionals with a growth mindset would perceive challenges as opportunities to learn and grow rather than feeling deficient and accepting the adversity as it is. Indeed, previous research has established the impact of mindset on resilience [35].

In this study, participants' growth mindset is evidenced in their strong goal, resilience and task orientation. For instance, participant B strongly believes that a strong determination to grow and persist in delivering tasks influenced her success despite unavoidable challenges and obstacles throughout career. In her own words, she stated, "Everyone has her own unique life and career challenges. As for me, I do not take obstacles as excuses to stop from pursuing my goals. I always take opportunity to grow and put my best effort in any assigned task". Highlighting the importance of having the right mindset, participant A explained, "As the leader, I often give opportunities for subordinates to grow but then it goes back to individual's choice whether to remain being obstructed by challenges or to bounce back and embrace the difficulties".

Indeed, Slaugther [36] also argued the extent to which women professionals are bold enough to stair step their career in climbing to leadership roles relies very much on their perception, whether to view the decelerating or plateau region as investment interval or as a disturbance that interrupts their career trajectory. The former perception indicates a growth mindset that would drive one's motivation [37] in switching strategies or in devising new strategies to adapt to the career realities and to thrive during the challenging period. For instance, in facing a concurrent familial obligation and career development, women SET professionals who choose to persist in SET workforce may redefine or rebalance the relative importance of their life and career goals at that interval, whether to seek for more financial security, more life balance, more learning and growth or more of an impact and legacy [38]. This was the case with participant D, who notably mentioned her decision to turn down promotion during a conflict time to address family needs: "Though I made decision to stay in the same position at that time, I've always kept myself motivated believing that period of interruption is temporary and I could always follow through my career goals later".

In other cases, women SET professionals who choose to take a temporary career break may also consider volunteerism, additional education or training, contract or project-based work, networking or entrepreneurship as among the strategies for a successful return to the SET workforce [23] [39]. Altogether, these examples signify the role of growth mindset that perceive the temporary decelerating or plateau phase with an aspiration for continuity and re-inclusion in the reaccelerating region, rather than a permanent opt-out.

b. Lifelong learning competency

As female SET graduates make a transition from university into launching their profession, it is imperative for them to recognize that their professional growth relies on their ability to adapt to the dynamic nature of SET fields throughout their career trajectories. Such adaptive skill is reflected in terms of their lifelong learning competency, which is defined as 'intentional learning that people engage in throughout their lives for personal and professional fulfillment and to improve the quality of their lives' [40]. Historically, scholars have long debated the needs for SET professionals to become lifelong learners [41][42], specifically as the ones who should be responsible for their own development by recognizing new knowledge they have to learn, recognizing areas of their inadequate knowledge and knowing how to seek information to address the knowledge gap [43].

The participants from this study are keenly aware that their attitudes toward lifelong learning can affect them to develop professionally. As participant B described, "In academic career, there are new areas of knowledge and skills that are not learnt during prior PhD study. For instance, I realized that the rapid changes of technology require me to keep abreast in learning new teaching approaches. Besides, I perceive my current position as an opportunity to learn and practice good leadership skills, which are new to me as I have not been involved heavily in management role previously".

The lifelong learning competency is even more crucial for engineers of the 21st century as the half-life of engineers' technical skills get even smaller with rapid changes in technology. Indeed, in the mid-90s, it was estimated that it would take 7.5 years, 5 years and 2.5 years for half of the knowledge of the engineering fields to become obsolete for mechanical engineers, electrical engineers and software engineers respectively [41]. This is particularly true for participant A, who decided to pursue PhD study while working full time in the automotive industry: "I am doing it for my personal fulfillment. Apart from that, the changing nature of technical knowledge in the industry puts a challenge for me to keep up with the changes". Similarly, participant C who is also pursuing PhD study while working described the nature of work requires her to be adaptive to new knowledge.

The significance of lifelong learning aptitude is even more pronounced for women SET professionals especially during the decelerating or plateau phases of their career trajectory. For those women professionals who opt to take a temporary career break, it is necessary for them to keep abreast of their respective SET industries and to keep updating their skills relevancy, in preparation to on-ramping back to the workforce and to reaccelerate to the leadership roles. For instance, the IBM Malaysia's first female managing director, Chong Chye Neo affirmed the importance of having the right mindset and a strategic planning for re-entry into the workforce the day she stepped out from the industry. Recognizing the importance of lifelong learning to her career, Chong always kept her mind alert with the dynamics of the industry, kept her knowledge updated and took initiative to learn about leadership when she took two and a half years off from work to allocate more time with her children. Indeed, Chong's career trajectory makes a good example of how mindset and lifelong learning competency helped her to move up the corporate ladder upon her return to IBM after the career break.

5. Conclusion

Losing female talents in science, engineering and technology is detrimental to the economic growth of a nation. This paper has discussed briefly the gender disparity at the top SET management in Malaysia is propagated from each level of recruitment, retention and rehiring female talents. In pursuing both professional and family goals, it is vitally important for women SET professionals to achieve a sense of life fulfillment and satisfaction at every stage of their career development. It is undeniable that there have been cases of women capable of making it to the top in a linear path the furthest and in the shortest time, who serve as role models in empowering female SET talents. However, it is equally important for all stakeholders to recognize and appreciate the reality of non-linear SET career trajectories, in which women may experience decelerating or plateau interval throughout their professional growth as evidenced in this study.

There have been initiatives placed by the Malaysia government and employers in devising policies to accommodate women's non-linear career patterns such as through the incentivizing of quality childcare facilities at the workplace and introduction of flexible working hours [44]. Moreover, the government has also recently announced the year 2018 as the Year to Empower Women with one of the strategic measures is to encourage women to return to the workforce [45]. Besides, feedback from the employers on the present challenge is to change the mindset and to upskill the female SET talents [46]. The findings from this study provide evidence that lifelong learners among female scientists, engineers and technologist who are bold enough to take the risk in moving forward would enhance their competitiveness and potentially make a difference to rise to the top management level eventually. Therefore, in addressing the gender gap at SET top management, greater efforts should be focused on the individual level to empower female talents themselves. As for a recommendation, future research in this field could explore the development and effectiveness of employee empowerment programs to provide lifelong learning platform and to inspire growth mindset among female SET talents throughout their career trajectories.

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