Una aproximación cualitativa a la trayectoria académica y desempeño profesional de las mujeres peruanas de TI

A qualitative approach to the academic trajectory and professional performance of Peruvian women in IT

Uma abordagem qualitativa da trajetória acadêmica e atuação profissional de mulheres peruanas de TI

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Resumen

Las investigaciones muestran que la participación de las mujeres en el campo de las tecnologías de la información (TI) ha continuado disminuyendo en los últimos 25 años. En Perú, menos de 1 % de las mujeres peruanas estaban matriculadas en carreras relacionadas con las tecnologías de la información y la proporción de mujeres y hombres matriculados en esos programas fue de 16 % y 84 %, respectivamente. Sin embargo, el campo ocupacional presenta una vertiginosa tendencia a seguir generando puestos de trabajo relacionados con las TI que ofrecen atractivas perspectivas profesionales y económicas, lo cual se ha acentuado debido a la pandemia del covid-19. Por tanto, el propósito de esta investigación cualitativa —enmarcada en el entrecruzamiento de tres ejes clave (educación superior, género y tecnologías de la información) que es insumo de un estudio mixto más extenso— fue realizar un acercamiento para caracterizar las trayectorias académicas y el desempeño profesional de cinco mujeres peruanas profesionales de TI mediante entrevistas en profundidad. Las entrevistas se abordaron bajo las siguientes dimensiones: vocación, rendimiento académico, grados obtenidos, soporte familiar, modelos para seguir y mentores, antecedentes profesionales, retorno económico, promociones/ascensos y satisfacción profesional. Los

principales hallazgos revelaron que, en general, las mujeres peruanas profesionales de TI están satisfechas con sus carreras, principalmente por los desafíos de aprendizaje que proponen, los salarios y el avance profesional; cabe destacar que el salario si bien es importante, no constituye una motivación primaria para ellas. El proceso académico para convertirse en profesionales comienza, principalmente, con una inclinación por las matemáticas, una elección de carrera influenciada por los padres, un soporte familiar muy alto y experiencias valiosas durante sus prácticas preprofesionales. Se concluye que la vida profesional para estas mujeres se configura como auspiciosa, pues se sienten satisfechas profesionalmente a partir de sus decisiones vocacionales previas, las experiencias vividas a lo largo de su trayectoria académica y los inicios de su vida profesional. La trayectoria académica con sus diferentes matices constituye para estas mujeres un puente interesante hacia una vida profesional satisfactoria.

Palabras clave: computación, educación superior, género, mujeres en tecnología, tecnologías de la información.

Abstract

Research shows that women's participation in the information technology (IT) field has continued to decline over the past 25 years. In Peru, less than 1% of Peruvian women were enrolled in careers related to information technology and the proportion of women and men enrolled in these programs was 16% and 84% respectively. However, the occupational field has a dizzying trend to continue generating IT-related jobs that offer attractive career and economic prospects, and that have even been accentuated by the COVID-19 pandemic. The purpose of this qualitative research, which is framed in the intersection of three key axis: higher education, gender, and information technology, and is input from a more extensive mixed study, was to carry out an approach to characterize the academic trajectories and professional performance of Peruvian IT professional women through in-depth interviews. The interviews were addressed under the following dimensions: vocation, academic performance, degrees obtained, family support, role models and mentors, professional background, economic return, promotions, and professional satisfaction. The main findings of this study revealed that in general, Peruvian IT professional women are satisfied with their careers mainly because of the learning challenges it proposes, the salaries and the professional advancement; it should be noted that salary, while important, is not a primary motivation for them. The academic process to becoming professionals begins mainly with an inclination for mathematics, a career choice externally influenced, very high family support and valuable

experiences during their internships. It is concluded that the professional life for these women is configured as auspicious where they feel professionally satisfied based on their previous vocational decisions, the experiences lived throughout their academic career and the beginning of their professional life. The academic trajectory with its different nuances constitutes for these women an interesting bridge towards a satisfactory professional life.

Keywords: computing, higher education, gender, women in technology, information technology.

Resumo

Pesquisas mostram que a participação das mulheres no campo da tecnologia da informação (TI) continuou a diminuir nos últimos 25 anos. No Peru, menos de 1% das mulheres peruanas estavam matriculadas em carreiras relacionadas à tecnologia da informação, e a proporção de mulheres e homens matriculados nesses programas foi de 16% e 84%, respectivamente. No entanto, o campo ocupacional mostra uma tendência vertiginosa de continuar gerando empregos relacionados a TI que oferecem perspectivas profissionais e econômicas atraentes, o que se acentuou devido à pandemia de covid-19. Portanto, o objetivo desta pesquisa qualitativa —enquadrada na intersecção de três eixos-chave (ensino superior, gênero e tecnologias da informação) que é a entrada de um estudo misto mais extenso— foi realizar uma abordagem para caracterizar as trajetórias acadêmicas e as desempenho profissional de cinco mulheres peruanas profissionais de TI por meio de entrevistas em profundidade. As entrevistas foram abordadas sob as seguintes dimensões: vocação, desempenho acadêmico, titulação obtida, apoio familiar, modelos e mentores, trajetória profissional, retorno econômico, promoções e satisfação profissional. Os principais resultados revelaram que, em geral, as mulheres peruanas profissionais de TI estão satisfeitas com suas carreiras, principalmente pelos desafios de aprendizagem que propõem, salários e ascensão profissional; Ressalta-se que o salário, embora importante, não é uma motivação primordial para eles. O processo acadêmico para se tornar profissional começa, principalmente, com uma inclinação para a matemática, uma escolha de carreira influenciada pelos pais, um apoio familiar muito alto e experiências valiosas durante suas práticas pré-profissionais. Conclui-se que a vida profissional para essas mulheres se configura como auspiciosa, pois se sentem profissionalmente satisfeitas a partir de suas decisões vocacionais anteriores, das experiências vividas ao longo de sua trajetória acadêmica e do início de sua vida profissional. A carreira acadêmica com suas diferentes nuances constitui para essas mulheres uma ponte interessante para uma vida profissional satisfatória.

Introduction

Currently, the representation of women who study and graduate from careers related to information technology is low [1] (TI) in Latin America and Peru (OECD.Stat, 2018; National Superintendence of University Education [Sunedu], 2021; World Economic Forum, 2021). Although the indicators that have accompanied this phenomenon have presented a negative trend for more than twenty years, the issue of the scarcity of women in the field of IT is still unresolved (Gorbacheva et al., 2019; Holland and Da Silva, 2021; Pantic and Clarke-Midura, 2019).

While fewer and fewer women are attracted to the field, organizations globally report a growing need for IT professionals, as well as difficulties finding specialists. In the United States, for example, it is estimated that computer and information technology employment will grow 11% between 2019 and 2029 (U.S. Bureau of Labor Statistics, 2020a) and it is also reported that only 25% of IT-related jobs are occupied by professional women (U.S. Bureau of Labor Statistics, 2020b). At the Latin American level, employers also highlight the deficit of IT professionals (ManpowerGroup, 2020). In Peru, according to the 2021 Occupational Demand Survey, engineers, analysts and information system developers are the professionals most in demand by companies, although they are also the least recruited due to the shortage of talent (Ministry of Labor and Development of Employment [MTPE], 2021).

The present qualitative study, therefore, represents an input for a more extensive mixed study, and is framed in the intersection of three key axes: higher education, gender and information technologies. In this sense, its objective is to characterize the academic trajectories and the professional performance of professional Peruvian women graduated from university careers related to IT. This research aims to help better understand the profiles of women in this field in order to achieve an approach to the academic foundation for the development of strategies that encourage more women to choose and remain in careers related to IT. Thus, they could have access to the growing job opportunities in that field and employers could meet the demand for specialists.

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[1] Information technologies (IT) or information and communication technologies (ICT) are considered in a broad sense synonymous with computing technologies, both in their application and their development; both are widely used concepts today and are industry-preferred designations (Sabin *et al.*, 2016).

En adelante, se presenta la revisión de la literatura, la sección de materiales y métodos, así como los resultados, la discusión, las conclusiones y una sección de líneas futuras de investigación.

Literature review

The literature review aims to identify recent approaches at the international, regional and national levels that have addressed the problem posed and that serve as support for this study. First, the conceptual frameworks that support the development of the main variables are presented and then the literature review is detailed for the categories that emerge from the main variables of the study.

The academic trajectory of women IT professionals was addressed using Trauth's (2002) Individual Gender Difference Theory and IT (DIGTTI) as a conceptual framework. This constitutes a solid frame of reference and incorporates the theoretical bodies of essentialism and social constructionism (Quesenberry, 2007). It focuses on how individuals differ in their behavior, preferences, talents, and choices in a given context. He argues that men and women do not form homogeneous groups and that there is no universal man or woman. The theory focuses on differences among women through understanding of personal characteristics, technical talents, inclinations, and social responses rather than relying solely on gender stereotypes or social influences. It discusses that the relationships between individuals and technologies are based on three high-level constructs with their respective subcategories: individual identity (demographics, lifestyle and work environment), shaping and influencing factors (personal characteristics and influences) and influence of the context. (cultural values and attitudes, geographic, economic and policy influence) (Trauth, 2002).

To operationalize professional performance, we started from the literature review related to career success, which is measured based on objective and subjective variables. The objective variables are mainly linked to salary increases and promotions (promotions) that professionals generally receive during their careers, and the subjective variables are associated with satisfaction with their professional performance. It is important to consider that the objective and subjective duality must be analyzed as a whole: some professionals who are extrinsically successful do not seem to be satisfied with their success. In addition, the investigations that have addressed the subjective dimension have done so mostly in a quantitative way; however, it is necessary to address this aspect also with a qualitative and individual approach that gives the objects of study the opportunity to listen and analyze them directly (Judge et al., 1994; Melamed, 1996; Ng et al., 2005).

The literature review on the categories identified as part of the main variables of this study is presented below:

Vocational choice and motivations for choosing an IT career

Several studies argue that the family is the first and most important nucleus of socialization of people. The father, especially one with a technical or professional education in technology or some other engineering discipline, has the most direct or indirect influence on young women in their choice of IT careers (Adya and Kaiser, 2005; Smith et al., 2019 ; Trauth, 2002). But it should be noted that not only the occupation of the father is decisive, but rather the attitudes of encouragement that both parents can offer their daughters to choose this type of career (Gabay-Egozi et al., 2015). Other family members (such as siblings, uncles), as well as teachers also exert influence, but to a lesser degree (Adya and Kaiser, 2005). On the other hand, it has been shown that women from developing countries are encouraged to pursue non-traditional careers such as IT due to job opportunities and economic returns, which in the future can help support the family financially. (Rankin *et al*., 2020; Varma y Kapur, 2015).

Previous skills that contribute to the study of the IT career

Mathematics represents a basic prerequisite for IT-related careers (Beaubouef, 2002; Knuth, 1974). In this sense, the latest results of the PISA 2018 tests show that gender differences in mathematics results are generally small according to the average of OECD countries (Scheleicher, 2019). However, boys tend to have a better self-concept in the domain of mathematics than girls (Hill et al., 2010), which could encourage them more to choose careers in the field of science, technology, engineering and mathematics (STEM), since self-concept in mathematics is considered an important predictor in choosing careers in these fields (Sax et al., 2015).

Likewise, in terms of knowledge gaps between college and university training, in the qualitative study by Varma and Kapur (2015), which aimed to understand why women in India are attracted to science careers in the computing, it was found that more than half (55%) did not feel well prepared after high school because they did not have a strong background in programming or computer science in general.

Expectations associated with the study of IT careers

A Peruvian study that analyzed the relationship between success and the individual professional aspirations of male and female engineers and that used gender as a moderating variable, concludes that there is a positive relationship between success and professional aspirations in men, but not necessarily in the women. Women orient their priorities to work, unlike their male counterparts who orient them to professional development. In addition, women have shown that their career success is more related to achieving a balance between work and family. (Dolan *et al*., 2011).

Family support

In the family sphere, it is important to describe the high family roots of Peruvian students, where 90% of them reside in the home of their parents or a relative while they carry out their university studies (National Institute of Statistics and Informatics [INEI] , 2010). In this sense, studies from contexts or cultural groups that exhibit, in a similar way, high family roots argue that family support is one of the main factors that positively impacts the academic success of students, such as the study of Payandeh Najafabadi et al. (2013) in Iran. In addition to the financial resources that the family possesses and can contribute to the student, encouragement, support, as well as positive attitudes towards STEM careers, are also associated with better educational performance among students from underrepresented groups (Kricorian *et al*., 2020; Mishra, 2020; Rankin *et al*., 2020).

Participation in student life

In a study by von Hellens and Nielsen (2001) of underrepresented Australian women in IT careers, they emphasized the need to socialize with male peers in extracurricular activities to help them through university. Another study with a mixed approach developed in the United States among female students of IT careers revealed that these careers require a significant workload and a lot of concentration, which would not leave time for the students to participate in extracurricular activities; this limitation, consequently, could affect the permanence of women in these careers. However, the findings of this study determine that women who chose these careers do so with the expectation of dedicating most of their time and concentration to their studies. (Cohoon, 2006).

Attitudes towards female IT professionals in college and at work

On the one hand, in the university environment, an Australian study reported that sexist behavior was not identified as an important factor in relation to the dropout of women from IT university careers (Roberts et al., 2012). On the other hand, in the United States, some qualitative studies have identified certain patterns in the academic culture of computer science careers related to boastful behavior on the part of male students and a tendency to underestimate the ability of their female classmates regardless of their gender. real skills (Schimpf et al., 2015).

In the workplace, according to other American studies, there would be a perception of favoritism, discrimination, as well as a hostile and generally unfair atmosphere in the workplace in the IT field that would be affecting women more (Hoonakker et al. , 2006a, 2006b). Likewise, Australian professionals, mothers in particular, would find lack of support from management, as well as the general perception of a strong masculine culture (Staehr *et al*., 2006).

Laboral life

Regarding the working life of IT women, there are discrepant studies. Some point out that the IT labor field is challenging, since it is dominated by men, requires constant updating, involves long working hours, has a fast pace and the need for constant travel; all this could interfere with women's desire to achieve a balance between work and family (Ahuja, 2002; Armstrong et al., 2018). On the contrary, the results of a national online survey of Australian IT women indicate that they find the field of work rewarding, as it offers opportunities and challenges that others do not offer; Likewise, they point out that they do not agree with the perceptions related to the IT labor field in the sense of being boring, sedentary and that it is populated by geeks and nerds. (Courtney *et al*., 2009).

Salary

The average annual salary for computing and information technology occupations in the United States is 118% higher than for other occupations (U.S. Bureau of Labor Statistics, 2020a). Although the economic conditions of the country are different in Peru, the professionals (both sexes) who graduated from the university between 2017 and 2019 for the family of computer and systems engineering careers in Peru had a salary 17% higher than the general average that considers all specialties (Perú: remuneración promedio mensual, mínima y máxima de jóvenes profesionales universitarios según familias de carreras, 2020).

Work satisfaction

Some studies indicate that the main motivation at work for women IT professionals is assignments that allow them professional growth and personal satisfaction (Buche, 2008); consequently, satisfaction would be found mainly in the subjective, understood as the evaluation and personal experience to achieve significant professional results at that level (Ng et al., 2005).

Although some authors indicate that there is more information on IT occupational roles than on the experiences lived by women in the IT labor field (Kirton and Robertson, 2018), some studies (mostly qualitative) have been found that attempt to explain the satisfaction employment of women IT professionals. The study by Trauth et al. (2009) argue that the personal profile of an IT woman (her demographic characteristics, her family burden, her personality and her support system) interacts with the particular characteristics of her occupational role in the field of IT and the culture of the place. of work to influence their satisfaction. Another qualitative exploratory study carried out in the United States indicates that the conflict between work and family negatively influences the persistence of women in the IT work field. So, flexibility in work hours makes it easier to navigate between work commitments and family roles. While it is true that flexible work schedules result in greater organizational commitment, job satisfaction, less stress and less work-family conflict for women, it could (depending on the organizational culture) reduce the chances of promotions or opportunities by being perceived as a sign of lack of dedication to work (Armstrong *et al.*, 2007).

Materials and methods

Design

The study was developed through a qualitative approach, since it is intended to understand the behavior of people (IT professional women) within a real and natural context (Hatch, 2002). The phenomenological design model was used, since it favors the understanding of the subjective individual experiences of the participants (Salgado Lévano, 2007) and with this it was possible to recover essential characteristics of their academic trajectories and their professional performance.

Participants

The profile of the informants consisted of women who completed undergraduate studies in careers related to IT from private and public universities in Lima (Peru) and who performed various roles of specialization or IT management in organizations from various sectors with at least five years of professional experience. For the selection of women from the final sample, purposeful sampling was used (Creswell and Poth, 2018). The women's directory for the definitive sample was built through specific searches on the LinkedIn professional network. It was possible to identify, coordinate and conduct interviews with five women. Table 1 shows the general demographic characteristics of the interviewees:

Table 1. *Demographic characteristics of women interviewed*

Nombre	Edad	Universidad	Carrera	Años de experiencia de trabajo	Tipo de organización para la que trabajan
Informante 1	31	Pontificia Universidad Católica del Perú	Ingeniería Informática	11	Privada, grande, banca
Informante 2	35	Universidad de Lima	Ingeniería de Sistemas	14	Privada, grande, auditoría
Informante 3	28	Universidad Tecnológica del Perú	Ingeniería de Sistemas	6	Privada, grande, energía
Informante 4	32	Universidad Peruana de Ciencias Aplicadas	Ingeniería de Software	5	Privada, *startup*, recursos humanos
Informante 5	25	Universidad Nacional San Marcos	Ingeniería de Software	3	Privada, grande, seguros

Source: self made

Instrument

Data collection for this study was carried out through in-depth interviews, a method typically used in phenomenological designs (Moustakas, 1994). For this, an interview guide was developed. Two pilots and a review by an expert researcher in qualitative methodology were carried out to assess the fluidity and coherence of the interview guide. In the first pilot, two women participated according to the profile of the sample, but with more than 10 years of experience to analyze the trajectories of more experienced women who can enrich the instrument. The results of the first pilot were reviewed with an expert researcher specialized in qualitative research,

adjustments were made mainly in relation to the order of the questions to generate a new version of the interview guide to be submitted to a second pilot. Two new women participated in this second pilot with the same characteristics as those of the first pilot. After minor adjustments, mainly in form, the version of the interview guide was generated to apply to the final sample.

Data collection

Voluntary participation was coordinated with each of the women in the sample to establish a date, time and place in order to carry out the face-to-face interview. Each participant was cited separately in a place close to their work centers or homes. The face-to-face interviews were carried out between November and December 2019, before the mandatory lockdowns due to the covid-19 pandemic. Each of the interviewees was given the information sheet of the study, as well as the informed consent. All the interviewees agreed to sign it and none revoked their participation.

The interview was audio recorded and additional notes were taken on the behaviors and attitudes of the participants during the interview. For the sequence of questions, the interview guide was taken as a basis; however, this was adapted according to the responses of the interviewee. It began with a brief social conversation that created a relaxed and trusting environment to help the informants feel comfortable and respond authentically and completely to the questions in the interview guide. (Moustakas, 1994).

Data analysis

The information obtained from the interviews and observations was transcribed in a word processor. The analysis process consisted of the analysis of the transcripts, the coding, the revision and reduction of the codes, the generation of categories and the identification of patterns (Patton, 2015). To process the information, the Atlas.ti software, version 7, was used, which allows maintaining clear evidence between the narratives and the coding of the information.

Once the coding and categorization were achieved, a visual representation of the relationships between the categories found was developed as an analysis strategy (Lofland and Lofland, 2006). A network model was chosen, that is, a collection of nodes connected by links or lines that show streams of actions, events and processes of the participants. Networks are very useful when working with multiple variables, since they help to analyze them in an integral way.

Likewise, being able to show the categories in a systematic way favors the reader's understanding (Miles et al., 2014). The resulting network model is shown in annex A.

Regarding the validation strategy of this study and as recommended by Creswell and Poth (2018), it was decided to request a review by two researchers who had no prior connection to the study to assess that both the process and the results of the study are supported by the data obtained. The review findings meant minor adjustments to the identified categories and relationships captured in the network model.

Results

This qualitative study allowed an approach to the characterization of the academic trajectory and professional performance of women IT professionals in Lima, Peru. The findings are presented below.

Vocational decision and motivations for choosing the IT university career

In relation to the vocational decision and the motivations leading to the choice of an IT career, there is evidence of low self-involvement in the decision process, which is why it is not established as well thought out or structured. In this sense, they seem to be more decisions associated with the environment that come from the influence than parents, friends or the school environment. In this sense, four of the informants reported that their parents had a technical professional occupation related to some engineering and one informant reported that her father was an administrator. Likewise, most of the informants expressly stated that they felt more comfortable with the world of exact sciences, fundamentally with mathematics, a rational bridge with engineering. The evidence of an informant is shown:

> Informant 1: In truth, when I was in school, more or less in secondary school, I always liked mathematics, a little bit of science... My last years of school I began to look for options, to see what engineering was about and first I was more inclined towards civil engineering but... I also took some vocational orientation tests and... I finally gave up civil engineering and applied for computer engineering, because I also saw the curriculum and found it interesting and I also saw that on the recommendation of relatives who at that time said, This is going to be a boom in a few years.

Previous skills that contributed to the study of the IT university career

The informants pointed out that the school stage contributed in a very limited way in terms of the skills and competencies that were later required to achieve success in their university studies. This is linked to the perception or experience where it is established that the mathematics required in the university stage were far superior to those reviewed in the school stage. The evidence of an informant is shown:

> Informant 2: So, I liked the numerical courses more, because they kept me more active, they called my attention and I think that my orientation was always for numerical careers, but of course, the truth is that I believe that the academic subject at school he never got as deep as he did in college. I do believe that between my school and the university there was a gap that was a bit of what cost me.

Expectations associated with the study of an IT university career

The expectations related to the study of an IT university career have to do with the symbols of success that can and should be accessed from it. From considerations associated with belonging to organizations of high value and uncontroversial recognition, the possibility of traveling abroad, transversality of the discipline, as well as the development of an ascending career line, although the latter in most of the cases studied is usually associated to relocation processes rather than to clearly established lines in the organizations. The evidence of an informant is shown:

> Informant 2: I had an uncle who had studied systems engineering at the University of Lima. It had been one of the first promotions and I really liked the comments that I had heard in my childhood or adolescence, I really liked what he did... what he said. He worked at IBM for a long time and I liked the fact of power, what he told, how he discovered new technologies, the topic of the trips he made and how the technologies were in other countries... I think that sparked an interest in me.

Family life: support and motivation from the immediate environment

The family is the cornerstone of the study process; thus, they are in charge of providing the necessary economic input, but also the support and motivation to achieve academic objectives. In this regard, it is evident that the participants feel great respect and gratitude for the family effort to

pay for their studies, establishing a kind of implicit commitment to achieve success. The evidence of an informant is shown:

> Informant 1: No, of course, it was with a lot of economic sacrifice, above all, because we even moved, because we lived in Chosica (a district located on the outskirts of Lima)... when my brother and I entered university, we already moved. everyone to Lima… but in any case it was a sacrifice to get a house here and then the payments that were not minor and my brother and I studying at the same time, so yes it was quite a sacrifice, so I also encouraged myself to continue so as not to disappoint them (a His parents).

Participation in university student life, guilds or professional associations

A very low involvement with university life is reported. That is, what does not directly impact their academic and professional profile is not given attention, effort or time. Likewise, during the labor stage there is evidence of a very low participation in guilds and/or professional associations.

Attitudes towards female IT professionals in college and at work

All the informants report that they formed a very marked minority group both at the university and at their workplaces. Most of the informants report having experienced moments or situations, both in the academic and work spheres, of different treatment by men under considerations of preference and/or chivalry, as well as situations of certain complacency or excessive understanding. In any case, the deviations or moments of differentiation have been the fewest, and have tended to be linked to academic and/or work spaces in organizations with very traditional cultures. Likewise, the occurrences have been perceived in the initial stages of their academic and work development. The evidence of an informant is shown:

> Informant 1: In the company where I worked for 3 years and 8 months, there was perhaps a different treatment, yes, a little differential yes, but not in a bad way, but suddenly in the entire area we were only 2 girls and the rest were men. ... and well, like the boys in the area were sometimes a little more accommodating or treated each other differently from how they treated us, in that sense there was a difference... Now it doesn't happen to me anymore because now we are the majority women.

Interviewer: And in terms of technical skills, did you feel that they were equals?

Informant 1: Yes, in that aspect, yes.

Interviewer: Regarding job assignments, was there a difference?

Informant 1: No, no, no... since there weren't many of us, we all put our shoulders to it.

Work life: beginnings, changes, relocations

The beginning of working life, in most cases, is associated with professional practices, which are strongly mediated by considerations associated with academic requirements to graduate, since in Peru all undergraduate students must carry out pre-professional practices as part of their academic training (Law No. 30220; University Law, 2014). However, the resulting experience seems to provide a great value that constitutes a source of motivation and important learning. In this sense, the pre-professional practices constitute the value of the knowledge acquired in the university stage, integrating it into their daily life and putting it in value at the service of the professional profile that they begin to build. An informant states:

Informant 3: I started my internship... I interned for the company that at that time was called CD (abbreviated for confidentiality) and I was in charge of providing technical support to what they call the help desk area. I worked there about 4 months. I was in the tenth (level), I think so. I was at the time where you see all your classmates practicing and I said: "why don't I do it?". Then I saw a call, I applied and I entered… I remember that I applied on a Friday, they called me that same day, I think, Monday was my interview and I think a week passed and I started working.

Throughout the investigation, it is evident that the labor world of the informants results in many movements. The duration periods are moderate, especially in those linked to consulting environments, where the work is conceptualized as projects with deliverables. On the other hand, it becomes evident that growth is usually linked to very specific specializations, which generates high-value profiles, but in specific topics, in such a way that their work or work is usually circumscribed to limited domains, which is why the sense of belonging to the commissioned projects is reinforced, and not so much with the organization. On the other hand, the participants in the research showed a propensity to change, which constitutes a value because it is linked to

their own professional growth (profile and knowledge), labor (position and compensation) and personal growth (balance between work and life). family).

Salary

All the informants declare that the evolution of their salaries received throughout their work experience has been positive. Two of the informants stated that they perceived differences in salaries with respect to their colleagues. On the other hand, at the time of the interview, the mode of the annual gross salary of this group of women was approximately 1,876.78 US dollars, that is, 143% more than the average salary for graduates of the specialty with three years of seniority. (Peru: average monthly, minimum and maximum remuneration of young university professionals according to career families, 2020). In general, the informants report being satisfied with their respective remunerations.

Work satisfaction

In general terms, the participants stated that they were satisfied with the organizations and conditions where they currently are. In any case, satisfaction will be moderately constant as long as the conditions of flexibility and professional challenges are maintained. Likewise, the constant training provided by their employers is of high value, which could be correlated with the fact that the self-perception of value of the participants is linked to specialization in specific areas of the world of technology.

Likewise, satisfaction seems to be closely linked to the achievement of objectives, but very punctually to the successful completion of projects (data analysis, specific technological architectures, artificial intelligence, among others). This refers to meeting the goals that organizations assign them, but also those that they themselves have set out to achieve, often exceeding organizational expectations, especially to solve more complex problems or opportunities than those they faced in the past.

Even when economic conditions are important and highly valued by the participants, they are conceptualized as hygienic variables; On the contrary, aspects such as problem solving, projects or highly complex tasks that challenge their creative capacity, opportunities, as well as flexibility (schedules and others) play a more important role. Below is evidence from the informants:

Informant 1: Well, I like what I do, I feel that in my work the pace is quite fast and every day I am always learning new things, I interact a lot with other people and I learn about everything, as well as about analysis businesses, about what it is closer to my career, the economic part has also met my expectations and I feel that there is still a long way to go, suddenly even if I do not climb upwards, I feel that there are a thousand possibilities of changing my area or even another field company, there are thousands of ways to apply what I have learned so far and what I can specialize in later.

Informant 2: I like what I do, that is, I love being able to find meaning in the application of technology, that is, I like that, being able to solve problems by applying what I know, the subject of technology, that for me It is the greatest meaning and because I really enjoy working as a team, consulting is teamwork, that is, at this moment I have a team in the room working and every day we look at each other's faces and work together, sharing ideas creating, so that's what I like to do.

Informant 4: Learning, learning is one of my reasons... well, another reason is economic and the other one that has motivated me a lot is being a female architect (of cloud computing), that is, to stand out as a woman in this branch It motivates me a lot. I remember that an architect told me: "How many female architects do you know?" and it's like it would be "crazy" to become (laughs).

Informant 5: I think I am quite satisfied because technology, that is, having the Internet is enough to learn, that is, you have the educational resource at hand, for the possibility of learning. Two because in this world of technology I think I find it very easy... job opportunities abroad and three because there is a lot of support at the level of wanting both to work and do a master's degree abroad, there are a lot of scholarships, really... I mean, I think What support to study will never be lacking in this career and why it is super important to know how to program... I think it should be like English.

As a relation to the network model (see annex A), it was intended to make a preliminary approximation to relate the categories found. It begins with the vocation characterized by the knowledge of the career, the opinion about the mathematics courses in the school, the influencers in the choice of their career and their professional aspirations. Then, vocation is related to

undergraduate university life, which is characterized by the attitude towards IT students, their social integration in the university environment, family support, role models, and their academic performance. Between undergraduate university life and professional performance, pre-professional practices are represented as a kind of hinge or bridge between these two categories, which are characterized by their achievement, attitudes to the practitioner and the resulting experience. Finally, professional performance is linked to salary, promotions and professional satisfaction.

Discussion

The objective of this study was to characterize the academic trajectories and professional performance of women IT professionals in Peru. Next, the discussion around the findings is presented.

Regarding the vocational decision and motivations to choose an IT career, the findings reveal that the vocational decision of the studied women is directly or indirectly influenced by the parents, especially the father, some other family member or a school teacher. or from the same university. Most of them reported the father's technical career. These results correspond to previous studies, which affirm that the family, especially the father —and more so when his occupation is related to engineering or technical matters—, as well as college or university professors, have an influence on the vocation of women in IT (Adya and Kaiser, 2005; Trauth, 2002). Likewise, the choice of a career linked to the world of technology has to do with the impetus or "creative" desire that the participants have shown throughout the investigation. Thus, the participants understand their role as a creator, and not repetitive or operational, through data modeling, design of technological architectures, among others. In this way, the value of their work in the organizations where they work increases, which fosters continuous learning, a fundamental source of motivation.

Regarding the previous skills that contributed to the study of the IT university career, the results report that the knowledge obtained at school poorly prepared them to face the academic demands of the university, both in the aspect of mathematics and programming. However, there is evidence in all of them of a marked taste or mastery of mathematics, which is a positive element given that, according to previous research, mathematics is a fundamental basic science in the different fields of study of information technology. (Beaubouef, 2002; Knuth, 1974).

In relation to the expectations associated with the study of an IT career, it is found that the informants in general aspire to a successful future as an almost natural consequence of having studied an IT career, explained in some cases by the models to follow that influenced them. your vocational decision. This finding is in line with the reviewed literature where women with similar profiles aspire to good jobs, to access recognized and high-value organizations, as well as opportunities and professional development (Arias Chaves and Rodríguez Ramírez, 2012; Liebenberg and Pieterse, 2016).

Regarding the support and motivations of the family environment, this work revealed similar results to the Peruvian study by Avolio et al. (2018), where economic, emotional and instrumental family support plays a very important role in the academic success of students.

Likewise, the investigation reports that the participation of women in the social spaces that are generated during university student life is low. In this sense, the findings of the reviewed literature are interesting, which explain that women who apply for IT careers know that they enter programs that require dedication and concentration, which consequently would leave less time for extracurricular activities (Cohoon, 2006). Likewise, the low participation in unions or professional associations during working life is linked to the low importance and the low perspective of impact that these activities can add to their professional profiles.

A permanent finding is the low representation of IT women in the different academic and work environments reported by the informants. Regarding the treatment they received —which differs from the reviewed literature, which indicates that many times women are discriminated against and exposed to participate in hostile environments (Hoonakker et al., 2006a, 2006b)—, the women in the study reported receiving preferential treatment by men, which could be explained as a desire to capture their attention as a symbol of competitive dominance over their male peers. It should be noted that these attitudes of men towards these women, as they occur mainly during the beginning of their academic and work experiences, could be explained by the age and social immaturity of some colleagues.

Regarding working life, the beginning of the work stage is reported through pre-professional practices that, although it is true that they occur in part due to Peruvian government regulations, constitute an important source of experience and learning. Regarding labor movements, the elements of value to accept a job are usually linked to the challenges that it proposes, that is, responsibilities or functions that are linked to their skills, experience, opportunity for professional growth and interests. This has to do with the very nature of the tasks entrusted.

The findings report that, with respect to salary, women received amounts higher than the general national averages and the national averages of the specialty, as well as a positive growth trend. It is important to highlight that all the informants worked for large companies in the private sector, which generally have higher average salaries than those in the public sector. On the other hand, no gaps are perceived with the salaries of male peers, which could be explained by the type of organization where they work, that is, structured organizations and/or that in some cases promote diversity and gender equality in their capital management. human. Likewise, although salary is reported as an important variable, it is not necessarily defining; In any case, elements such as the flexibility of the organization that allows a balance with personal or family life, agility and work pace are usually more important for the informants.

In reference to job satisfaction, it becomes a constant in the discourse of the informants that the main motivations are not primarily related to salary, but rather to others such as professional challenges, training opportunities, travel and flexibility in the schedule that allows them have a balance between work and their responsibilities with the family. These findings correspond to what is reviewed in the literature on the importance of subjective satisfaction (Ng et al., 2005) in the case of women, that is, growth at a professional level through the roles held in the organization (Buche , 2006; Kuhn and Joshi, 2006) and the possibility of balancing their time between work and family (Armstrong et al., 2007).

Finally, the limitations associated with the sample of this study, which was small and not representative of the country or the city, are acknowledged. Although it is not statistically sound to generalize from a study such as the one presented, it has made it possible to preliminarily explore a group of these women in a context such as Peru, where this phenomenon has been studied in an incipient manner. Likewise, variables related to this phenomenon have been identified that can be evaluated with greater scope and using other methods in the future.

Conclusions

As stated at the beginning of the article, this study sought to characterize the academic trajectory and professional performance of Peruvian women IT professionals. Regarding the academic trajectory of women IT professionals, it can be concluded that it begins with a vocation that is distinguished by a taste for mathematics, the decision to choose a career that is externally influenced (especially by parents), as well as high expectations of success as a result of choosing an IT career. In addition, in undergraduate university life, women identify themselves as a minority group that did not perceive different (negative) treatment in academic spaces or pre-professional practices, unlike what was found in the reviewed literature. The academic performance of the women interviewed during their time at university is reported as medium high. Likewise, family support in their educational process plays a very important role.

As for the beginning of the labor stage, it is not difficult for them to obtain pre-professional internships, which turn out to be closely associated with the value that can be obtained from them with respect to the complementarity of what they learned at the university, as well as becoming a gateway to working life. Regarding professional performance, in the objective aspect, the evolution of salaries, job changes (promotions), assignments of greater responsibility or organizational changes are positive. In the subjective aspect, job satisfaction is not mainly related to salary, but to other aspects such as professional challenges, training opportunities, travel and flexible hours to reconcile work and family responsibilities.

In general, it can be concluded that Peruvian women IT professionals have a particular academic trajectory, mainly because they are a minority in most of the spaces where they work and because they are challenging in terms of academics; however, in most cases it is something that they are aware of even before entering the career, but they do so largely supported by their vocational instinct. Their academic trajectories constitute a very important stage of technical preparation. Likewise, professional life is configured as auspicious, since they feel satisfied with the experiences lived throughout their academic career, their professional growth and what they feel they are achieving in their own careers.

Future lines of research

As future research, it is suggested to extend the study to a larger and more diverse sample, as well as to develop a theoretical model (based on the network model presented) that seeks to relate the variables found in this study or other additional ones, and that can be validated. with a quantitative approach through advanced statistical models.

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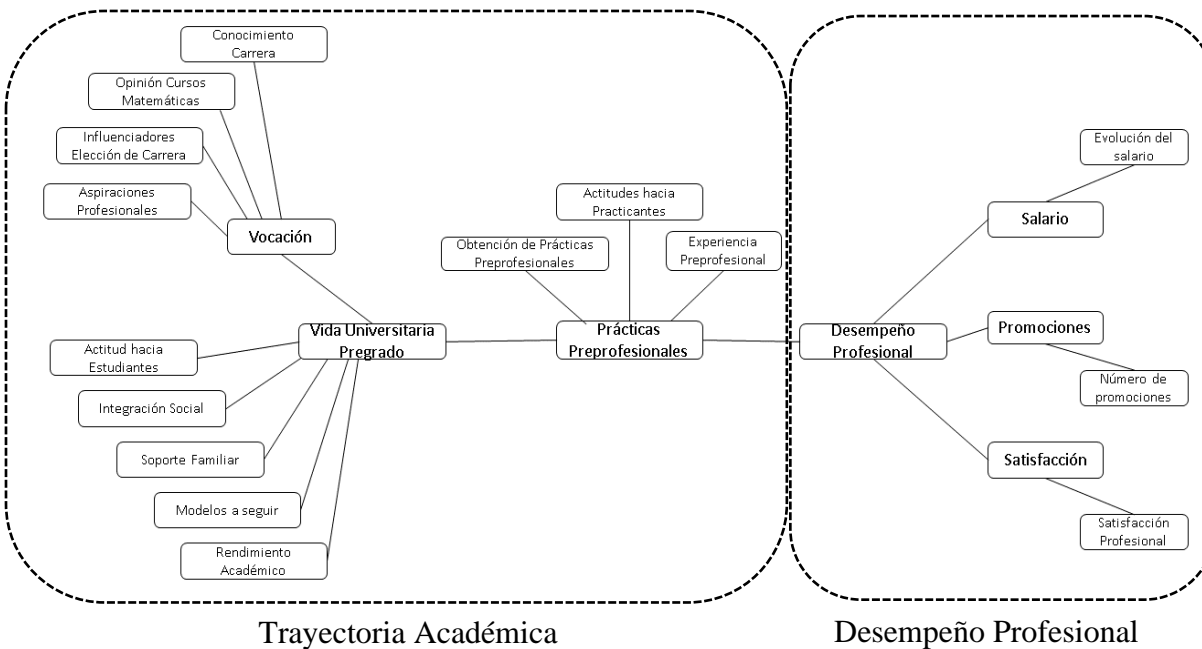KSPACE.Z18_2802IK01OORA70QUFIPQ192H31-26fcbef6-6e3d-4172-b251-
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Appendant A: Network model academic career and professional performance

Figure 1. *Network model academic career and professional performance*

Source: self made