ZIBELINE INTERNATIONAL™ PUBLISHING

ISSN: 2617-9415 (Online)
CODEN: ESSDAX

Education, Sustainability & Society (ESS)

DOI: http://doi.org/10.26480/ess.02.2021.73.76

RESEARCH ARTICLE

MARKETIZATION OF RESEARCH ACHIEVEMENTS OF UNIVERSITIES AND THE STARTUPS OF FEMALE SCHOLARS IN COASTAL CHINA

Jueping-Xie

School of Economics and Management, Tiangong University, NO. 399, Binshui West Road, Xiqing District, Tianjin, China.
**Corresponding author email: xiejueping@tiangong.edu.cn*

ARTICLE DETAILS

Article History:

Received 13 September 2021
Accepted 16 October 2021
Available online 21 October 2021

ABSTRACT

There are more and more researches on academic entrepreneurship in coastal China, but the research on female scholars' entrepreneurship is very rare. At present, female scholars occupy one-third of the total number of scholars, so it is a profound and valuable question how to promote female scholars to take part in the marketization of research achievements and to start up business. From the perspective of human capital and social gender role theory, the paper makes the double-case research to find some problems in the process of transformation from female scholars to female entrepreneurs. For example, the influencing factors are more and complex, the entrepreneurial process is more difficult. The paper's research conclusion can enrich the academic entrepreneurship theory and provide the important reference value for the role transformation of female scholars in the startups. At the same time, it can also help universities and governments to establish the relevant scientific and technological entrepreneurship policies.

KEYWORDS

Academic entrepreneurship, Female scholars, Research achievements, Coastal China.

1. INTRODUCTION

On January 4, 2020, "China city science and technology innovation development report 2019" released by China Academy of Science and Technology Strategy, according to the report more than 289 local and national city, Beijing ranked first, shenzhen first demonstration, accelerated the rise of southeast coastal cities. In recent years, China's financial investment in science and technology has increased by 20% per year, the annual investment can reach more than 460 billion Yuan, the number of scientific and technological achievements in universities is very high. In 2005, Tsinghua university, Fudan university and other universities made a survey report on the exploration of the transformation of scientific and technological achievements in universities to find the number of the real achievements transformation and industrialization is less than 1/10 although there are 6000-8000 achievements in universities every year. This research examines the major contribution to this development made by the Marketization of Research Achievements of Universities and the Startups of Female Scholars in Coastal China. According to the database statistical analysis of the Ministry of Science and Technology, the paper proves that the universities' scientific research institutions have consumed much money and manpower, but the output of scientific research achievements is very less, this situation of high input and low output is very obvious.

Therefore, more and more scholars begin to pay more attentions to how to make the universities' research achievements become marketized to realize the research value, Angel investors often make investment decisions based on motivational cues communicated during pitches including enthusiasm, preparedness, and commitment to evaluate potentially important qualities of entrepreneurs (Cardon et al., 2018). As a dynamic start-up system, academic entrepreneurship refers to the process that scholars and academic organizations break through resource restrictions to recognize and use the opportunity to achieve the growth of individual and organization under the background of the entrepreneurial environment system. Now, the concept of academic entrepreneurship is not unified, the paper defines the academic entrepreneurship is the process that the universities' scholars (including professors, researchers and doctoral candidates) start up business to realize the commercialization of scientific research achievements.

In this process, both of academic organizations and scholars can take part in the startups, such as industry-academy-cooperation, venture capital funds based on universities, university spin-off companies and new enterprises founded by scholars. There are many scholars who study the academic entrepreneurship of European and American universities in foreign countries, but the research subjects are male scholars, the female workers in the institutions have been ignored. Therefore, Entrepreneurship for academics appears a gradual process and episodic although the marketization problem of scientific research achievements has been widely discussed in the academic and policy literature, as well as the problem of how the gender can affect the career development of female scholars, but there are few researches on the academic entrepreneurship of female scholars, what is the reason? (Astebro et al., 2013).

However, it has a great significance to research the female scholars' startups. First, it can promote the gender equality, especially in the scientific and technical areas (according to the data of UN's gender workgroup in 1994, there are serious inequality between men and women in the field of science and technology). Second, it can fully seek and utilize the human resource of China. Aiming at the present reality, the subject of academic entrepreneurship on the basis of science and technology is men. As another half of scientific research institutions, the female scholars'

Quick Response Code	Access this article online	
	Website: www.educationsustability.com	DOI: 10.26480/ess.02.2021.73.76

Cite The Article: Jueping-Xie (2021). Marketization of Research Achievements of Universities and The Startups Of Female Scholars in Coastal China, *Sustainability & Society , 4(2): 73-76.*

potential and demands have often been ignored by the academic entrepreneurship which is led by men. Therefore, it will play a decisive role in the development of economy how to develop the entrepreneurial potential of female scholars better. Aiming at the female scholars of universities and scientific research institutions, the paper studies the influencing factors and successful models in the academic entrepreneurship. In this way, it can provide the reference for more female scholars in the academic entrepreneurship. At the same time, it can also provide suggestions for the government to make the relevant academic entrepreneurship policies.

2. Materials and Methods

Academic entrepreneurship has drawn attention of the academia, but the previous studies lack the discussion of individual factors of academic entrepreneurial behaviors of female scholars from micro level. Through the theory-driven case research method, the paper discusses the relationship between the marketization of universities' scientific research achievements and the intrinsic motivation of female scholars' startups and the external environment. This method needs to consider the following aspects. First, case study method can objectively record the management practice of entrepreneurs and the situation of entrepreneurship to extract the relevant concepts from the original data and analyze the relationship between concepts. This method mainly solve the questions of how and why. The subject of paper is the methods of academic entrepreneurship of female scholars and the factors that hinder or promote the academic entrepreneurship of female scholars, this subject conforms to the study of how and why. Second, the focus of case study is to analyze the dynamic process of a single situation, the academic entrepreneurship has become a single situation that has the theoretical support, the scholars' startups are a dynamic process in such a situation, so the case study is applicable. Third, many literatures have studied the importance and related forms of academic entrepreneurship, but few literatures have studied the process of academic entrepreneurship of female scholars. Therefore, it still belongs to the category of exploratory study to analyze the rule of academic entrepreneurship of the marketization of scientific research achievements from the perspective of female scholars. The paper adopts the method of exploratory case study.

2.1 Case Selection

According to the principle of theoretical sampling and replica method, the paper selects two representative cases of female scholars' startups to make the research. Namely TJGD Textile Auxiliary Limited Company and TJHY Semiconductor Limited Company. As the female researchers of research institutions in the universities, the founders of two companies have the ability to develop and use the core technologies, these two companies have been established for more than five years. As the ordinary teachers who are engaged in scientific research work, the two founders need to teach the students, make the scientific research and bear the pressure from the families. Outside of work and life, what promoted them to start up the planning of academic entrepreneurial career? As female scholars, how they converted the scientific research achievements into the market value? How they broke through the barriers of market competition to become the leaders of industries? Compared with general entrepreneurs, their success is much more difficult, the process of their academic entrepreneurship is inseparable from the intrinsic motivation of individuals, the entrepreneurial atmosphere of scientific research institutions and the support of social policies, so it is worth being studied.

2.2 Collection of Case Materials

In order to keep the reliability and validity of the collection of case materials, the paper follows the suggestion and Eisenhard to make a detailed design plan of case study, mainly including the research purpose, place, working content and interview outline (Yin, 2003). According to the methods of observation and files box interview, the paper organizes and records the research literatures, interview recordings and internal reports to establish the case database. In order to ensure the validity of materials, the paper uses the triangulation method of multiple data sources to focus on the quality, quantity and consistency of materials. Through the confirmation of information providers, the materials are evaluated many times by more than two researchers. Aiming at the two female founders and the related workers, the paper's researcher makes several in-depth communication and special interviews to improve the rationality and reliability of data materials, the time of each interview is about two hours. After organizing the case information, the researcher sends the interview information to the interviewees to confirm. In this way, the details of interview materials can be modified to effectively ensure the accuracy of case materials.

2.3 Case Analysis

2.3.1 TJGD Textile Auxiliary Limited Company, Professor Zheng

The predecessor of TJGD Textile Auxiliaries Limited Company is the company that is found by the department of A university in 1989, it made the joint-stock system reform in 2010. Now, it is the important research and production base of chemical fiber oil and textile auxiliaries in China, and it is a high-tech enterprise that is firstly certified by Tianjin to get import and export rights. A group researchers discovered that the development of independent ventures begins with a decision about the nature of the business, a decision that involves a choice among industries (Chrisman et al., 1998). Regardless of the type of venture, the structure of the entered industry is critical to survival and success. TJGD's many products have won the second, third and fourth prize of science and technology progress in Tianjin and Textile Department, such as superfine polypropylene fast spinning finishing agent, chinlon fast spinning oil, functional polyether products, dry acrylic spinning oil, dacron POY fast spinning oil, dacron stretch yarn agent and renewable liquid carbonitriding agent. In additional, far-infrared polypropylene fast spinning agent is listed as the key new product in China. TJGD provides a series of chemical fiber oils for hundreds of companies, Tianjin Petrochemical Group is one of users. The downstream users also believe that TJGD's synthetic fiber agent is in the domestic leading position. With the same quality of imported oil, it can satisfy the need of fiber production and should be popularized widely in China. In addition, far infrared oil of polypropylene fast spinning is original in China, it has filled up the technical gap of China and reached the advanced level in the world.

Professor Zheng is a team leader who takes the lead and puts the research first. The leading technology is the key of success in the company. The company's products can be comparable with imported additives, this depends on the struggle of research team for nearly 20 years. With the strong scientific research capability, Professor Zheng's team has successfully made 35 national and provincial scientific research projects that consumed the research found of more than 70 million Yuan. The team has won 18 awards of invention and sci-tech progress, 2 national invention patents and 5 new products promoted at the national and provincial level. She has published more than 40 high-level papers and guided more than 20 postgraduates. Professor Zheng said that she had only done one thing, namely the study of textile auxiliaries. She developed the new products in the process of continuous research, these products expanded the market to counter against the expensive textile auxiliaries from other countries. All of these have made her have a strong national sense of responsibility, her team has used the efforts to strive for more benefits for the country and domestic enterprises. At the same time, the strength of domestic brands has been proved.

Professor Zheng's team has successfully promoted more than 30 scientific research achievements to become the products, it has greatly enhanced the company's competitiveness, the number of company's products has become more than 60 from 1. More than 70% of products can replace the imported products, the product sales has reached more than 40000 tons, the output value is more than 400 million Yuan, the profit is nearly 100 million Yuan. She has broken up the monopolistic market of imported products in the chemical fiber oil to make the price of many imported products become cheaper. The cost of many related chemical fiber enterprises has been reduced. In this way, the great social benefits can be achieved and the development of national industry will be promoted.

2.3.2 TJHY Semiconductor Limited Company, Professor Niu

As a high-tech enterprise that develops, produces and sells high-end LED lighting products, TJHY Semiconductor Limited Company is a professional provider of LED energy-saving lighting products and system solutions. Cooperated with universities, the company established a research center of TJHY semiconductor lighting to make the national "863 Program" projects and independent innovation sci-tech projects of Tianjin. In this way, it can promote the theoretical research and application development of semiconductor lighting technology. Since the establishment of enterprise, Professor Niu has made the research on the products of LED auto headlamp and made the bulk-production, although this technology is blank in China at that time. In the research, the most difficult problem is the optical design because the light source of LED lamp is different from that of traditional lamps. Professor Niu and her team have used the most advanced optical design software in the world to establish the theoretical model and make various simulation design. They have separately made the directional lighting distribution for each lamp bead to solve the technical problem, it meets the optical requirements of LED auto headlamp in China. But because the technical content is very high, the precision of the actual machining process could not meet the theoretical demand, this design was

failed. With the help of Professor Niu, all of the members has tidied up all moods soon to make the research again. Through the efforts, they have taken 11 months to find a new way, that is to use the innovative free-form surface reflector to make the optical design of the filament.

3. Results and Discussion

Through the collection of data and the in-depth interviews, the paper makes the systematic analysis of TJGD Textile Auxiliaries Limited Company and TJHY Semiconductor Limited Company from the perspective of entrepreneurs, team, entrepreneurial opportunities and environment to have a preliminary understanding of the two female scholars' academic entrepreneurship practice. In order to further explore the theoretical construction function of double-case study, Professor Niu followed the case analysis method of Yin (2009) to make the transverse comparison of each case's research results on the basis of the within-case analysis (as referred Figure 1). In this way, she has extracted the conception dimension with the theoretical sense to have a more profound understanding of problems, the answers were more accurate and clearer. From the perspective of entrepreneurial opportunities, the advanced technology and the market demands are the starting point of the two women in the startups. They think they didn't actively start up the business, it is the result of push in the market.

As for the question of why they decided to start up a business, both of them have stressed the existence of technology and market. The target of their startups is not to earn money. Their scientific technology is very advanced, a lot of enterprises need their agents and lighting technology, the price of foreign products is very high and the technology is not very good. Therefore, they can provide the technology for the enterprises at the beginning. Then the colleagues told them they could establish a company to make more people know and use this technology. From that time, they began to have the idea to establish a company. Both of the two entrepreneurs have emphasized that the solid foundation of companies is their own research capability. They know the technology and continuously research the technology, so they have a great say in the scientific research team that contains the male researchers. Otherwise, they can often encounter the unfair gender treatment in the research. Of course, this unfair treatment often appeared at the beginning, but both of them didn't fear it. On the contrary, they spent more time and energy to make the research, they hoped to defeat the people who discriminated them. Both of them focused on the research, Professor Zheng has often lived in the company for several days every week, she dealt with the company's transactional work in the daytime and made the research at night.

Through the interview with the two women, it can be found that their characters are not very hardline and not very tender, they combined all of the advantages of men and women, bidirectionality is the advantage of their characters. If it is time to be hardline, their attitudes are very decisive and firm. If it is time to think in shifting perspectives, they are tolerant and kind. They combined the determination of men and the understanding of women in their characters. In the communication, their forthright, generous character and the open mind are very impressive. At the same time, they put themselves in the position of employees to reflect their tender character. Before entering the universities, the two scholars have had the working experience in the enterprise, so the enterprises are not strange to them. With the strong execution, the great intelligence, the strong tolerance and the tenacity in the research, they don't fear the difficulties and try to find the solutions (Yao et al., 2016). In their opinion, a good manager should build an atmosphere, that is to play an exemplary role in the company. Only in this way, the employees can believe and follow them (Volchek et al., 2013). Their sense of responsibility in the enterprises has gradually cultivated their enthusiasm for startups, the enthusiasm has also influenced the team. With the efficient team, they researched the latest technology. Some researchers discovered that it is important about the social network building within the organization to promote effective communication and knowledge sharing (Miranda and Borges, 2019). In the good team atmosphere, everyone was consciously to do things and solved the difficulties together. Of course, this is inseparable with the wisdom of the leaders. If the leaders can firstly consider the team members and firstly meet the interests of members to make the distribution and rewards fair, including the financial disclosure, all of the members will fully believe and follow them.

Female entrepreneurship will not become a critical mass of economic activity, and therefore social acceptance and credibility, unless the obstacles has identified are addressed and overcome (Danish, 2012). Good entrepreneurial environment and policy are the guarantee of the startups of two scholars. If there were only the team, the passion and the opportunity but without a good entrepreneurial environment and policy, the two scholars couldn't successfully start up the business (Lockyer and George, 2012). Before starting a business, the universities' leaders did not pay a special attention to the marketization of the scientific research achievements, but they didn't object it. As long as the scholars can find the money, integrate the resources to start up the business, the leaders will not interfere it. With the development of social economy, the demand of the market has been further expanded, the development of enterprises has gradually become standard. In addition, the scholars have guided the school leaders in various occasions (Ebersberger and Pirhofer, 2011). Therefore, the school leaders have knew more and more knowledge in the transformation of the scientific research achievements and began to support the marketing practices. The school leaders helped find the workshop and provided the financial support to become the shareholder. Academic entrepreneurs are influenced by their context of affiliation when involved in formal (patents) and informal (consultancy services and contractual agreements) commercialization outputs (Halilem et al., 2017). At the same time, the school leaders helped to introduce the related scientific researchers to build a platform of innovative talents team (Kim et al., 2018). The national innovation funds and the research funds are also more favorable to the establishment of high-tech enterprises, various research funds can arrive the enterprises quickly to promote the research and marketization development of enterprises better (Dahlstrand and Politis, 2013).

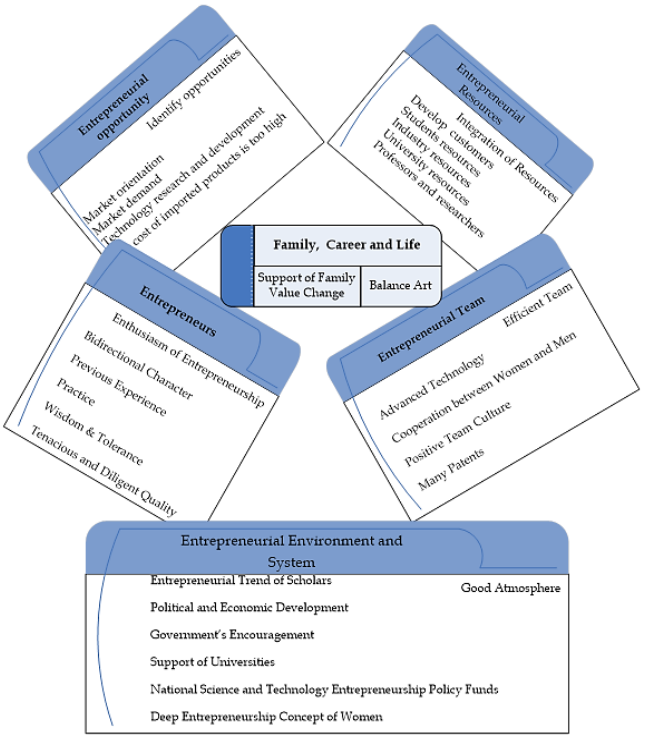

Figure 1: Influencing Factors of Startups of Female Scholars

4. Conclusion

Through the interview and analysis of new and high technology enterprises of two female scholars, it can be found that it is very difficult for female scholars to make the academic entrepreneurship. The success is not occasional, the success of two female scholars is the best fusion of good time, good terrain and the unity of employees. The following factors have played the important roles.

4.1 Social Culture Influences the Choice of Female Scholars

Many factors can hinder the women to choose the scientific research as the goal of career development, the main obstacle comes from the attitude of parents, teachers, friends and society toward the career choice of women. People often doubt or object women to engage in the scientific research, they think women are not suitable for the scientific research. Therefore, the women will have no confidence in the mathematics and engineering from childhood to the university, they will have a deep prejudice to think they must be inferior to men in these fields. In fact, the reason that women often underestimate their scientific thinking is the profound influence of social culture, family and school education guidance rather than the lack of capacity.

Because the families often give the low investment to women in the

scientific education and enterprise management, the women's human capital is relatively weaker than men. The women can rarely accept the skills training of scientific research institutions and industrial enterprises in the learning process, so even if they enter the scientific research institutions, their motivation of starting up a business is not obvious due to the lack of the industrial experience and skills. But for female academics supplementary management education exerts a significantly positive effect almost offsetting the gender effect.

4.2 The Occupation Bottleneck of Women in the Field of Science

Through the survey of many research institutions, it can be found that the career development of female scholars and male scholars is very different in the research path. In general, the scientific research is a masculine work, women are not very popular when most of workers are men in the science department and laboratory, even the women often feel they are excluded. In addition, the prejudice against women in the scientific research will also hinder the development of women scholars. Dahlstrand and Politis discovered that if policy makers would like to contribute to increasing the number of women's academic start-ups in incubators, they ought to pay more attention to what kind of incubators receive public support. That is, sectors that might very well be important for future entrepreneurship and growth, and where both incubators and entrepreneurship education might be shown to be especially important for the empowerment of women and the future success of women's academic start-ups.

The division of social gender roles is also the obstacle that affects the progress of women's academic career, especially the conflict between work and family. Social tradition and family expectations have a profound impact on women's academic career, because women must spend more time and energies in the scientific research if they want to get a prestigious academic status. However, the expectation of society and family is to hope women to take good care of the family and children, then it is work and career. Therefore, this contradiction often makes women feel guilty to doubt their choice. The study has found that the research stress of female scholars is not smaller than male scholars, female scholars must spend more time to bear the family responsibility. Because of the conflict between academic work and family, female scholars need to slow down the process of academic research and even need to stop the academic career.

4.3 Gender and Startups

Social gender role theory explains why the education investment of women from families is mainly in culture, education and medicine, this theory has been formed before the woman is born. Women naturally should play the role of the traditional women, so the direction of women's human capital accumulation is different from men. Social gender role makes the career development and life choices of women fixed, it runs through the whole process of life choices of women. Women's self-employment is regarded as the desire for self-fulfillment and the rebellion of discrimination in the labor market. Most of academic researchers are men, the female scholars are at a disadvantage in the male-dominated search atmosphere, so it is difficult for women to make the better academic achievements than men. The initial decision to pursue innovation-based growth, however, is affected only by a firm s internal factor. However, the growth outcome depends on the normative institutional environment.

The women scholars' self value pursuit promotes them to actively consider the career change or the transformation from academia to academic entrepreneurship. Now, the research results show that the opinion of men and women is consistent in the entrepreneurial motivation. Through the comparison of motivation between men and women entrepreneurs in America, Researchers have found that the opinion of women and men is consistent in the pursuit of independence and the realization of individual value, as well as the identification of entrepreneurial opportunities by the social capital. The obvious difference is the pursuit of finance and profits. Male entrepreneurs are more active to pursue the financial performance and profits, men hope to get more wealth by the entrepreneurship for the purpose of achieving the financial security. Male entrepreneurs' desire that uses the efforts to achieve the innovation is stronger than female entrepreneurs. These reasons can make the men's startups is faster than women, the performance of men is better and obvious than women at the beginning of entrepreneurship.

Acknowledgment

National Social Science Project: Research on the Statistical Measure of Collaborative Innovation and its Effect Evaluation, Project Number: 18BTJ015

References

Astebro, T., Braunerhjelm, P., and Brostrom, A., 2013. Does academic entrepreneurship pay? industrial and corporate change, 22, Pp. 281-311.

Cardon, M.S., Mitteness, C., and Sudek, R., 2018. Motivational Cues and Angel Investing: Interactions among Enthusiasm, Preparedness, and Commitment. Entrepreneurship Theory and Practice, 41 (6), Pp. 1057-1085.

Chrisman, J.J., Bauerschmidt, A., and Hofer, C.W., 1998. The determinants of new venture performance: An extended model. Entrepreneurship Theory and Practice, 23, Pp. 5-30.

Dahlstrand, A.S.L., and Politis, D., 2013. Women business ventures in Swedish university incubators. International Journal of Gender and Entrepreneurship, 5(1), Pp. 78--96.

Danish, A.Y.S., 2012. Female entrepreneurship in Saudi Arabia: opportunities and challenges. International journal of gender and entrepreneurship, 4 (3), Pp. 216 - 235.

Ebersberger, B. and Pirhofer, C., 2011. Gender, management education and the willingness for academic entrepreneurship. Applied Economics Letters, 18, Pp. 841-844.

Halilem, N., Amara, N., Olmos-Peñuela J., and Mohiuddin, M., 2017. To Own, or not to Own?" A multilevel analysis of intellectual property right policies on academic entrepreneurship. Research Policy, 46 (8), Pp. 1479-1489.

Kim, C., Park, S., and Seol, B., 2018. The role of universities for the change of a network structure in the regional business ecosystem. Asia Pacific Journal of Innovation and Entrepreneurship, 12 (1), Pp. 77-89.

Lockyer, J. and George, S., 2012.What women want: barriers to female entrepreneurship in the West Midlands. International journal of gender and entrepreneurship, 4 (2), Pp. 179 - 195.

Miranda, M.G., and Borges, R., 2019.Technology-based business incubators- An exploratory analysis of intra-organizational social networks. Innovation & Management Review, 16 (1), Pp. 36-54.

Volchek, D., Jantunen, A., and Saarenketo, S., 2013. The institutional environment for international entrepreneurship in Russia: Reflections on growth decisions and performance in SMEs. Journal of International Entrepreneurship, 11 (4), Pp. 320 - 350.

Yao, F., Sun, T., and Xie, J., 2016. Boundary, Performance and Controversy of Academic Entrepreneurship: A Grounded-analysis Based on Review of Literature from 1990 to 2014. Science and Technology Management Research, Pp. 98-102.