Original Article

Identifying and prioritizing strategies to achieve scientific supremacy in one of the universities in northwest Iran

Sahar Valimoghaddam Zanjani[1], Shohreh Mohebbi[2*]

[1] Director of monitoring program of educational affairs, Zanjan University of Medical Sciences, Zanjan, Iran
[2] Medicinal Chemistry Department, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran

Article Info

Article history:
Received 1 Sep. 2022
Accepted 6 Feb. 2023
Published 27 Mar. 2023

***Corresponding author:**
Shohreh Mohebbi, Medicinal Chemistry Department, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran.
Email: shmohebbi@zums.ac.ir

How to cite this article:
Valimoghaddam Zanjani S, Mohebbi Sh. Identifying and prioritizing strategies to achieve scientific supremacy in one of the universities in northwest Iran. J Med Edu Dev. 2023; 16(49): 57-67.

Abstract

Background & Objective: The improvement of Iran's position as a developed country requires the enhancement of the efficiency of the scientific, research, and technological systems. Accordingly, universities must identify and determine the differentiation extent of their academic mission. This study aimed to determine the implementation of scientific supremacy strategies considering its differentiation extent in one of the universities in northwest Iran.

Materials & Methods: This study was conducted based on an exploratory mixed method. SWOT (Strengths, Weaknesses, Opportunities, And Threats)-QSPM (Quantitative Strategic Planning Matrix) technique was used in order to determine the strategies to achieve supremacy. The internal and external factors at the university were identified through semi-structured interviews with 10 academic experts up to data saturation. A questionnaire was then designed and provided to 40 faculty members in order to score the factors. In addition, the QSPM technique was used to evaluate and prioritize the selected strategies.

Results: SWOT matrix analysis led to the identification of 34 factors. The final scores of the internal and external factors were estimated at 2.29 and 2.03, respectively. As a result, the university under study was placed in the WT (weaknesses and threats) zone. According to the QSPM matrix, the prioritized strategies were communication and interaction at different levels, development of human resources, development of financial resources, compilation of related documents, and establishment of rules.

Conclusion: According to SWOT analysis, the most important strategies to achieve scientific supremacy regarding university excellence are reinforcement of the strengths and exploitation opportunities by providing financial and human resources, establishing rules, and making comprehensive communication and interaction.

Keywords: Scientific supremacy, Strategic management, SWOT analytical matrix, QSPM

Introduction

The contemporary literature on evolution in medical science education encompasses numerous terms, such as competitive advantage, mission-oriented, mission distinct, center of excellence, specific mission, and scientific supremacy. Although there is no clear analytical definition for these terms, each implicitly refers to a common concept. Medical sciences universities possess many competitive advantages; therefore, they are benefited from a variety of potential possibilities to become centers of excellence at the macro-regional and national level, as well as the international level, in the case of centralized planning and headquarters support. Scientific supremacy is an individual, group, and long-term effort that is made by the individual and society's demands to produce science (1).

In other words, scientific supremacy can be explained by being in a position of inspiration in the world and

having scientific supremacy in such a way that one can be successful in producing and providing health goods and services, as well as treatment and medical education required by society. Accordingly, other countries can take advantage of using scientific theories, technical knowledge, and service excess transfer from inside the country to foreign borders. This not only spreads Iranian and Islamic culture and raises the level of the country's dignity and supremacy, but also the society benefits from its economic advantages (2).

In the previous studies, the five identified components related to the concept of scientific supremacy were cultural, scientific, international, supervisory, and social; moreover, regarding management strategies, the precise determination of the scientific supremacy strategy at the micro, medium, and macro levels, as well as the necessity of long-term planning, and prospective attitude toward science and technology have been emphasized (3).

To develop a strategic plan to achieve scientific supremacy, the results of the studies have highlighted the need to draw a timeline, develop a road map, and establish a differentiated strategic plan (4,5). Some studies have also been conducted regarding the identification and prioritization of factors affecting the scientific supremacy of universities. According to the results, factors affecting scientific supremacy regarding the prominence included training and empowerment of self-confident and entrepreneurial human resources, the provision of a synergistic national and transnational scientific network, and the appropriate pyramid of academic staff members with the recruitment of specialized qualitative forces which ranked first, second, and third, respectively (6).

The scientific supremacy strategy in the national horizon and at the level of higher education of the country is the result of a series of strategic and long-term decisions of the country. It is expected that this strategy integrates the macro policies of the country, accomplishes the upstream documents, and makes scientific supremacy a united concept. It is worth mentioning that scientific supremacy has a strategic, merit-oriented, and process nature (7).

One of the significant methods to evaluate the strategic plan is to focus on the weaknesses and strengths of internal factors and consider the opportunities and threats of external factors, which can be achieved using the SWOT matrix (8, 9). SWOT stands for Strength, Weakness, Opportunity, and Threat. The two primary concepts focus on internal and the next two words highlight the external factors affecting the system (10).

The Quantitative Strategic Planning Matrix (QSPM) is another strategic plan (11, 12). The QSPM technique determines the feasibility of the strategic options selected through the SWOT matrix and prioritizes the extracted strategies. To achieve scientific supremacy, Zanjan University of Medical Sciences, one of the universities in the northwest of Iran, identified and explained the indicators related to scientific supremacy in 2015. Accordingly, the accomplishments in drug delivery were determined as the activity domain to achieve scientific supremacy due to its distinction and excellence, compared to other functional activities of the university (Table1).

Table 1. Key indicators for determination of Drug Delivery as the area of university excellence

Row	Indicators	Row	Indicators
1	The presence of faculty members among the top 1% of scientists in the world	10	The presence of faculty members possessing national/international grants
2	Membership of the university faculty members in related international scientific associations	11	The number of published Q1 papers (first quartile) by faculty members
3	The presence of university faculty members with an h-index above 20 (based on the Scopus database)	12	The presence of faculty members having national/international patents for invention
4	Membership of the university faculty members in the national academic board of the related fields	13	Holding national and international conferences by the university in the specialized fields
5	The number of articles published in journals with an impact factor above 15	14	Establishment of knowledge-based companies by faculty members
6	Existence of postgraduate courses	15	Writing reference books and textbooks in Persian and English
7	The presence of faculty members having national mega project	16	Winning awards from prestigious domestic and international festivals by faculty members
8	The existence of research centers at the university	17	The existence of up-to-date educational and research infrastructures in the specialized fields or subjects
9	The existence of specialized incubator centers in the university	18	The existence of a related center of excellence in the university

Considering the perspective and comprehensive nature of scientific supremacy and the dependence of this issue on various political, economic, social, and cultural factors, the development of a strategic plan, as a road map, suggests suitable strategies through the analysis of internal and external factors. The research questions raised in this study are as follows:

- What are the main issues for developing the scientific supremacy plan of the university in line with the vision of the program administrators?
- Considering the evaluation of the external affecting factors, what are the opportunities and threats of the scientific supremacy plan?
- Considering the evaluation of the internal affecting factors, what are the strengths and weaknesses of the scientific supremacy plan?
- What is the strategic position of scientific supremacy and which of the four aggressive, competitive, conservative, and defensive strategies is suitable in this regard?
- What are the most important strategies of the scientific supremacy plan of the university?

With this background in mind, this study aimed to identify and prioritize strategies to achieve scientific supremacy at Zanjan University of Medical Sciences, Zanjan, Iran.

Materials & Methods

Design and Setting

This exploratory mixed-method study was conducted based on an applied research method at Zanjan University of Medical Sciences, Zanjan, Iran, in 2021.

Participants and Sampling

In this method, using qualitative data collection and analysis methods such as case studies, interviews with experts, and action research, the main aspects of the phenomenon under study were identified and determined and then were considered as the desired dimensions for developing measurement tools through quantitative method (13). The statistical population in the qualitative section consisted of 10 senior managers and experts, each of whom had executive experience in developing a strategic plan. Furthermore, the statistical population in the quantitative section included 40 faculty members participating in the scientific supremacy program as described in Table 2. Due to the limited statistical population, there was no need for sampling.

Table 2. The characteristics of the faculty members completing the questionnaire

Gender	Male (n=24, 60%) Female (n=16, 40%)
Academic ranks	Professor (n=4, 10%), Associate professor (n=25, 62%), Assistant professor (n=11, 28%)
Relevant faculty	Pharmacy: (n=15, 37.5%), Medicine: (n=12, 30%), Dentistry: (n=5, 12.5%), Health and Paramedicine: (n=5, 12.5%), Nursing and Midwifery: (n=3, 7.5%)

Data collection methods

In the qualitative section of this study, individual interviews with experts were used to determine the vision issues and the importance of internal and external factors, as well as extract the strategies of the scientific supremacy plan. Accordingly, 10 members of the planning team were selected for the SWOT interview using the snowball method, and in-depth semi-structured interviews were conducted regarding weaknesses, strengths, opportunities, and threats. It should be mentioned that the data saturation method was used to determine the adequacy of sampling (14). Data saturation refers to the point that no new information is expected to be added by asking repeated questions. In this study, data saturation was achieved after conducting interviews, each of which lasted 120 min on average. It should be mentioned that after obtaining consent, the interviews were recorded as audio content and transcribed verbatim by the researcher.

Data analysis

The qualitative data obtained from the interviews were analyzed through constant comparative analysis of data, which is based on the comparative analysis of different parts of the data in terms of similarities and differences (15). Finally, the main components were identified based on the four factors of SWOT. In order to weigh the mentioned factors, a meeting was held with the members of the expert team, and they were asked to assign a weight (importance level) from 0 to 1 for each factor to estimate the final weight (16). After analyzing the comparative content of the interview text, Cohen's kappa coefficient was used to analyze the data, and the

importance of the factors was determined using Analytical Hierarchy Process (AHP).

To score (weight*coefficient) internal and external factors, a 34-item questionnaire (17 items for Internal Factor Evaluation [IFE] and the other items for External Factor Evaluation [EFE]) was developed. Following that, to determine the questionnaire's validity, the items were given to the expert team, and they were requested to express their corrective comments. The reliability of the questionnaire was also obtained at 0.991 using Cronbach's alpha indicating the internal consistency of the items. According to the results obtained from the one-tailed t-test, the ineffective terms were eliminated from the beneficiaries' viewpoint. Subsequently, the strengths and weaknesses of the internal factors, as well as the opportunities and threats of the external factors, were extracted.

In order to determine the mean weight and coefficient, SPSS (Statistical Package for the Social Sciences) software was used. In the next stage, Quantitative Strategic Planning Matrix (QSPM) was employed to prioritize the obtained strategies. This matrix estimates the relative attractiveness of each strategy based on weight and importance or degree of attractiveness; moreover, it provides an objective basis for ranking inclusive strategies for the studied population. Based on the effect and attractiveness of internal and external factors, the team of university experts assigned a score of 1 to 4 to the selected strategies, which was called the attractiveness score.

The classification of the attractiveness score of the strategies was as follows: score 1 (the strategy is not acceptable), score 2 (the strategy is somewhat acceptable), score 3 (the strategy can be implemented), and score 4 (the strategy is highly acceptable). Each strategy's attractiveness was calculated by multiplying the weight of each factor by the attractiveness score. To obtain the total attractiveness of each strategy, the numbers of the attractiveness columns of each strategy were added. Finally, the strategies were prioritized based on the score obtained from the overall attractiveness of each strategy in descending order.

Results

The research findings based on the research questions are as follows:

Research questions 1-3:

- What are the main issues for developing the academic supremacy program of the university in line with the vision of the program administrators?
- Considering the evaluation of the external affecting factors, what are the opportunities and threats of the scientific supremacy program?
- Considering the evaluation of the internal affecting factors, what are the strengths and weaknesses of the scientific supremacy program?

The focus group research strategy was used to determine the scientific supremacy vision. Accordingly, using the conceptual framework and semi-structured questions, the experts' opinions were obtained through individual interviews. During the interviews with academic experts, organizational weaknesses, strengths, opportunities, and threats regarding the university's movement toward scientific supremacy were discussed and analyzed separately. In total, 203 concepts regarding the current state of the university were recorded by the experts divided into strengths (n=71), weaknesses (n=41), threats (n=62), and opportunities (n=29). Afterward, through constant comparison and analysis of data in terms of similarities and differences, 203 concepts were integrated, and a total of 34 components were identified (Table 3).

Table 3. Strengths, weaknesses, opportunities, and threats (SWOT matrix)

Weaknesses:	**Strengths:**
1. Lack of financial resources, as well as no continuous and transparent allocation of finances to scientific supremacy	1. The presence of the General Secretariat of 6th tentative division in Zanjan University of Medical Sciences
2. Lack of internal belief and necessary support from senior managers, especially middle managers, regarding leadership and provision of the necessary resources for supremacy	2. The existence of the scientific and educational center of excellence in pharmaceutical nanotechnology of the country in Zanjan University of Medical Sciences since 2012
3. Lack of regulations and special supporting instructions in order to establish scientific supremacy in the university	3. The presence of young, competent, and motivated faculty members in the university
4. The inadequacy of organizational interaction between education and research, as well as technology sectors in connection with scientific supremacy in the university	4. The existence of facilities and infrastructures under development in the university, such as research centers, development centers, a Science and Technology Park, a comprehensive research laboratory, and an animal laboratory
5. Weakness in the approach of meritocracy and professionalism in the management of human resources, especially specialized human resources	5. Varieties in courses and postgraduate courses in the university
6. Lack of special empowerment programs for faculty members in	6. The existence of top researchers according to the scientometrics information database regarding the distinction of the university's

specified domains in order to activate scientific supremacy 7. Lack of commercialization, product-oriented, and result-oriented approach in the educational and research activities of the university 8. Limited financial resources in the research and technology centers of the university	academic mission 7. The existence of laboratory equipment and facilities considering the specified domain of the scientific supremacy in the university 8. Formation of research groups of scientific supremacy aiming at improving teamwork spirit and integration of different specialties regarding scientific supremacy of the university 9. Existence of an active EDC center interested in the development and evolution of medical education
Threats: 1. Lack of strategic, systemic, and global attitudes, as well as professionalism and teamwork in the prevailing organizational culture in governmental organizations 2. Restrictions on communication and international interaction due to political and economic sanctions 3. Lack of a system based on growth, excellence, and sagacity in the educational structure of the country, and the presence of the brain drain phenomenon 4. Dependence of the macromanagement of higher education and research centers of the country on the governing bodies and political system 5. The integration of the healthcare system with the education and research system in the universities of medical sciences and its effect on reducing the support and financial resources for education and research 6. Quantitative development and article-oriented research field instead of qualitative development 7. Lack of an efficient private sector in higher education, research, and technology 8. Existence of parallelism and conflict of interests among various executive and legislative bodies in higher education, as well as research and technology sectors	**Opportunities:** 1. The proper geographical location of Zanjan province regarding the easy access to the capital, industrial centers, and communication with other provinces 2. Believing and relying on the country's internal knowledge and expertise following political and economic sanctions 3. The priority and support by the Ministry of Health and the National Agency for Strategic Research in Medical Education to move toward scientific supremacy in universities 4. The existence of researchers and young elites in the country and abroad 5. The appropriate rank of the country in the prestigious global rankings regarding pharmaceutical sciences (14th among 200 countries in the world according to Scimago ranking) 6. Existence of a graduate university of basic sciences in Zanjan province 7. Supports from upstream documents, including the medical education transformation and innovation document, the country's scientific development document, and the statement of the second step of the revolution to move toward scientific supremacy in universities. 8. Existence of prominent knowledge-based companies in the private sector in the specified domain in the country (accelerators and other companies 9. The current support of the government to establish and develop the relationship between the university and the industry

Research question 4:

- What is the strategic position of scientific supremacy and which of the four aggressive, competitive, conservative, and defensive strategies is suitable in this regard?

Each factor mentioned in the IFE and EFE tables was scored using the SWOT matrix analysis. Accordingly, the internal and external factors were scored 2.29 and 2.03, respectively, and the university was placed in the WT zone of the quadruple SWOT matrix (Figure 1).

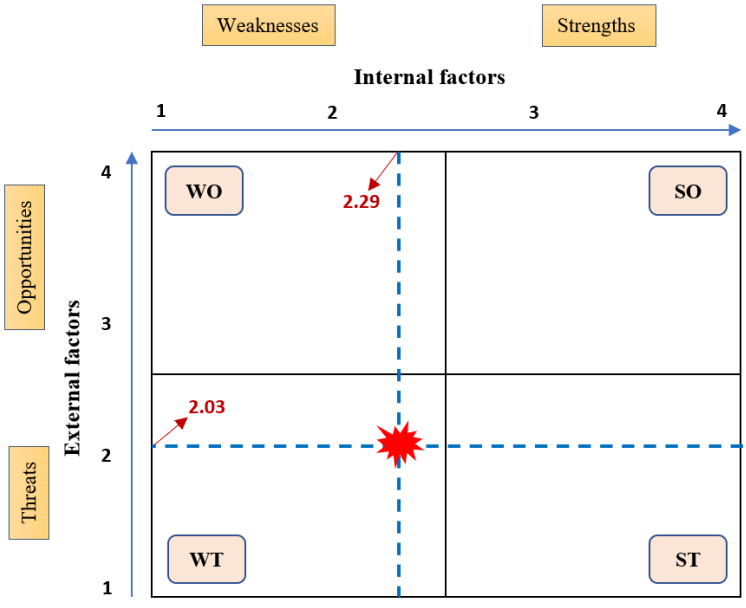

Figure 1. The university position in the SWOT matrix

Following that, the strategies of each section of the SWOT matrix were identified by the experts as described in Table 4.

Table 4. SWOT strategies

WO strategies: **WO1**: Attracting the support and cooperation of the private sector and knowledge-based companies **WO2**: Training and empowering managers, professors, and related staff **WO3**: Creating the opportunity to exchange professors, students, and scientific content among scientific and research centers in the province and the country	**SO strategies**: **SO1**: Arranging cooperation agreements with other scientific centers and target countries **SO2**: Introducing the capacity and facilities of the university at the level of the province, country, and region **SO3**: Supporting the research groups of the scientific supremacy regarding drug delivery **SO4**: Using facilities and infrastructure at their maximum level related to the specified domain of scientific supremacy
WT strategies: **WT1**: Estimating and providing the required financial resources **WT2**: Estimating and providing the required human resources **WT3**: Developing the related documents and rules **WT4**: Making communication and interaction at the level of university, province, country, region, and target countries regarding scientific supremacy	**ST strategies:** **ST1**: Promoting global and systemic thinking, as well as professionalism in the organizational culture of the university **ST2**: Identifying countries with target research centers for scientific exchange in the selected field of scientific supremacy **ST3**: Qualitative development of the articles and products in the specified domain of scientific supremacy **ST4**: Maintaining the efficient human resources of the university in the specified domain of scientific supremacy

Research question 5:

What are the most important strategies of the academic supremacy plan of the university?

In the last stage, to evaluate and prioritize the WT strategies identified for the status of the university in the SWOT matrix, the Quantitative Strategic Planning Matrix (QSPM) was used by the expert team to score the strategies. The results are presented in Appendix 1 and 2.

Based on the QSPM scores, the strategies were prioritized as follows:

1. Communication and interaction at the levels of university, province, country, region, and target countries regarding scientific supremacy and considering university excellence (WT4).
2. Estimation and provision of the required human resources regarding the academic distinction of the university (WT2).
3. Estimation and provision of financial resources required in the area of academic distinction of the university (WT1)
4. Development of documents and rules related to scientific supremacy (WT3)

Discussion

The present study was conducted to prioritize scientific supremacy strategies at Zanjan University of Medical Sciences using the SWOT-QSPM technique. In the contemporary era, the provision of strategic thinking and the development of strategic planning is considered a vital necessity for every organization, institution, and country. Scientific supremacy is basically a strategic concept since it is a comprehensive and long-term process affected by various factors. In addition, the analysis of the current situation is the first step to developing the strategic planning of supremacy and the university protocol.

On the way to achieving scientific supremacy in a specified domain and obtaining this position, Zanjan University of Medical Sciences possesses a series of strengths, including capable faculty members, equipment and facilities related to that specified domain, and a pharmaceutical nanotechnology center of excellence. In contrast, the weaknesses in this regard are limited financial resources in the research and technology sectors, the lack of regulations and guidelines supporting the scientific supremacy concept, and no belief in the competencies of professors, managers, and employees to achieve supremacy. In the external context, the obtained opportunities of the university include the support of upstream documents on the issue of scientific supremacy, the appropriate position of the country in the world rankings regarding pharmaceutical sciences, and the presence of researchers and elites in the country.

The most important contextual threats in this regard were the dependence of the country's higher education and research centers on the governing bodies, islanded operation and parallelism among different executive systems, as well as weakness in the growth system and meritocratic thinking in strengthening the scientific and research foundation of the country. After integrating the

internal and external factors regarding scientific supremacy, the university was placed in the WT position in the SWOT diagram. This means that the university should utilize the maximum capacity of existing strengths and opportunities to overcome these weaknesses and threats.

The four proposed strategies of the WT are explained considering their priority. The first strategy is establishing communication and interaction at different levels from the lowest level which includes educational and research groups to the international level. The main goal of this proposal is to employ the maximum capacity and potentials available at different levels in order to attract cooperation and synergy, use resources and facilities at the province and country levels, as well as introduce and increase the potential and actual capacities of the university.

The second strategy is the provision of human resources. Efficient faculty members and experts are the driving force of moving toward supremacy. Therefore, this strategy aims to form a cohesive and superior team in terms of science, ethics, teamwork spirit, commitment, and motivation. The third strategy is related to financing. Supremacy cannot be achieved without resources and investment in planning. Therefore, the aim of this strategy is to provide financial resources, allocate expenses, and reach financial efficiency. The fourth strategy is to develop related documents and establish rules. Examining the existing documents and rules shows that the upstream documents, including the general policies of science and technology, as well as the evolution of medical education, support the concept of supremacy. However, it is necessary to review the existing documents and rules regarding the scientific supremacy concept in terms of compatibility and support at the level of the ministry and universities; moreover, new rules should also be formulated and announced.

The results of this study are in line with the findings of a study performed by Yazdani et al.(4). They emphasized the consistency of the universities' mission with upstream documents and synergy at the national level. It is worth mentioning that the aforementioned studies in the introduction section have only indicated the importance of developing a strategic plan; however, the present study aimed to analyze the current situation and obtain the proper strategies along with the university status.

Conclusion

The universities' movement toward scientific supremacy requires strategic thinking. The analysis of the position of Zanjan University of Medical Sciences in order to achieve scientific supremacy regarding excellence showed that this university should improve its weaknesses and threats by using its strengths and existing opportunities. The most important suggested strategies in this regard are the estimation and provision of financial and human resources, development of related documents and establishment of the rules, as well as communication and interaction at the levels of university, province, country, region, and target countries.

Ethical considerations

This study was approved by the Research Ethics Committee of the National Agency for Strategic Research in Medical Education in Iran (IR.NASRME.REC.1400.218). Written consent was obtained from the participants to record the interviews and transcribed verbatim. Moreover, the objectives of the present study were explained to the participants, and they were assured of the confidentiality of their information.

Acknowledgments

This project was funded by The National Agency for Strategic Research in Medical Education. Tehran. Iran. Grant No. 4000158. Moreover, the experts and faculty members of Zanjan University of Medical Sciences are appreciated for their cooperation in conducting interviews, participating in the survey, and providing spiritual support for this research.

Conflict of interest

There is no conflict of interest.

Authors' contributions

S.Valimoghaddam Zanjani (first author) designed the study, collected data, and performed the analysis. S. Mohebbi (Corresponding author) participated in the design of the study, as well as data collection and analysis, wrote the manuscript and was responsible for reading and approving the final version of the study.

Abbreviations

Analytical Hierarchy Process (AHP)
Internal Factor Evaluation (IFE)
External Factor Evaluation (EFE).

References

1. Cain F, Hüchtker D, Kleeberg B, et al. Introduction: Scientific Authority and the Politics of Science and History in Central, Eastern, and Southeastern Europe. Berichte zur Wissenschaftsgeschichte. 2021; 44, 339-351. [https://doi.org/10.1002/bewi.202100035]
2. Ramesheh SMK. Basics, Principles and Objectives of the Healthcare Authority's Certificate. Iranian Journal of Culture and Health Promotion. 2019; 3(1):7-15. [in persian] [http://ijhp.ir/article-1-143-fa.html]
3. Sadabadi AA, Rahimi Rad Z, Fartash K. Recognizing the components of scientific referent in the Islamic Republic of Iran. Research Journal of Islamic Revolution. 2020; 10(35): 87-115. [in persian] [https:doi.org/10.22084/rjir.2020.21909.3091]
4. Yazdani S, Dashti M, Hoseini Abardeh M, et al. Roadmap for Achieving Supremacy in Medical Sciences Universities. Iranian Journal of Culture and Health Promotion. 2022; 5 (4) :427-433. [in persian] [http://ijhp.ir/article-1-513-fa.html]
5. Mohagheghi MM, Golshani M, Marandi A, et al. The Current Status of Science, Technology and Health Innovation of IR Iran. Iranian Journal of Culture and Health Promotion. 2019; 3 (1) :24-42. [in persian] [http://ijhp.ir/article-1-145-fa.html]
6. Koushazade F, Akbari A, Maghool A, et al. Identifying Classification and Prioritization the Factors Affecting the University Academic Authority. 2020; 13(47): 133-152. [in persian] [https://doi.org/10.22034/jiera.2019.173167.1816]
7. Taban M, Yasini A, Shiri A, et al. Designing and Explaining Process Model of Scientific Authority in Iran's Higher Education Mixed approach. Knowledge Retrieval and Semantic Systems. 2016; 3(6): 20-40. [in persian] [https://doi.org/10.22054/JKS.2016.4994]
8. Gurel E, Tat M. SWOT analysis: A theoretical review. The Journal of International Social Research. 2017; 10(51): 994-1006. [https://doi.org/10.17719/jisr.2017.1832]
9. Hunger J, Wheelen TL. Situational (SWOT) analysis. Essentials of strategic management. 5th ed. Pearson new international ed. Edinburgh. Prentice Hall. 2014, 90–107.
10. Harrison JS, St. John CH. Strategic management of organizations and stakeholders: concepts. 2nd ed. Minneapolis West. 1998.
11. Suroso JS, Fatchan HA, Quantitative Strategic Planning Matrix Analysis on the Implementation of Second Screen Technology. 5th International Conference on Electrical Engineering, Computer Science and Informatics (EECSI). 2018; 62-66. [https://doi.org/10.1109/EECSI.2018.8752748]
12. Zulkarnain, A, Wahyuningtias D, Putranto TS. Analysis of IFE, EFE and QSPM matrix on business development strategy. IOP Conference Series: Earth and Environmental Science. 2018;126 012062. [https://doi.org/10.1088/1755-1315/126/1/012062]
13. Weyant E. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th Edition, Journal of Electronic Resources in Medical Libraries, 2022; 19(1-2): 54-55. [https://doi.org/10.1080/15424065.2022.2046231]
14. Saunders B, Sim J, Kingstone T, et al. Saturation in qualitative research: exploring its conceptualization and operationalization. Quality and Quantity. 2018; 52: 1893–1907. [https://doi.org/10.1007/s11135-017-0574-8]
15. Creswell JW. Qualitative Inquiry and Research Design: choosing Among Five Traditions. 4th ed. London: Sage Publication Ltd. 1998.
16. Lousiane N, Syaroni DAW. Analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT) for Business of Laboratory Competency Training. Advances in Economics, Business and Management Research. 2019; 112: 62-68. [https://doi.org/10.2991/aebmr.k.200108.017]

Appendix 1. The effects of strengths and weaknesses on WT strategies

Strengths	**Weight**	**Attractiveness**	**WT1**	**Attractiveness**	**WT2**	**Attractiveness**	**WT3**	**Attractiveness**	**WT4**
The presence of the General Secretariat of 6th tentative division in Zanjan University of Medical Sciences	0.041	1.5	0.0615	1.5	0.0615	2	0.082	2.5	0.1025
The existence of the scientific and educational center of excellence in pharmaceutical nanotechnology of the country in Zanjan University of Medical Sciences since 2012	0.051	1.5	0.0765	2	0.102	1.5	0.0765	2.5	0.1275
The presence of young, competent, and motivated faculty members in the university	0.057	2.5	0.1425	3	0.171	1	0.057	1	0.057
The existence of facilities and infrastructures under development in the university, such as research centers, development centers, a Science and Technology Park, a comprehensive research laboratory, and an animal laboratory	0.052	2.5	0.13	2.5	0.13	1	0.052	1	0.052
Varieties in courses and postgraduate courses in the university	0.056	1.5	0.084	3	0.168	1	0.056	2.5	0.140
The existence of top researchers according to the scientometrics information database regarding the distinction of the university's academic mission	0.062	3	0.186	2.5	0.155	2	0.124	3	0.186
The existence of laboratory equipment and facilities considering the specified domain of scientific supremacy in the university	0.076	1.5	0.114	2	0.152	2	0.076	2.5	0.190
Formation of research groups of scientific supremacy aiming at improving teamwork spirit and integration of different specialties regarding scientific supremacy of the university	0.064	2.5	0.16	2.5	0.16	1.5	0.096	3	0.192
Existence of an active EDC center interested in the development and evolution of medical education	0.04	1.5	0.060	2.5	0.10	4	0.16	4	0.120
Weaknesses	**Weight**	**Attractiveness**	**WT1**	**Attractiveness**	**WT2**	**Attractiveness**	**WT3**	**Attractiveness**	**WT4**
Lack of financial resources, as well as no continuous and transparent allocation of finances to scientific supremacy	0.071	1	0.071	1	0.071	2	0.142	1	0.071
Lack of internal belief and necessary support from senior managers, especially middle managers, regarding leadership and provision of the necessary resources for supremacy	0.074	1	0.074	1	0.074	1.5	0.111	1	0.074
Lack of regulations and special supporting instructions in order to establish scientific supremacy in the university	0.060	1	0.06	1	0.060	1	0.060	1	0.060

The inadequacy of organizational interaction between education and research, as well as technology sectors in connection with scientific supremacy in the university	0.058	2	0.116	1	0.058	1	0.058	1.5	0.087
Weakness in the approach of meritocracy and professionalism in the management of human resources, especially specialized human resources	0.064	1	0.064	1	0.064	1.5	0.096	1	0.064
Lack of special empowerment programs for faculty members in the specified domains in order to activate scientific supremacy	0.057	1	0.057	1	0.057	1.5	0.0855	1	0.057
Lack of commercialization, product-oriented, and result-oriented approach in the educational and research activities of the university	0.052	2	0.104	1	0.052	2	0.104	1	0.052
Limited financial resources in the research and technology centers of the university	0.065	1	0.065	2	0.130	1.5	0.0975	1	0.065
Total		-	1.62	-	1.76	-	1.53	-	1.69

Appendix 2. The effects of opportunities and threats on WT strategies

Opportunities	**Weight**	**Attractiveness**	**WT1**	**Attractiveness**	**WT2**	**Attractiveness**	**WT3**	**Attractiveness**	**WT4**
The proper geographical location of Zanjan province regarding the easy access to the capital, industrial centers, and communication with other provinces	0.050	3	0.15	3	0.15	1	0.05	3.5	0.175
Believing and relying on the country's internal knowledge and expertise following political and economic sanctions	0.040	1.5	0.06	2.5	0.1	1	0.04	1.5	0.06
The priority and support by the Ministry of Health and the National Agency for Strategic Research in Medical Education to move toward scientific supremacy in universities	0.054	3	0.162	3	0.162	3	0.162	2.5	0.135
The existence of researchers and young elites in the country and abroad	0.053	2.5	0.1325	3	0.159	1	0.053	3	0.159
The appropriate rank of Iran in the prestigious global rankings regarding pharmaceutical sciences (14th among 200 countries in the world according to Scimago ranking)	0.045	3	0.135	1.5	0.0675	2	0.090	3	0.135
The existence of a graduate university of basic sciences in Zanjan province	0.049	1	0.049	2.5	0.1225	1.5	0.0735	3	0.147
Supports from upstream documents, including the medical education transformation and innovation document, the country's scientific development document, and the statement of the second step of the revolution to move toward scientific supremacy in universities	0.048	1.5	0.072	1.5	0.072	4	0.192	1.5	0.072
The existence of prominent knowledge-based companies in the private sector considering the specified domain in the country (accelerators and other companies)	0.049	2.5	0.1225	2.5	0.1225	1	0.049	3	0.147
The current support of the government to establish and develop the relationship between the university and the industry	0.048	2.5	0.120	2.5	0.120	1	0.048	3	0.144

Threats	Weight	Attractiveness	WT1	Attractiveness	WT2	Attractiveness	WT3	Attractiveness	WT4
Lack of strategic, systemic, and global attitudes, as well as professionalism and teamwork in the prevailing organizational culture in governmental organizations	0.073	1	0.073	1	0.073	1	0.073	1	0.073
Restrictions on communication and international interaction due to political and economic sanctions	0.075	1	0.075	2	0.150	1	0.075	1	0.075
Lack of a system based on growth, excellence, and wisdom in the educational structure of the country, and the presence of the brain drain phenomenon	0.074	1.5	0.111	1	0.074	1	0.074	1.5	0.111
Dependence of the macro management of higher education and research centers of the country on the governing bodies and political system	0.072	1	0.072	1	0.072	1	0.072	1.5	0.108
The integration of the healthcare system with the education and research system in the universities of medical sciences and its effect on reducing the support and financial resources for education and research	0.064	1	0.064	1	0.064	1	0.064	1	0.064
Quantitative development and article-oriented research field instead of qualitative development	0.070	2	0.140	1.5	0.105	1	0.070	0.5	0.035
Lack of an efficient private sector in higher education, research, and technology	0.069	1	0.069	1	0.069	1	0.069	1	0.069
Existence of parallelism and conflict of interests among various executive and legislative bodies in higher education, as well as research and technology sectors	0.066	1	0.066	1	0.066	1	0.066	2	0.132
Total		-	1.67	-	1.74	-	1.32	-	1.84