Original Article

Scientific productions of clinical and non-clinical research centers before and after the implementation of the strategic planning

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Abstract

*Background and Purpose***:** One of the most important conceptual and thematic priorities in twenty-year visions of the country has been to develop scientifically, and achieve high scientific progress and excellence and the optimum position in the various global relations. Since scientific production is one of the most important missions of universities, the aim of this study was to review the scientific production of Mazandaran University of Medical Sciences, before and after the implementation of the strategic planning.

Method: This descriptive-analytical study was conducted on six research centers at Mazandaran University of Medical Sciences. The current research adopted the census method, and the data was collected through definition data collection form, and all statistical analyses were carried out using SPSS (V20.0) through descriptive statistics and inferential statistical methods, such as Kolmogorov-Smirnov, t-test, and Chi-square.

Result: The results showed that the total score improved after the implementation of strategic planning (Sig. = 0.0001). In addition, there was a meaningful relationship between the total scores before and after the implementation of strategic planning in clinical centers and non-clinical research centers (Sig.=0.000).

Conclusion: The Strategic planning in research organizations can act as a driving force along with other factors for the progress in all areas of science, and it was found that achieving comprehensive development without proper utilization of research findings will undoubtedly be impossible. Hence, it is necessary for academic centers, and especially for universities of medical sciences, to prepare their current planning with environmental assessment, and regularly pursue strategic opportunities to fulfill the role of research and technology organizations in the knowledge-based economy.

Keywords: scientific indicators; Strategic Planning; Research Center; Mazandaran

1. Introduction

Science and technology are the most important components of national and international authority in countries. One of the most important conceptual and thematic priorities in twenty-year visions of the country has been to develop scientifically, and achieve high scientific progress and excellence and the optimum position in the various global relations. Research centers are the kind of organizations that have a central role in the production of knowledge and economic development. However, these organizations have a long history, and their growth, development, and the recognition of their role are important and based on the current forecasting show, the growing trend (1). The effectiveness of these organizations and their services in national and international levels is as a result of different factors, such as strategic management. Over the past decade, the management culture has mainly been focusing on the importance of strategic thinking, because it has caused a competitive position and its protection against environmental changes. More organizations have recently started to take advantage of strategic management and planning, but a group of organizations that make less use of such planning is health organization, and the vice presidents of research centers at the center of science and technology production (2). With regard to this issue, the percentage of use of administrative tools like strategic planning by managers was 88 % in 2006, which shows that the importance of strategic planning as a vital influential factor in the progress of many organizations is not well understood. Even in some cases, managers make it a fancy and an expensive affair (3). Strategic planning is a process used in a variety of business sectors to enhance operational performance. It is a methodical, structured process whereby an organization defines its mission, identifies its direction, develops a unified approach, prioritizes long-and short-term goals, assigns

accountability, and allocates financial resources (4). The problem of managing public institutions in an efficient and effective manner has been discussed for a long time. The concept of strategic planning might bring a new perspective and might be a necessary tool for changing the inefficient structure of public institutions (5). The need for strategic planning is especially acute in healthcare where leaders face both (a) a lean, nongrowth economy, and (b) recent change to a market-oriented economy. Under these conditions, the fundamental knowledge of interrelationships between organizational strengths and budgeting is essential, along with the ability to effectively communicate decisions regarding organizational goals (6). The importance of the current study has been noted on an implementation on the basis of the Clause 1 of Article 110 of the Iranian Constitution from Leader Outlines General Policies on Health Care to the strategic change of the medical research with an innovative approach and planning to become the scientific authority on science, technology and medical services, and to change Iran into the unique reference of the medical centers in Southwest Asia as well as Islamic nations. Today, most countries are faced to waves of globalization in their industries and business sectors as well as higher education sectors or universities (7). Strategic planning in higher education institution is a systematic planning process designed to guide decisions about the improvement of education and training, research and development, and application and service processes. It also allocates financial and other resources, makes provision for the procurement of new resources, and enhances the performance and quality of an institution. The results of previous studies showed that there is currently no clarity on the major determinants of success for strategic planning in universities (8). In order to institutionalize the scientific activities of the target university, and take step forward in the

direction of the research, Mazandaran University of Medical Sciences set their programs within the framework of the strategic planning, and set off on the implementation phase, and have taken this route for four years. The variables of the present study were the production and publication of knowledge, capacity-making, scientific projects, creation and approval of research centers, setting up PhD courses and colleges, establishment of faculty, justification of scientific journals, and the acceptance of more faculty members and researchers according to the goals of the present strategic planning. The aim of the current study was to determine the performance indicators and the lack of fulfillment and realization of the set goals in different aspects. Despite the internal development of research and technology organizations, the country suffers mainly from their insignificant share of these markets in national and international competitive levels; hence, achieving the first level in the region needs resources, and to attain these goals, research centers should make the best use of strategic and prospective management towards the realization of the desired goals. Accordingly, it is hoped that through reviewing the scientific indicators of the research centers of the target university, before and after the implementation of the strategic planning, this study could help the country's scientific community, medical research centers, universities, other relevant organizations, and particularly the country's health system to achieve the goals and visions of the comprehensive academic plan, 1404.

2. *Materials and Methods*:
This descriptive-analytical study was conducted on six research centers at Mazandaran University of Medical Sciences.

All scientific production indicators in all target six centers were examined through census method. The studied research centers were Pharmaceutical Sciences Research Center, Health Sciences Research Center, Thalassemia Research Center, Traditional and Complementary Medicine Research Center, Molecular Cell Biology, Psychiatry and Behavioral Sciences Research Center, which were investigated from 2008 to 2013. The variables of this study were the production and publication of knowledge (including articles in different databases), capacity-making, scientific projects, creation and approval of research centers, setting up PhD courses and colleges, establishment of a faculty, justification of scientific journals, and the process of acceptance for more faculty members and researchers according to the goals of the present strategic plan. This strategic planning was implemented from the year 2011, and for collecting the required data, the data collection forms from Research Information Management Site of the Ministry of Health, as well as the research centers were used. The collected data were analyzed by descriptive statistics and inferential statistical methods, such as Kolmogorov-Smirnov, t-test, and Chi-square through SPSS Software (V20.0).

3. *Results:*
The members of the Scientific Board – faculty members – in the research centers before and after the implementation of strategic planning changed from 351 to 402, and this growth has happened in each center.
 The scientific production, capacity-making and the total score before and after the implementation of the planning in research centers are all shown in Table 1.

Table 1. Compare the scientific production, capacity- making and total scores in research centers before and after implementation of the strategic planning

Variables	Time	Mean	Standard deviation	T	Sig.
Scientific production	Before	436.27	59.6	-6.44	0.0001
	After	799.77	124.55		
Capacity making	Before	23.72	4.1	1.66	0.126
	After	19.26	5.07		
Scientific project	Before	0.86	0.74	0.335	0.74
	After	1.01	1.04		
Total score	Before	445.58	74.83	-8.24	0.0001
	After	767.74	59.72		

As you see, the status of scientific production with t=-6.44 and sig. = 0.0001 improved, and there was a significant relationship between before and after the implementation of strategic planning. But capacity making with t=1.66 and significance level equal to 0.126 decreased before and after the implementation of strategic planning, which was not significant. At the same time, the total score, with t=-8.24 and sig.=0.0001, was found to be higher than before implementing the strategic planning, which meant that there was a meaningful relationship between the total scores before and after strategic planning.

There were also variables like articles in different database, such as ISI, PubMed, Scopus, and other database and non-indexed articles in scientific production and total score in this section, which is illustrated in Table 2.

Table 2. The frequency of articles in ISI, PubMed, Scopus, and other database and non-indexed database and the total score

Variables	Time	Non Clinical Pharmaceutical	Non Clinical Health	Non Clinical Molecular cell biology	Psychiatry and Behavioral	Clinical Traditional and complementary	Thalassemia	Total
ISI, PubMed	Before	56	6	17	6	7	9	101
	After	51	21	30	18	5	10	135
Scopus	Before	17	2	6	12	2	8	47
	After	17	69	27	46	4	17	180
Non-indexed	Before	1	1	0	2	0	0	4
	After	0	2	9	0	0	1	12
Other database	Before	1	0	3	5	0	3	12
	After	2	7	3	1	0	5	18
Total score	Before	1653	306	600	181	125	197	3062
	After	2187	1332	1052	676	235	279	5761

As is shown in the table, the number of articles published in ISI and PubMed journals showed an increase equal to101 to 135 after the implementation of strategic planning. This progress was mainly observed in behavioral, health, and molecular cell biology research centers. Regarding Scopus database, there was also documented an increase in the number of published articles from 47 to 180, which was experienced in all research centers expect drug research center. In non-indexed articles, there was an increase, as well, except for the drug and behavioral research center which experienced a decrease in the number of published articles. This increase was also observed in the number of articles in the other studied databases, except for behavioral research center. This progress was also documented in the total score of all research centers in terms of the studied database. Tables 3 and 4 show the result of chi-square test which compares the differences between the examined research centers in terms of their performance, before and after implementing strategic planning, in publishing articles in different databases.

Table 3. Chi-square test result of total score in research centers

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	384.588ª	5	<0.05
Likelihood Ratio	406.633	5	<0.05
Fisher's Exact Test	23.806	1	<0.05
N of Valid Cases	8823		

*a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 124.94.

According to the table, the Value of chi-square statistics equaled to 84.588, and the significance level was less than 0.05, which rejected the zero hypotheses, meaning that there was a meaningful relationship between the number of total scores before and after strategic planning.

Table 4. Chi-square test result for ISI, PubMed, Scopus, other database and non-indexed articles in research centers

	ISI, Pubmed				Scoups				Other sites				Non- Indexed			
	value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	7.650ª	1	.006		9.115ª	1	.003		.375ª	1	.540		.197ª	1	.657	
Likelihood Ratio	8.069	1	.005		8.945	1	.003		.385	1	.535		.349	1	.555	
Fisher's Exact Test				.006				.004								1.000
N of Valid Cases	130				137				24				13			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.95.					a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.04.				a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.67.				a. 3 cells (75.0%) have expected count less than 5. The minimum expected count is .15.			

According to the above table, the value of chi-square statistics regarding ISI and PubMed articles equaled to 27.446 and the significance level was less than 0.05, which meant that the zero hypotheses were rejected, and 6it could also mean that there was a meaningful relationship between the number of ISI and PubMed articles before and after strategic planning. In addition, the Value of chi-square statistics related to Scopus articles equaled to 68.403, and the significance level was less than 0.05, based on which the zero hypotheses were rejected, and it meant that there was a significant relationship between the number of Scopus articles before and after strategic planning. Also, the Value of chi-square statistics regarding non-indexed articles equaled to 16.0 with a significance level of less than 0.05, which caused the zero hypotheses to be rejected, and it meant that there was a significant relationship between the number of non-indexed articles before and after strategic planning. The Value of chi-square statistics concerning other database articles equaled to 12.529 and the level of significance was less than 0.05, based on which the zero hypotheses were rejected, and it meant that there was a meaningful relationship between the number of other database articles before and after strategic planning.

Table 5. Chi-square test result for ISI, PubMed, Scopus, other database and non-indexed articles in clinical and non-clinical research centers

	ISI, Pubmed				Scoups				Other sites				Non- Indexed			
	value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	7.650[a]	1	.006		9.115[a]	1	.003		.375[a]	1	.540		.197[a]	1	.657	
Likelihood Ratio	8.069	1	.005		8.945	1	.003		.385	1	.535		.349	1	.555	
Fisher's Exact Test				.006				.004								1.000
N of Valid Cases	130				137				24				13			
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.95.					a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.04.				a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.67.				a. 3 cells (75.0%) have expected count less than 5. The minimum expected count is .15.			

As is shown in the table, the total articles in ISI and PubMed in two groups (clinical and nonclinical) has increased. Chi-square equaled to 7.650, and the significance level equaled to .0006, which is less than 0.05, and showed that there was a meaningful relationship between the increase in ISI articles and the implementation of strategic planning in both groups.

The number of Scopus articles in both research centers had also increased, with chi-square =9.115, and sig.=0.003<0.05, which showed that there was a meaningful relationship between the number of Scopus article and the implementation of strategic planning.

The number of published articles of nonclinical research centers in non-indexed journals showed an increase, as well, but there was no increase in this number in clinical centers. Despite the growth in number, the value of chi-square equaled to 0.197 with sig.=0.657, which was more than 0.05, and showed that there was not any significant relationship between the number of non-indexed articles and the implementation of strategic planning. An increase was also documented in other databases in both research centers, but chi-square = 0.375, and sig. =0.54, which indicated that there was not any significant relationship between the number of other database articles and implementation of strategic planning.

Table 6. Chi-square test result of total score in clinical and non-clinical research centers

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	20.951[a]	1	.000	
Likelihood Ratio	21.528	1	.000	
Fisher's Exact Test				.000
N of Valid Cases	8097			

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 452.76.

As is illustrated in the table, the total score in clinical and nonclinical research centers showed an increased in the researched time range. Also, Chi-square equaled 20.951 and sig.=0.000, which meant that there was a significant relationship between the total score and the implementation of strategic planning.

4. *Discussion*:

Universities have a rich history and a very important mission of providing accessible, affordable, quality education, responsive to the community in which it resides. Innate to the nature of the community college is its ability to adapt quickly to the changing needs and trends of its students and the community. From its inception, the hallmark of community colleges has been their ability to be flexible, responsive, innovative, and dynamic (7). Globalization is another challenge facing community colleges. Community colleges have already undoubtedly begun to face many challenges in the 21st Century; so, strategic planning within these organizations is essential. Various research studies in the field of higher education have been carried out and the majority of studies have dealt with strategic plan investigations because universities have their unique and dynamic structures, compared to other organizations (9).

An overview of the defined strategic planning showed that Mazandaran University of Medical Sciences was in progress phase before the plan, and it has also maintained its position after the implementation while proving to be successful in obtaining higher developmental levels, and outperforming the assigned written goals. As a management tool, Strategic planning has been very successful in the business organizations, and is now being applied to the public and nonprofit organizations, as well (10). Strategic planning models for institutions of higher education are not well represented in the literature. There is no one right model, as each institution must create its own model to fit its organization. Although there are various general models, and the concepts of strategic planning are found in the literature, those relevant to this research are environmental scanning and SWOT analysis, as these strategies are commonly used in strategic planning at community colleges. The environment within which, the institutions of higher education must operate is characterized by rapid changes and uncertainty. Many colleges and universities include environmental scanning as an element in their strategic planning process. Although the number of academic boards in both educational and research fields increased slightly, there has not been observed any significant change in scientific production. In this part, the number of PhD by research student after implementing the plan in

comparison with the time of establishing the research centers was documented to be increased, which showed that their share in scientific production cannot be inevitable. Before implementing strategic plan, the number of research centers was six, but after it, this number reached 13. At the same time, one important achievement of the University has been the unique reference laboratory in the north of Iran. The main performance indicators of the target university included the number of research projects, the number of articles published in journals, the number of published books, the number of citations and references made to the books and articles published in the University in academic papers, and the number of thesis and scientific projects according to the strategic plan. Despite these increases, the number of international conference presentations and book publications showed a decrease in the studied time period. In capacity making, there was not observed any meaningful difference before and after the plan. Six journals have recently been added to the list of credible journals in Mazandaran. The enough attention, which was paid to the journals of the University, acted as one of the most important factors in the production of articles for the University. All indicators in strategic plan was according to evaluation indicators, which help Mazandaran University to be successful. It should be noted that some factors had direct and some others had indirect effect on progressing the plan. Sometimes strategic planning process was unclear, as Karadal study showed that some of the corporate values written in strategic plans were irrelevant. Also, some of the expressions, such as consultancy, EU, infrastructure systems showed the importance of this unclear situation. Strategic planning process deals mainly with defining the direction of

organization, hence this process should be completed in a comprehensive and detailed manner (9). It was expressed in previous studies that strategic planning would help a public institution manage its sources effectively and establish control on its personnel, while they perform their duties. It is also expressed that strategy, objective, activity, and projects that are carried out within the scope of strategic planning would increase the institutional productivity. However, as strategic planning includes an entirely new understanding, it demands a significant and radical mental shift in public diplomacy. As a result, this situation creates some difficulties for preparing and implementing strategic plans if the institution is in lack of this understanding and a broad perspective (11). It should be noted that the head of Pharmaceutical Sciences and Health Sciences Research Center had the key role in the formulation of the plan, and as can be seen in the results, the performance of these research centers was much better in comparison to the other research centers, which was similar to the study of Villa and Canales, the result of which showed active participation in the formulation of related strategies by the managers who prepared their commitment in the implementation stages of the plan (12).

Implementing a strategic plan requires delegation, deadlines, and accountability among those in the organization tasked with implementation. Jonathan noted that Strategic planning requires an assessment of the current position of a neuroradiology division and a vision of where the neuroradiology would like to be in the near future. Two commonly used strategic frameworks are SWOT framework and the balanced scorecard framework, which examines an organization from four different perspectives: customer, learning and growth,

internal business process, and financial (13). This study showed to be successful in all aspects of evaluation (78%). Also, in the report of Strategic Planning in Qazvin University of Medical Science, it was revealed that 49% of the goals were attained. Meanwhile, 83% of the reports of the sub-systems were evidence-based. During monitoring the programs, the lack of budget, and human resource together with the lack of inter-departmental cooperation were found to be the main obstacles in accomplishing the goals (14).

Overall, the results of implementing strategic management in hospitals showed that the investigated managers' awareness degree of strategic management principles has been on average based on Likert scale grading, and they believed that the implementation of strategic management in their hospitals was very useful and almost applicable. Regarding this study, the possibility of strategic management implementation in the investigated hospitals was found to be not very high. Thus, the results suggested that it can be increased through developing facilitators, such as training of managers, and eliminating barriers such as centralization in national health system (14). Statistically significant difference was also found between the implementation of strategic planning and scientific production in Mazandaran University of Medical Sciences. Further, it was revealed that a strategic planning that is combined and integrated with certain other factors can help organizations, such as universities, in their journey to quality, greatness, and excellence. It is currently believed that one of the distinguishing features of knowledge-based development in developed countries, as well as developing states is the essential emergence and growth of research organizations and technology. On this basis, it is expected that the role and place of research and technology organizations be more and more highlighted in universities and especially in medical universities, because the results of such studies could directly affect patients and their quality of life.

Conflict of interest:
The Authors have no conflict of interest.

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