Website: http: jebhpme.ssu.ac.ir
EBHPME 2019; 3(3): 222-30 pISSN: 2538-5070

EBHPME

ORIGINAL ARTICLE

Evidence Based Health Policy, Management & Economics
Health Policy Research Center, Shahid Sadoughi University of Medical Sciences

Challenges of Health Technology Incubators in Iran: A Qualitative Study

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ARTICLEINFO

Article History:
Received: 23 Apr 2019
Revised: 20 Jun 2019
Accepted: 18 Sep 2019

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ABSTRACT

Background: Health Technology Incubators (HTI) play an important role in paving the way depicted in Iran's comprehensive health plan in order to achieve the aimed position in 2025. In light of the emerging nature of these centers in Iran, identification of HTI problems and challenges, as well as appropriate planning to resolve those problems can have a significant effect and improve Iran's health system functionality.

Methods: This qualitative study was conducted in Iran in 2016. Data were collected through interviews with 24 experts (Interviewees included managers, deputies, and employees from the country's incubators) in the field. Purposeful sampling continued until data saturation level was achieved. All interviews were recorded and then analyzed, and main themes and subgroups were extracted from them based on a framework analysis. In all the mentioned steps the Atlas-Ti software has been employed.

Results: Challenges of Health Technology Incubators in Iran were categorized into eight concepts- Cultural, Rules and Principles, Funding, Concentrated Administrative System, Human Resources, Stewardship and Monitoring, Physical space and Equipment, and Communicational. Then 22 challenges were identified with in these concepts.

Conclusion: This study suggests that considering the challenges influencing technology incubators in the health sector, a sustainable program for these centers can be designed.

Keywords: Incubators, Health care, Innovations, Technology parks, Health technology

Citation

This paper should be cited as: Moghbeli MA, Kalantari AR, Noori Hekmat S, Salemian pour M, Lorafshar E, Saleh Koushki M, et al. **Challenges of Health Technology Incubators in Iran: A Qualitative Study.** Evidence Based Health Policy, Management & Economics. 2019; 3(3): 222-30.

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[DOI: 10.18502/jebhpme.v3i3.1504]

Introduction

Practical experience have shown that small and middle-size companies play an important role in technology development, economic boom, and creation of productive occupations (1, 2). Equipping these companies with business skills, market knowledge, and technical, professional, and management experiences can assist them to avoid undesired failures (3).

It is highly advised that by employing entrepreneur forces these small companies are able to prevent potential collapses. In order to benefit from these capacities and improve innovatory achievements, some "appropriate contexts" are required. Inauguration of Science and Technology Incubators can be a good example of providing these "appropriate contexts" (4). These centers can support new businesses and small companies (5). An incubator or science park is an organization managed by specialized experts, whose main aim is to increase the wealth of its community by supporting the culture of innovation and the competitiveness of its associated businesses and knowledge-based organizations (6). In fact, the foundation of these incubators is an efficient mechanism for relating research centers to industry and government in order to produce goods and to provide services based on innovation and entrepreneurship (7).

The established role of incubators is economic development (8). They give companies a chance to innovate in an open arrangement because they act as a middle between technology developer and technology diffuser and transfer innovations from universities and research centers to the bazaars (9). As emerging phenomena, technology incubators have been introduced in both developed and developing countries in recent decades (10).

As a developing country, Iran has been interested in these centers since the late of the 1990s. During the first decade of 21st Century, seven technology parks have been established in country and 17 more permission for upcoming technology incubators have been issued (11).

In recent years there has been a great tendency to set up health-related incubators and to assess their impacts on the health sector (12). According to scientific evidence, development of local and indigenous innovations can increase profitability in health sector (13). Because of their vital importance, it has been emphasized in Iran's high-level documents that health sector should carefully consider technology incubators' needs. Hence, the Ministry of Health, and Medical Education, even later than the Ministry of Science, Research, and Technology, but with considerable speed, started to form technology incubators in some selected Medical Universities. According to comprehensive scientific map of Iran, all type 1 medical universities are required to create incubators related to pharmaceutical and medical equipment and are asked to develop their relations with the industry. These universities are now related to such industries as drug industry, medical equipment, and environmental industries (14).

Owing the fact of novelty of this experience in Iran, and specifically in the health sector, and since the development of HTI is listed in the Ministry of Health's agenda, and lack of a study on the challenges of establishing incubators in the health sector, the purpose of this study was to examine the challenges of incubators in the health sector of Iran.

Materials and Methods

Data Collection

This study has been conducted using a qualitative approach in the first six months of 2016. The research sample of 24, has been selected by employing purposeful sampling techniques. Sampling has been extended until the data were saturated. The snowball technique also has been used in sampling. The sample population was consisted of:

a) HTI managers or deputies.

b) HTI experts who were interested to participate in this project. These experts were selected based on the following criteria: having related management experience, related education and/or research interests, having membership affiliation or a background in HTI across Iran.

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All interviews were recorded and then the transcripts were analyzed. The average time for each interview was around 45 minutes. And all these interviews were done by two researchers (M. M& M. S.). The interviews' questions were asked in a manner to carefully explore the interviewees' perspectives. They were ensured that they could leave the interview table at any time, even though they remain anonymous during the research time.

In the first step, four deep interviews were organized to obtain a better understanding of the subject and to identify more important topics for the semi-structured interviews.

Questions in the interviews include: what are (cultural, Economic, resources, rules and regulations, supervision, communication, stewardship) challenges of Health Technology Incubators in Iran?

Data Analysis

For data analysis, Framework analysis techniques was used and employed all its five steps of identifying, thematic framework identifying, indexing, charting, and mapping and interpretation. This technique is widely used in data analysis of qualitative studies in public policy (15). In the identifying step, a worksheet containing personal information of the interviewees as well as a content draft of every interview has been prepared. For designing the primary conceptual guide form, after several meetings and long discussions between researchers, its final version has been adapted with the unique features of each interview. One of the researchers (R. D) codified each particular interview separately and extracted a list of these codes along with their relations with the conceptual framework. In this step one or two codes were allocated to each section of each interview contained related information (16). Then, these codes were examined through several meetings with other researchers and were modified in some cases. Then, this process was repeated again and again for each interview. The next step was the charting in order to compare the interviewees' perspectives regarding each component of the conceptual model, as well as, to explore the relationship between these components and their subsections. The interpretation of each component of the conceptual model has been done in a similar process with the encoding. In all mentioned steps the Atlas-Ti software has been employed. This software is generally used in analysis of qualitative data. The conceptual framework has been reviewed several times during the data analysis (17).

In order to observe ethical considerations in this study, people were entered completely voluntarily and consciously and their specifications and information remained completely confidential. The ethical committee of Kerman University Medical Sciences approved this research. The ethical approval code is IR. KMU.REC.1395.355.

Results

The results were classified into eight main concepts and 22 subthemes (Table 1).

The First Concept: Cultural Problems

One of the most important problems of Iran's HTI is related to the absence of appropriate cultural basis. Among these problems are poor attitude toward commercialization, managers' unfamiliarity with the nature of HTI, lack of commitment to HTI, harmful competition to increase operational statistics, and the ignorance of non-academic experts.

Regarding the commercialization, one of the interviewees stated that:

"It is expected that our faculty be more concerned about producing new products and services, but unfortunately they are more engaged with writing papers and books, or teaching and holding workshops" (P. 3).

The interviewee also mentioned the managers' low commitment to the topic.

"The HTI is depended on the medical universities and university administrators usually pay more attention to priorities other than HTI while they are distributing the budget" (P.15).

According to some experts, stakeholders are hardly familiar with the nature of HTI. One of the experts believed that:

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"When you speak about private sector, people think that these companies are willing to use society's resources in favor of their own individual interests, while they actually prevent cash flow from the country" (P.4).

Another problem with these centers in Iran is their extraordinary deliberation to quantity rather than quality. In this respect, one interviewee declared that:

"In our reports, we do care about the number of centers regardless of their efficiency. The ministry's goal-setting also follows the same rule" (P.18).

Additionally, the HTI in Iran is more interested in academic experts.

"Iran's HTI is concentrated in employing universities' graduates …. Non-academic experts have no place in these centers." (P.15)

The second Concept: Rules and Regulation Problems

The mentioned challenges under this title include lack of required regulations, deficiency in existing rules and specifically in rules related to intellectual property. Regarding the lack of regulations, one interviewee believed that:

"Clear and specific rules have not been legislated for HTI, and these centers are governed under an incomplete statute" (P.4).

Some of the interviewees also mentioned other problems:

"Some individual inventors and innovative companies are concerned about their rights and their intellectual properties". (P.13)

The Third Concept: Funding Problems

According to the interviewees, financial difficulties are one of the most important challenges of HTI in Iran. These problems can be divided into two subdivisions of universities' internal and external issues. To some extent, external problems are influenced by this fact that the private sector plays a small role in Iran's national economy.

"The centers' pattern has been adopted from the countries whose economy is based on the private sector, while in our country all of these centers are related to the government" (P.1).

In addition, risk-taking funds, as supporters of knowledge-based companies, have not carried out their duties satisfyingly.

"Creation of local risk-taking funds is vital for the maintenance of HTI activities, but unfortunately we suffer from a wide range of deficiencies in this domain" (P.1).

Another issue in this part is related to the lack of transparency in the allocation of financial resources in the Ministry of Health and Medical Education.

"Resource allocation in the Ministry is not based on priorities but on centers' lobbying power" (P.4).

In the case of universities' internal funding problems, two main points are considerable. The first point is related to unavailability of an independent banking account for most of these centers. Although some centers, due to the authority of their managers were able to open an independent account, most of these centers are not independent in this regard, and rely on the universities completely. The second matter is associated with the complex administrative and financial procedures in universities. In this respect, it has been stated that:

"Unfortunately, universities control the centers' budget. Because of such problems as late allocation of budget, arbitrariness of allocation of HTI's budget, and so on, centers' funding is not available until the end of the Fiscal Year" (P.14).

"How can an incubator, which is not independently able to buy even a garbage can, support a private company" (P.2)?

The Fourth Concept: Concentrated Administrative System's Problems

The HTI dependence on universities has resulted in a kind of administrative procedure governed by an intense bureaucracy. Although some improvements have happened but a majority of entrepreneurs and job seekers are still engaged with such hardship in their activities.

"The HTI usually gets frustrated with the administrative system during its efforts to secure basic facilities and to attract several supports" (P.3).

The Fifth Concept: Human Resources Problems

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One of the main challenges of the HTI in Iran is related to human resources who offer different services to companies. And the improper way of managers and experts choices forms the basic part of this problem.

"The manager choosing procedure by the Ministry is not merit-based. The unjustified precipitancy in creation of HTI resulted in a situation in which most of the HTI directors have a minimum familiarity with their management duties and responsibilities" (P.1).

In addition, the HTI staff and experts' knowledge is not adequately updated and there is no coherent program by the Ministry to improve this knowledge.

"The Ministry does not offer systematic workshops or educational programs" (P.8).

Considering the verity of companies' activities, and weaknesses in communication, especially in smaller universities, the HTI is usually faced with difficulties to find genuine experts who offer consulting services to companies.

"Companies need consulting services, and normally they have no access to the right experts to gain these services" (P.14).

The Sixth Concept: Stewardship and Monitoring Problems

Some of the HTI problems are referred to as the legal authorities and stewardship. Among these problems, the lack of sufficient supervision on the establishment process is more considerable.

"The HTI initiations were not based on local needs and capabilities and consequently I should say there was no proper observation on these establishments" (P.2).

Furthermore, different organizations claim that they are a trustee of the HTI.

"There is no single organization to supervise the HTI, in fact, the Ministry of Health, the Ministry of Science, and in some cases the Ministry of Industry claim that they are the stewardship of HTI" (P. 8).

According to the interviewees although there are some problems in all three procedures of attraction, empowerment, and inspection of the companies, the supervision problem is more serious. As the Ministry is more concerned about the numbers of companies located in the HTI, centers are focused to increase the companies' numbers and pay less attention to their inspecting and monitoring duties.

"Because of their novelty and lack of experience, the HTI does not control and monitor its affiliated companies" (P.11).

The Seventh Concept: Problems of Physical Space and Equipment

Although it is mandatory for the HTI that its physical space should meet all the requirements before their license is issued, the universities usually reassign the incubators' spaces to other activities after a while. Moreover, some of these centers face difficulties to provide drug, medical equipment, and information technology companies with their required equipment. One interviewee stated that:

"The allocated spaces are gradually occupied by other university units and there is no possibility to develop these spaces in order to create required workspaces. Some centers lack the required equipment, too" (P. 5).

The eighth Concept: Communicational Problems

As stated by the interviewees, there is no clear and defined communication between these centers with each other, stewardship and authorities on one hand and with outer influential organizations such as banks on the other hand. This situation has led to a number of problems for the incubators.

"A fruitful communication has not been established with the institutions that are able to support financially and non-financially the centers' companies. These centers have not even set up a satisfying relation with each other yet" (P.11).

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Table 1. The most important challenges of Iran's HTI

Theme	Subtheme (Codes)
Cultural Problems	poor attitude toward commercialization managers' less familiarity with the nature of HTI universities managers' lack of commitment to HTI the harmful competition to increase operational statistics ignorance of non-academic experts
Rules and Principles Problems	the inadequacy of required regulations the rules' lack of clarity and flexibility weakness of intellectual property rules
Funding Problems	external funding difficulties governmental economy unavailability of risk-taking funds lack of transparency in resource allocation in the Ministry of Health internal financial difficulties unviability of an independent banking account for the center slothfulness of university's financial procedures
Problems of Concentrated Administrative System	deficient administrative structures slothfulness of administrative procedures to obtain a license and start production
Human Resources Problems	problems in the employment of human forces out of date knowledge of centers' managers and experts unavailability of professional advisors and consultants
stewardship and monitoring problems	lack of appropriate supervision by the board of trustee lack of supervision on the establishment of HTI weakness in the actual supervision on the centers
Problems of physical space and equipment	the inadequacy of physical space the inadequacy of equipment
Communicational Problems	problems in communication with the board of trustee problems in communication with other centers

Discussion

The HTI challenges can be discussed under several topics including problems of working culture, regulation, funding, administrative, human resources, stewardship, physical space and equipment, supervision, and communication.

The results of this study demonstrated that the required context for the HTI's success is not still available in Iran. In other words, the innovatory system of more developed countries with different infrastructures has been adopted without providing necessary infrastructures and fulfilling the required perquisites. In fact, this situation is more analogous to build a huge construction on weak and frail foundations (18). The quick and cursory issuance of licenses without providing minimum cultural and infrastructural requirements has led to a number of problems (19).

Although the existing HTI have been adopted from the foreign samples, and the authorities have frequently visited some selected successful foreign examples, but a number of basic issues like ruling, cultural and infrastructural circumstances have been rarely considered, specifically in the pre-establishment period. Ignoring these points has caused a number of problems for the HTI in Iran. In fact, these issues are hardly recognized as sort of the post-creation solvable problems.

Another important issue in this respect is related to the absence of entrepreneurial morality among the faculty and students. Unfortunately, most university professors were not able to guide students toward business and entrepreneurship even they made obstacles in some cases. Another study in the U.S.A. has shown that some faculties

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were reluctant to collaborate with the university incubators (20).

Furthermore, a number of entrepreneurs are still less familiar with the nature of science and technology parks. According to the participants of this study, such common advertising activities as distribution of fliers in universities and so on were not sufficient. Moreover, there are still extraordinary elites in society who are not invited to participate in these centers.

As another important problem, it is needed to mention the weakness of appropriate rules and regulations regarding HTI activities. Obviously, this problem is one of the most important obstacles in the development of HTI in Iran. Some really cumbersome rules like, banking rules, tax rules, insurance rules, trade law, and the law of occupation, because of their inflexibility, make individual innovators reluctant to register their new ideas and establish a new business.

Because of its bureaucratic nature, absence of a customer-oriented policy, limited budget, numerous holidays, deficiency of administrative system, and the lack of transparent rules, public sector suffers from a kind of clumsiness in carrying out its duties. And as the HTI is dependent on the public sector, it follows the same pattern while communicating with its affiliated companies (19).

Funding hassle forms another challenge in front of the HTI in Iran. Financial support of the private sector by public sector organizations, with no profit-making motivations, is actually a new experience in Iran. These circumstances in the state medical universities that govern the HTI has caused numerous problems (19).

Risk-taking is an inherited quality of all individual entrepreneurs and in light of this fact; incubators try to boost companies' financial risk-taking motivations by financial support and trust. But there is a different story in Iran, meaning that not only public and private sectors have not enough financial resources to support risk-taking investments, but also risk-taking endeavor is not considered a cultural norm yet. Obviously, as long as parks and incubators are not able to attract risk-taking funds, they would hardly be able to accomplish their duties successfully (21).

The HTI dependence on the public-sector has even problematized the frequent access to the centers for the companies and their customers, especially during the non-regular hours and dates (19). Studies assert that most of the existing incubators in Europe and USA and even South East Asia, in spite of investment by local or central government, are administrated by the private-sector (19). In fact, private-sector participation is a priority and necessity to establish science and technology parks and incubators (22).

Lack of transparency in the budget is apparently not restricted to the HTI alone, and the Science and Technology Ministry's incubators also suffer from the same problem. Because of their newness, the HTI is usually ignored by the medical universities' administration during the budget distribution period. It is highly recommended to secure an autonomous account for the HTI in order to restrict the universities managers' manipulation.

Another HTI's problem is associated with the human resources that offer several services to the companies. Improper personnel choosing, their outdated knowledge, and lack of expert forces are parts of this barrier. Since the HTI managers' recommendation is influential for companies to choose their consultants, and as those managers have spent all their professional life in the public sector, the chance of getting improper consultation is technically numerous (19). In general, each incubator has its own educational needs. As most of the HTI's staff are in want of required knowledge, a need-based education program should be placed among the HTI's priorities (23).

Some of the HTI's problems are connected to the stewardship. In the current situation, there are several institutions and organizations that claim to control parks and incubators, and this situation has caused a kind of inconsistency in decision makings (24). Additionally, those organizations claims do not exert actual supervision on most parts. Unfortunately, other health projects in Iran

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have also been damaged by inappropriate stewardship (25).

One previously mentioned challenge of the HTI was derived from the miscommunication between the HTI with other incubators in one hand, and with upper and influential organizations on the other hand. Characterization of the type and quality of these relations as well as clarification of the HTI's status in administrative charts can effectively prevent these problems (19). As Health Incubators are inexperienced to some extent, making effective relations with other incubators can provide them with practical knowledge and experience in management. Unfortunately, these relations have not been established yet. The results of a need assessment study of 15 ICT incubators in Iran have indicated that these centers have held their educational courses in a finite period and separately, therefore they were ineffective. Difficult access to interviewees and beneficiaries was the main limitation of this study.

Conclusion

It seems that a meticulous plan is needed in order to create an appropriate context for the HTI activities in Iran. This problem, along with problems such as weaknesses in existing laws, financing, manpower problems, stewardship problems, problems with physical space and equipment, and regulatory and communication problems prevent the proper functioning of health centers in the country. Obviously, the removal if these problems and challenges requires a systematic program to change the existing situation and design a long term and well- studied plan for the HTI. This plan should be able to resolve all the determined problems systematically in this study. The authors also suggest that the government create the necessary infrastructure for the launch of these centers and consider the necessary financing and spiritual incentives.

Acknowledgments

The authors are highly grateful to all the experts and the HTI managers who kindly accepted the invitation for the interviews. The ethical committee of Kerman University Medical Sciences approved this research. The ethical approval code is IR. KMU.REC.1395.355

Conflict of Interest

The authors declared no conflict of Interests.

Authors' contributions

Dehnavieh R, Moghbeli MA, Noori Hekmat S designed research; Moghbeli MA, Salemian M, Koushki MS, Lorafshar E conducted the research; Dehnavieh R, Moghbeli MA, Salemian M, Kalantari AR analyzed the data; Moghbeli MA, Salemian M, Kalantari AR wrote manuscript. Kalantari AR had primary responsibility for the final content. All authors read and approved the final manuscript.

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[DOI: 10.18502/jebhpme.v3i3.1504]