

## DESIGNING THE BUSINESS MODEL OF HERBAL PHARMACEUTICAL KNOWLEDGE BASED COMPANIES

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### Abstracts

Today, research has indicated Knowledge based companies as a potential area in promoting knowledge economy, and due to the substantial added-value they make in the knowledge economy of the countries, these companies play a pivotal role in producing national income. Considering the novelty of the field of designing business models for herbal pharmaceutical Knowledge based companies and the importance of these companies among Knowledge based companies on the one hand, and the lack of academic research on exploring these companies on the other hand, the need for a comprehensive business model to help understand the components of herbal pharmaceutical Knowledge based companies seems urgent. This study aimed at identifying and prioritizing the components of business models and also structuring a business model of herbal pharmaceutical Knowledge based companies around these components. The Friedman test was used to prioritize the importance of the components of Knowledge based companies' business models. The statements of the present study's questionnaire were collected from the literature and the experts' opinions, too. Out of the 130 distributed questionnaires, 119 were collected which were analyzed by employing the Cochran test of the SPSS Statistics software. The components of key activities with the mean ranking of 6.76, cost structure with 6.09, and key resources with 6.06 were the most important components and customer relationships with 5.67, value propositions with 5.45, key partnerships with 4.10, distribution channels with 4.04, customer segment with 3.60, and revenue streams with 3.24 were the least important ones.

### Research paper

**Keywords:** Business model, Knowledge based companies, Herbs, Friedman's test

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## **Introduction**

Today, science and innovation are considered as the main factors in promoting economic and industrial growth. Terminating reliance on the type of economy that is based on primary industries and selling raw and low-processed material is only feasible by way of innovative economy and knowledge production. In other words, by commercializing technological and scientific achievements, Knowledge based companies play a significant role in a country's economy. Furthermore, these companies and their technological and scientific development have attracted the attention of Iranian policy-makers in the recent years. Due to the novelty of Knowledge based companies and their impact on promoting the country's gross production growth, and as a result the jobs they can create for the graduates, developing these companies is of particular importance (Parise & Henderson, 2001).

Moreover, the economic and medicinal importance of herbs is already obvious and the world is witnessing a shift from modern medicine to traditional medicine due to the minor side effects and lower overall costs of these herbs in treating many diseases. Furthermore, considering Iran's variable climate and vast area and also having the second plant variation in the world, the ground for moving towards establishing Knowledge based companies operating in the field of herbal pharmaceuticals is ripe. Yet, the establishment and success of these companies require an appropriate business model. In fact, clearly understanding the system and having access to a rigorous scientific algorithm which include understanding the frameworks of industry and business accurately, knowing ways to face competitors, and familiarity with the principles of the market are the keys to participate and survive in the market (Lorentzen, 2008).

Therefore, it is essential to introduce new business models to match the herbal pharmaceutical Knowledge based companies. In fact, a business model a. is a set of elements and the relationships among them which expresses the money-making logic of the company b. generally states the company's main structures which include the value structure (how to create values), resource structure, and the structure of business process (George et al, 2011), and provides a solid framework for taking potential, technological properties as data and turning them into economic outcomes through customers and markets. Therefore, having a business model to effectively taking the ideas and characteristics as input and converting them through customers and markets in economic output for these companies to succeed in the market seems essential (Chesbrough, 2010). Considering the importance of the aforementioned statements, unfortunately, the need for a business model for Knowledge based companies operating in the field of herbal pharmaceuticals is felt. Lack of a comprehensive model has caused new businesses, especially those operating in the field of herbal pharmaceuticals, to face crippling challenges. According to the mentioned difficulties and shortcomings, this study attempted to explain the importance and priority of the components of the herbal pharmaceutical Knowledge based companies' business models.

## **The Literature**

### *The history of the evolution of business models in the literature*

Venkatraman and Henderson (1998) define a business model as a three-dimensional architecture: interaction with the customer, asset configuration, and leveraging knowledge. They are focused on virtual organizations which

are heavily dependent on outsourcing. In fact, a business model is the manner of running the business so that the company can generate profit to survive in the industry. For instance, this model explains how the company can offer services and products for which customer are ready to pay (Taft, 2007; Radovic-Markovic & Salamzadeh, 2012). In other words, a business model is a set of elements and their relationships, allowing the expressing of the business logic of a specific firm. It is the amount of description that a company offers to one or more customer segments, as well as the architecture description of the firm and its network of partners for creating, marketing and delivering this value to generate profitable and sustainable revenue streams (Osterwalder et al, 2010).

In fact, ignoring a few exceptions, it could be said that business models have not been investigated according to past research and within a coherent framework and there is no clear relationship between research and methodology titles and previous findings (Zott & Amit, 2010; Raftari & Amiri, 2016). Despite these bewilderments, it seems the business model theory has been approached more from six aspects of: (i) organizational architecture, (ii) resource-based view, (iii) description, (iv) innovation, (v) opportunity, and (vi) transaction structure.

According to Saarenketo et al. (2004), knowledge-based firms are those which hire university and college graduates, consist mainly of the experts, and use knowledge to generate profit. In other words, in these firms, the experts' intellectual capabilities are used to produce profit. Important elements in the competitive climate of Knowledge based companies include: human resources, generating knowledge, organizational culture, architecture, management, and information infrastructure. Knowledge firms are pri-

vate or cooperative companies established to enhance knowledge and profit, promote knowledge-based economy, actualize economic and scientific goals including furthering invention and innovation, commercializing research findings, and developing technology. Issues such as knowledge, innovation, skills, and continuous learning play a crucial role in Knowledge based companies. In economies which rely on knowledge-intensive companies, this means that a number of firms need to be established to support and facilitate innovation, learning, and dynamism (Ahmadian & Abasali, 2011).

Knowledge-based organizations have captured the attention of researchers; many researchers focus on one or more aspects related to these organizations. Some of these aspects include: varieties of knowledge, organizational learning and knowledge, knowledge assets and certain operations of these assets which allow the organization to acquire, use, save, and deliver organizational knowledge and strategies in order to support or enhance the use of knowledge in or outside the organization. Numerous research works indicate that knowledge is the main source of organizations in the 21<sup>st</sup> century. Moreover, knowledge streams are remarkably more important than financial streams and human resources are the generators of profit. The hierarchical structure of the knowledge organizations enjoys qualitative levels. Managers in these organizations are on their way to becoming the organizations' leaders and are focused on developing the staff's capabilities, supporting organizational learning, and continuous innovation. Yet, all these are not enough to explain why an organization is "smarter" than those which adopt many different philosophical approaches (Neagu, 2008).

The industry of processing herbs is totally a local knowledge which has been integrated with new scientific technologies and achievements and

can constitute one of the main pillars of a country's growing economy. Herbs are plants different parts of which such as roots, stem, leaves, flower, seeds, latex or the whole plant contain active biological substances which can be used in producing medicine, perfumes, or industrial products. Using herbs to cure illnesses is as long as human life. In the past, humans had no alternative but to seek herbs to restore their health. Although the trend in medicine has been towards using chemical and synthesized medication, their harmful side effects on health has forced human to return to the traditional method of curing illnesses. In addition to their long history, these plants' extensive influence in the nation's and religion's history i.e. important historical, political, social, and religious events is remarkable. Herbs have been a rich source of medication through thousands of years. Today, even the World Health Organization has estimated that more than 80% of people still rely on traditional cures such as vegetables.

Herbs are important medicinal resources for protecting human life throughout the world and especially the climate of Iran has provided for its various plants. While Iran, compared to some other countries, has a poorer density of plants, regarding plants diversity it is one of richest lands. This diversity has turned the country into one of the biggest genetic reservoirs in the world and every day more new information about the properties of Iran's herbs is available. Information is used to produce more natural products from these herbs (Zargari, 1992).

Recently, good measures have been taken to increase the production and use of herbs and plant medications. Establishing knowledge-based companies which operate in the field of processed herbs to produce productions with good added-value and distributing them in markets in and outside

the country is one of these measures. According to the herbal experts, establishing knowledge economy in the field of herbal productions promotes resistance economy. Knowledge based companies in the field of traditional medicine and pharmaceuticals are the best ground for industrializing pharmaceutical ideas, where the academics and scholars along with the technologists, artisans, policy-makers, and executive officers of the country can work together to identify target consumers' needs. Iran is a rich country regarding herbs and this industry can promote the country's economy provided that this area is properly cultivated (Zargari, 1992).

### **Theoretical Framework**

After reviewing the literature on business model, the Osterwalder business model was found to be the common model used in the majority of foreign studies and all of the Iranian studies which had been conducted experimentally. Comprehensiveness, applicability for businesses in different industries, and having adequate indexes for measuring multiple aspects of models are among the advantages of the Osterwalder business model. Therefore, the Osterwalder business model was used in this study for Knowledge based companies' business model and the core components of herbal pharmaceutical Knowledge based companies' business model are explained below. As can be seen from the following conceptual model one of the components is key activities which include:

*Research:* investigative and sometimes clinical activities which are conducted in the company's laboratory and research section to deliver products according to the customers' needs before mass production (Chesbrough & Rosenbloom, 2002).

*Outsourcing parts of activities:* most Knowledge based companies do not necessarily do their producing and selling activities on their own as this might not be economically justifiable for them. Therefore, they relegate some parts of their work to other companies and instead focus on more important activities. Outsourcing, then, depends on the company's strategies; whether the stakeholders decide to outsource key activities or unimportant ones.

*Recruiting skilled workforce:* one of the main concerns of Knowledge based companies, especially those in the field of herbs, is finding skilled workforce for production and sales purposes, because catering for the needs of these qualified workers is demanding. The reason for this concern is that quitting a job in the research and development section by the employee who knows the company's formulas and critical knowledge is both detrimental to the company and if the person is employed by other companies, it would strengthen the competitors. Also, finding a qualified replacement is both time and cost-intensive for the company.

The second component is cost structure which includes:

*Costs of production:* these costs include supplying raw material, facilities and maintenance, storage, etc. to make products.

*Costs of maintaining the skilled human force:* providing for the experts, creating motivation in them, and recruiting new staff require spending without which maintaining the staff and competing with other companies would prove impossible.

*Costs of researching and developing new products:* offering new products and even improving previous ones require conducting research and



clinical efforts which also mean spending sums of money. Companies will not survive long without research and development (Gerard et al., 2011).

*Costs of acquiring national and international licenses:* to deliver products to the market, companies in the field of herbs need to acquire necessary licenses from the related organizations. Without these licenses, companies are not allowed to operate, furthermore, to export their products and also winning the trust of Iranian customers, they seek international licenses. Obviously, this step incurs charges.

The third component of herbal pharmaceutical Knowledge based companies' business model is key resources which include:

*Innovative capabilities:* one of a company's key resources is having creative employees and also organizational and cultural structures which boost innovation. Knowledge based companies welcome innovation and encourage creativity. This innovation will appear in the product and other activities (Chesbrough, 2013).

*Skilled and reliable workforce:* in addition to creativity and innovation, a company needs skilled employees and experts to manage other resources.

*Company's credibility:* a key resource of Knowledge based companies which include having reputable directors, delivering efficient products, customers' perception of the company's brand and position, and the company's commitment to fulfil its obligations buy a company credibility. In sum, a company's credibility and reputation among customers is a key component worth striving for.

The fourth component of these companies' business model is customer relationships including:

*Providing products' information and usage:* giving the customers information about the products and their usage is very important in attracting customers. In many cases providing simple information about a product and how it can help consumers is an effective way to market the product.

*Having good quality, size, and packaging:* quality is one of the primary principles of creating customer loyalty; yet it is not enough. Issues such as user-friendly packaging, convenient size, and product's sufficiency are among the factors which create and maintain customer relationships (Osterwalder & Pigneur, 2010).

The fifth component is value propositions which includes:

*Products for curing acute illnesses:* producing medications for curing acute illnesses which happen sporadically such as: scars and burn, headaches, nausea, and so on.

*Products for curing chronic illnesses:* producing medications for curing chronic illnesses which take a long time to be cured such as: hypertension, diabetes, eczema and skin diseases, heart failure, and so on.

*Products for prevention and better health:* herbal teas such as saffron, hound's tongue, and so on.

The sixth component of this business model is key partnerships which include:

*Universities, research centers, and clinical treatment centers:* are one of the main factors in producing and delivering Knowledge based companies' products. Many of herbal pharmaceutical Knowledge based companies do not have access to all the required facilities during research or simply do not find investing in laboratories economic, so they relegate parts of

experiments to universities or clinical centers. These relationships with these centers are important for expanding and updating information.

*Companies or people who facilitate the production process:* such as outsourcing. For instance, some young companies relegate the marketing to expert companies in the field. Or in their production process, instead of supplying unprocessed raw material and storing them, they purchase ready material from other companies and save costs of not having to store the material.

*Influential organizations and firms:* which play important roles in the success or failure of Knowledge based companies; in other words, they take part in introducing the products. For instance, the ministries of Health, Agriculture, and Science, Research, and Technology, along with the parliament, the Vice-Presidency for Science and Technology of the President, and insurance companies can have a significant role in encouraging consumers to use herbs by introducing these plants as a medicinal alternative.

The seventh component is distribution channels which include:

*Prescribing physicians:* an effective way to persuade the consumers to purchase herbs and therefore promoting sales is to convince physicians to prescribe certain herbs for their patients.

*Sales representatives:* are useful distribution channels for some of the herbal productions, especially cosmetics.

*Direct sales:* some herbal pharmaceutical Knowledge based companies prefer to sell their products directly to the consumers. Although this method of sale is not very common in these companies, in some cases it sounds more reliable to the customers.

The eighth component of the herbal pharmaceutical knowledge-based companies is customers which include:

*Patients with chronic illnesses:* producing medications for curing chronic illnesses which take a long time to be cured such as: diabetes, joints' pain, hypertension, heart diseases, skin diseases, and so on.

*Patients with acute illnesses:* producing medications for curing acute illnesses which happen sporadically such as: sudden headaches, burn, strain, nausea, and so on.

*Consumers who use products for prevention and pleasure:* such as herbal teas.

The ninth and last component is revenue streams which include:

*Pricing methods:* are one of the mechanisms which significantly contributes to the revenue stream. Usually, there are two pricing methods in knowledge-based companies: the first one is for new products which are priced according to the value of the product in curing an illness and herbal pharmaceutical companies enjoy much freedom in this regard. And the second one is for products with similar types in the market which are priced 20-30% beyond total cost by the Ministry of Health and the Food and Drug Administration's officer.

*Selling formulas and information about production process to other companies:* in some cases, a company, despite having the formula and mainly for economic justification reasons, refuses to produce certain products. Instead, it sells its formulas to other companies and generates revenue streams.

*Having representatives to sell the company's final product:* This is the way many successful companies, especially in the field of cosmetics, both promote their sales and decrease sales costs.

*Online selling:* is one of the fastest and most effective revenue streams which are not bound by time or place. It should be noted that in this method, the pharmaceutical products should be licensed as some of these products are not allowed to be advertised or sold except at the pharmacies.

## **Methodology**

The main research question of this study was how to prioritize the components of the business model of knowledge-based companies operating in the field of herbal pharmaceuticals. Therefore, according to the research question and the topic, this study was conducted qualitatively. First, the literature was reviewed for choosing target factors and composing the questionnaire items, and to measure the validity of the items, the experts' help was sought. At the next stage, these factors were evaluated by herbal experts and they stated their opinions about priority of the factors. For a qualitative research to be successful at this stage, data should be collected first. The data are used for creating the measurement tool –questionnaire.

In the second phase of the qualitative research data were collected about the current state of the herbal industry. The population of this study consists of founders, directors, and staff of the marketing, research, and development sections of companies on the top ten list according to the Vice-Presidency for Science and Technology, the staff of companies which are active in the Pharmaceutical Science and Technology Park, professors and doctoral students of the Faculty of Pharmacy, and two distribution compa-

nies which together equal to 171 participants. Employing the Cochran formula, a total 119 questionnaires were collected. Using the Cronbach's alpha, the reliability for value proposition, customers, infrastructure, revenue, and the whole questionnaire was 0.809, 0.857, 0.904, 0.792 and 0.935 respectively.

## Findings

To evaluate and prioritize different components of the business model of herbal pharmaceutical Knowledge based companies the Friedman Test was applied. The results are shown in the following table.

<b>Business model components</b>	<b>Mean rank</b>	<b>Friedman's Test statistics</b>	
Value propositions	5.45	Number	114
Customer segment	3.60	Chi-square	210.153
Customer relationships	5.67	d.f.	8
Distribution channels	4.04	Sig.	0.000
Revenue streams	3.24		
Key activities	6.76		
Key resources	6.06		
Key partnerships	4.10		
Cost structure	6.09		

## Data Analysis

In this study, the level of significance for the Friedman Test is 0.000 which is lower than  $\alpha = 0.05$ . Therefore, the null hypothesis is rejected and the conclusion is that the importance of different components of the herbal pharmaceutical Knowledge based companies' business models is different. It is possible to rank various factors which according to the Friedman Test key activities, cost structure, key resources, and revenue streams with means of

6.76, 6.06, 6.06, and 3.24 respectively are the most to the least important components.

Mean rank of the business model components is as follows: (i) *Infrastructure*: key activities 6.76, key resources 6.06, key partnerships 4.10; (ii) *Products*: value propositions 5.45; (iii) *Customer*: customer relationships 5.67, customer segment 3.6, distribution channels 4.04; (iv) *Financial*: cost structure 6.09, revenue structure 3.24.

## **Discussion**

As can be seen from Figure 1, the participants believed key activities with a mean of 6.76 to be the most important component. This component includes: (i) Research, marketing products, production-related activities, outsourcing, and (ii) Finding and recruiting skilled staff, evaluating the market. The second component of this business model is cost structure with a mean of 6.09 including: Costs of production, maintaining the skilled human force, researching and developing new products, acquiring national and international licenses. The third component of herbal pharmaceutical Knowledge based companies' business models is key resources with a mean of 6.06 which includes: Innovation and creativity, skilled and reliable workforce, company's reputation, relationship with active people and organizations in the field, obtaining patents, national and international licenses, and marketing capabilities. Customer relationships with a mean of 5.67 is the fourth component and includes: Providing information about a product and its usage, having good quality, size, and packaging, providing scientific proof and documents for the doctors, convenience of usage and efficiency of products, having enough supply at any time and place. The component of value prop-

ositions with a mean of 5.45 is the fifth component of this business model and includes: Products for curing acute and chronic illnesses, products for better health, ease of drug use in the form of capsule, tablet, drops, topical gel, and drug effectiveness. The sixth component is key partnerships with a mean of 4.10 which includes: Universities, research, and clinical treatment centers, companies and people who facilitate production, influential companies and experts of the field, collaboration with reputable foreign companies. The seventh component of the herbal business models is distribution channels with a mean of 4.04 which includes: Prescribing physicians, pharmacies and herbal stores, the internet, advertisement, drug distribution companies, sales representatives, and direct sales. The eighth component is customers with a mean of 3.60 which includes: Patients with chronic or acute illnesses, people who use drugs for prevention. The ninth and last component of herbal pharmaceutical Knowledge based companies is revenue streams with a mean of 3.24 which includes: Pricing methods, selling the formula and production information to other companies, obtaining sales representatives for selling the final product, selling through websites, and selling directly to the customers.

As can be noticed, conducting a company's key activities has been selected as the most important factor in herbal pharmaceutical Knowledge based companies by the participants. Next in the ranking is cost structure with the mean ranking of 6.09 and key resources with the mean ranking of 6.06 is among the top important components of the business model. Following are customer relationships with the mean ranking of 5.67 and value propositions with the mean ranking of 5.45 in the model and the least important component for the respondents is revenue streams with the mean



ranking of 3.24. One of the reasons for the position of the last component, in the respondents' opinions, is that if the other components of the business model of the herbal pharmaceutical Knowledge based companies work efficiently, so does the revenue streams component.

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