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Strategic Guidelines for the Development of the Market of Suppliers of X-ray Diagnostic Equipment of East Kazakhstan

Abstract. Kazakhstan has embarked on a path where mutually beneficial cooperation between the state and the private sector should lead to the successful implementation of socially important projects in sectors traditionally related to the sphere of state responsibility, including, inter alia, health care. Kazakhstan's market for X-ray diagnostic equipment is large and dynamic enough. But, despite the perspective of its development, the main problem is the fact that in some segments (computer tomography, angiographs, etc.) local manufacturers are completely absent. The market is saturated due to the supply of necessary equipment from abroad. As research task authors have defined an attempt to estimate strategic reference points of the market of suppliers of the radio-diagnostic equipment of the companies of the East Kazakhstan region. The main content of the study is the analysis of the environment using the SWOT-analysis method. Based on the presented methodology the circle of problems of development of this branch is described and ways of their solution are defined. In conclusion, the strategic directions of short-term and long-term development for companies operating in the market of suppliers of radiological diagnostic equipment are presented. The results in the form of the research methodology will be interesting for marketing specialists, economists, representatives of both private companies and state organizations and development institutions, as well as investors.

Keywords: health care, public-private partnership, radiographic equipment (RDE), SWOT analysis,

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Issues of health infrastructure development in Kazakhstan are currently being considered against the background of innovations and modern information and communication technologies. One of the priority areas, as noted in the State Program for Health Development of the Republic of Kazakhstan for 2020-2025 [1], is the development of a network of diagnostics, primary health care, and medical rehabilitation services, as well as rehabilitation care.

The need to develop infrastructure and attract modern technologies in the medical industry requires significant budget expenditures. In this situation, the public-private partnership (PPP) is the main instrument to attract the necessary financial resources [2].

But at the same time, the potential of PPPs in the health sector has huge opportunities and many options, for example, such forms of PPPs as service or lease contracts of PPPs on medical equipment and facilities, projects on private finance initiative, as well as projects of small forms of PPPs may be in demand in the industry [3].

The main advantage of PPP projects is the reduction of the budget burden. In the conditions of limited public financial resources and continuous active growth of public needs, the need for projects implemented on the principles of public-private partnership increases. And especially relevant today for both private business and the public sector is the study of potential opportunities to use PPP mechanisms as one of the alternative ways to find new sources of income, the possibility of participation in major projects for companies operating in the market for the supply of X-ray diagnostic equipment in the East Kazakhstan region.

Kazakhstan's medical equipment market today is characterized by the absolute dominance of imported products. The small amount of medical equipment produced within the country represents the most simplified variants of medical equipment existing in the world market [4].

In turn, modern medicine is unimaginable without X-ray diagnostics. This method provides the most accurate information about the condition of the patient's organs and different areas. Radiography is used for making and confirming a diagnosis, helping to control the treatment process and evaluate its results. Radiagnostics (X-ray diagnosis) is the recognition of diseases of different organs and systems based on the data of radiological examination.

To study the market of X-ray diagnostic equipment suppliers (RDO), identify its potential, identify problems in this market and the prospects for its development, we will use the SWOT-analysis matrix for strategic positioning of companies as a subject of the market sector [5].

SWOT (S - strengths, W - weaknesses, O - opportunities, T - threats) analysis of the environment is a widely accepted approach, allowing a joint study of the external and internal environment.

The SWOT analysis was first proposed by Prof. K. Andrews in 1963 at the Harvard Business Policy Conference. The SWOT methodology involves first identifying external threats and opportunities, as well as strengths and weaknesses that are inherent to the organization, and then establishing chains of communication between them, which can then be used to formulate the strategy of the organization. The data from this analysis will make it possible to identify strategic alternatives and provide a more complete picture of the current state of internal development factors as well as external factors of direct and indirect impact.

The SWOT-analysis identifies and structures the strengths and weaknesses of the institution, as well as potential opportunities and threats. This is achieved through the fact that the manager must compare the internal weaknesses and strengths of his institution with the opportunities and threats that the external environment offers. The results of the comparison will make it possible to decide in which direction the institution should develop its activities.

Strengths are the internal forces of an active or start-up institution. They include human resources, equipment, and financial security.

Weaknesses are internal factors that hinder the further development of an institution. Weaknesses are those "bottlenecks" in an institution that we are aware of and able to influence.

The external environment is the source of the necessary resources to determine the capacity of the organization. It is in the external environment that the organization overcomes competition and experiences commercial risk. The important task of managers is providing such interaction with the external environment, which would provide the necessary level of potential.

So, the analysis of the external environment is a process using which it is possible to reveal factors external concerning the organization to define possibilities and threats for the company.

Opportunities are external factors that contribute to an institution's development. These factors arise and flow independently of us, but we can use them to develop the institution.

Threats are external factors that hinder an institution's development. These factors arise and proceed independently of us, but we can reduce or partially prevent possible damage from these factors.

SWOT-analysis operates with a large number of information logic units - characteristics (factors), which are far from identical in their influence on the state of the object and the results of the analysis. If there is a question of formalization of SWOT-analysis procedures, the first and important stage of this process is to establish the importance of each factor in quantitative terms. Each factor can have its dimension, different peculiarities of its measurement. At present, the only way to establish the relative weights of factors is to use expert assessments. Full paired factor comparisons and subsequent mathematical processing of the comparison results can also be used as one of such methods.

A comprehensive study of the market situation in which the institution operates, assessment of opportunities and threats it may face, is one of the most important components of the marketing policy of the institution.

At carrying out research interrogation of the top-managers of the companies working in the market of suppliers of EDR in the East Kazakhstan region has been conducted. Specialists-experts of six leading companies working in the markets of Ust-Kamenogorsk, Semey, Kurchatov, Ridder, Altai cities, providing supplies and service of X-ray diagnostic equipment took part in the survey: "AlmaMed" LLP, "West Trading" LLP, "VostokMedSnab" LLP, "Alliance" LLP, "Performer Light" LLP, "Rodix" LLP.

At the first stage, the factors of influence of the internal and external environment of the market of RDO suppliers were formulated. The experts had a task: to answer the questionnaire from the standpoint of the company's strengths and weaknesses, as well as opportunities and threats of the external environment. Identification of environmental impact factors was conducted in six key areas:

1) product (what do we sell?);
2) process (how do we sell?);
3) clients (to whom do we sell?);
4) distribution (how does the product reach the clients?);
5) finance (what about market prices, costs and investments?);
6) administration (how can we manage all this?).

The analysis of organizational strengths, weaknesses, threats, and opportunities in the external environment was carried out using the SWOT analysis and resulted in the following results, presented in the form of a matrix in Table 1.

Table 1

SWOT-market analysis of RDO suppliers

Strengths	Weaknesses
– sales and installation of reliable RDE of modern models (S1); – market deliveries of equipment of wide price range (S2); – availability of experience of the companies of the region in the market (S3); – cooperation with reliable manufacturers of RDE (S4); – high qualification of engineers of the companies that perform setup of RDE (S5); – creating motivational factors to improve the skills of engineers (S6); – engineers of the companies provide quality service of supplied equipment (S7); – qualified training of medical company engineers to work with the RDE (S8).	– purchase of consumables for RDE from own funds leads to an increase in warehouse stock (W1); – participation in tenders does not always ensure regularity of sales of RDE (W2); – the lack of own working capital for procurement (W3); – attrition rate of experienced professionals (W4); – sales of RDE decline (W5); – ongoing training costs for engineers (W6).

Opportunities	Threats
– the emergence of modern technologies in the field of radiology that meet the needs of radiodiagnostics, such as CT, PET (O1); – the end consumer is the entire population of the country that needs to be examined for radiology (O2); – changes in the legislation of the Republic of Kazakhstan in the field of PPPs, opening up new mechanisms for sales of RDEs (O3); – government support for the availability of diagnostics in health care (O4); – interest of RDE manufacturers in the final result and provision of technical support for equipment service (O5); – expansion of the network of commercial radiology clinics (O6); – geographical expansion in RDE sales (O7).	– due to low solvency of state hospitals and polyclinics, outdated models are supplied to the market of Kazakhstan (T1); – post-warranty service is in some cases transferred to competing companies (T2); – instability of currency exchange rates, instability of prices on RDE (T3); – change in supplier policy (T4); – hospital policy shifting (T5); – low qualification of medical personnel working in a number of hospitals, especially in rural areas (T6).
Note – developed by the authors based on research	

The following points were identified as a result of questionnaire processing.

Internal strengths:

- sales and installation of reliable RDEs of modern models;
- supplies to the market of equipment of a wide price range;
- availability of experience of the region's companies on the RDE market;
- cooperation with reliable RDE manufacturers;
- high qualification of engineers of the companies engaged in RDE setting up;
- creating motivational factors for further training of the company's engineers;
- engineers of the companies provide quality service of the delivered equipment;
- qualified training of medical staff by company engineers to work at the RDE.

Internal weaknesses:

- purchase of consumables for RDE from own funds leads to an increase in inventories;
- participation in tenders does not always ensure regularity of RDE sales;
- working capital constraints for RDE procurement;
- turnover of skilled personal;
- RDE sales decline;
- engineering development costs.

External opportunities:

- the emergence of modern technologies in the field of radiology that meet the needs of radiodiagnostics, such as computed tomography (CT), positron emission tomography (PET);
- the end consumer is the entire population of the country that needs to be examined for radiology;
- changes in the legislation of the Republic of Kazakhstan in the field of PPPs, opening up new mechanisms for sales of RDEs;
- state support for the availability of diagnostics in health care;
- interest of RDE manufacturers in the final result and provision of technical support for equipment service;
- expansion of the network of commercial radiology clinics;
- geographical expansion in RDE sales.

External threats:

- due to low solvency of state hospitals and polyclinics, outdated models are supplied to the market of Kazakhstan;
- post-warranty service is in some cases transferred to competing companies;
- instability of currency exchange rates, instability of prices on RDE;
- supplier policy changes;
- hospital policy shifting;
- low qualification of medical personnel working in a number of hospitals, especially in rural areas.

A quantitative assessment and ranking of the influencing factors were then carried out. That is, each element of the matrix should be assigned some parameters that characterize its importance. For this purpose, the method of expert estimations has been used. The method is used for reception of the decision in the weakly formalized problems on which the big enough volume of the information which carriers are the experts acting as experts is saved up.

Formalization of SWOT-analysis requires the establishment of not only the relative significance (weights) of the factors but also their quantitative values.

The second stage of the research assumed that with the help of experts the rank of the factor will be determined from its influence on the companies' activity on the RDE market.

The rank of the factor was determined by experts on a scale with numerical values – "1", "5", "10" where:

"1" – least significant and unlikely factor;

"5" – important factor with high probability;

"10" – the most significant and likely factor.

As well as the significance of the factor on a five-point scale.

The results of the final calculations and evaluations are presented in Table 2 below.

Table 2

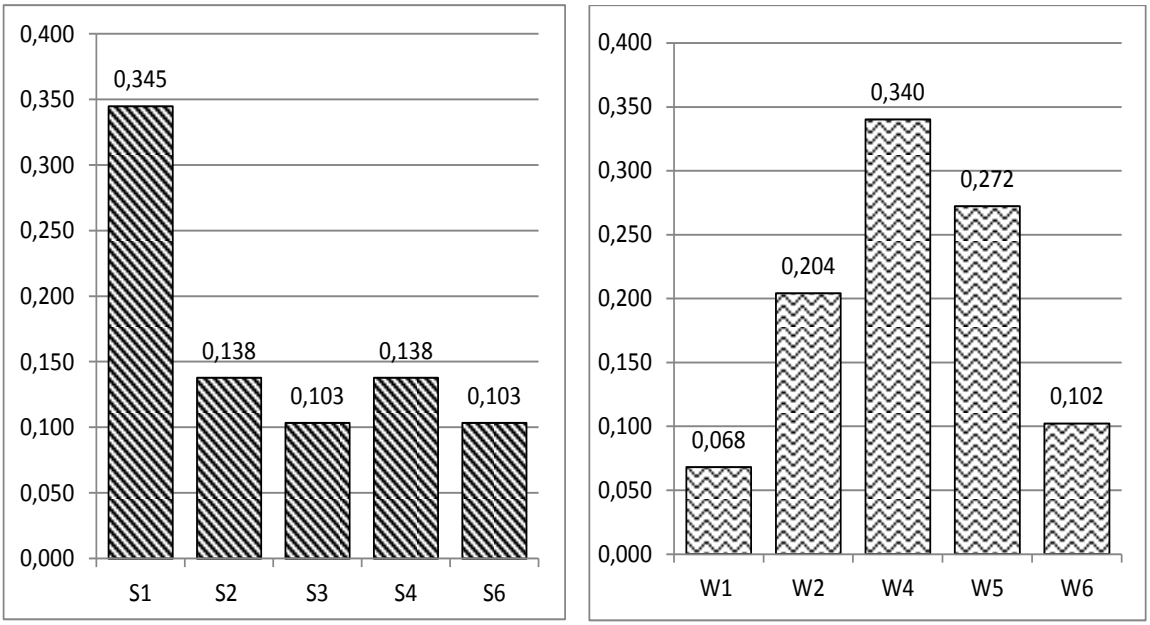
Evaluating the importance of market factors for RDE suppliers

Factor	Importance	Impact Assessment	Score in Points	Share	Factor	Importance	Impact Assessment	Score in Points	Share
Strengths					Weaknesses				
S1	10	5	50	0,345	W1	5	2	10	0,068
S2	5	4	20	0,138	W2	10	3	30	0,204
S3	5	3	15	0,103	W3	1	2	2	0,014
S4	10	2	20	0,138	W4	10	5	50	0,340
S5	10	1	10	0,069	W5	10	4	40	0,272
S6	5	3	15	0,103	W6	5	3	15	0,102
S7	5	2	10	0,069					
S8	5	3	15	0,034					
Total:			145	1	Total:			147	1
Opportunities					Threats				
O1	10	3	30	0,199	T1	5	4	20	0,125
O2	5	5	25	0,166	T2	10	4	40	0,250
O3	10	5	50	0,331	T3	10	5	50	0,313
O4	5	4	20	0,132	T4	5	3	15	0,094
O5	1	3	3	0,020	T5	5	2	10	0,063
O6	1	3	3	0,020	T6	5	5	25	0,156
O7	10	2	20	0,132					
Total:			151	1	Total:			160	1
Note – developed by the authors based on research									

The result was a relative assessment of the factor importance for each field of study.

The next step is to identify five factors in each field that have the highest scores in terms of percentage.

Visible results on the identified factors that relate to the internal environment of the company, with the selected maximum values are shown in Figure 1.



Note – developed by the authors based on research

Figure 1 – Assessment of the company's internal environmental factors: strengths (S) and weaknesses (W)

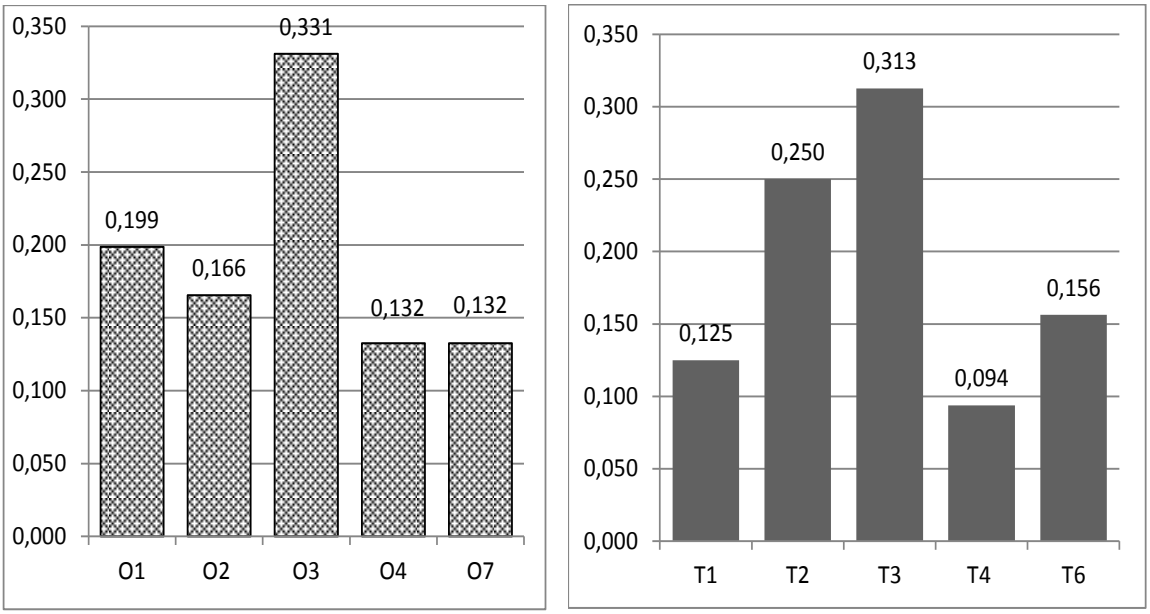
From Figure 1 we can see that the most significant factor in the field "Strengths" is the factor S1 – "Sales and installation of reliable RDOs of modern models". Further two factors follow S2 – "Deliveries to the market of the equipment of wide price range"; S4 – "Cooperation with reliable manufacturers of RDEs". After that, the following factors follow S3 – "Presence of experience of the companies of the region in the market of RDE"; S6 – "Creation of motivational factors for improvement of qualification of the company's engineers".

In the "Weaknesses" field - the most significant factor in the experts' assessment is W4 – "Flow of experienced qualified personnel". Then follows factor W5 – "Decrease in sales level of RDE". Further factors: W2 – "Participation in tenders not always provides regularity of RDE sales" and W6 – "Expenses for constant improvement of professional skill of engineers". The ranked series of maximum values is closed by factor W1 – "Purchase of consumables for RDE at the expense of own funds leads to an increase in stock levels".

Visible results on the identified factors that relate to the external environment of the company, with the selected maximum values are shown in Figure 2.

In this way, Figure 2 shows that the most significant factor in the "Opportunities" field is O3 – "Changes in the legislation of the Republic of Kazakhstan in the field of PPPs, opening up new mechanisms for sales of RDEs". Then there follows factor O1 – "Appearance of modern technologies in the field of EC, satisfying requirements in radiodiagnostics, such as CT, PET". Then, factor O2 – "The end consumer is the entire population of the country, which needs x-ray diagnostics". This is followed by the following factors: O4 – "Government support for the availability of diagnostics in health care"; O7 - «Expanding the geography in the field of sales of

RDEs".



Note – developed by the authors based on research

Figure 2 – Assessment of the company's external environmental factors: opportunities (O) and threats (T)

Now we can see that the field "Threats" - the most significant factor here, according to experts, is the factor T3 – "Instability of currency rates, instability of prices on the RDE". This is followed by factor T2 – "Post-warranty service in some cases goes to competing companies". Then factor T1 comes into play – "Due to low solvency of state hospitals and polyclinics, outdated models are supplied to the market of Kazakhstan", and T6 – "Low qualification of medical personnel working in several hospitals, especially in rural areas". Closes the ranked range of values for factor T4 which called "Changes in supplier policy".

Thus, the SWOT-analysis of the market of X-ray diagnostic equipment for the companies of the East Kazakhstan region allows concluding that today a strong factor of influence is the fact that the market of Kazakhstan supplies reliable RDEs of modern models, purchased from reliable suppliers. During this time, the companies have accumulated positive experience, qualified engineers work, who carry out the adjustment of the RDE and provide quality service of the equipment supplied, the companies create motivation factors to improve the skills of engineers.

However, the most important problem for all companies is the turnover of qualified personnel and a decrease in sales. For today search of new ways of sales of the equipment is necessary as participation in tenders not always provides regularity of sales of RDE, and stocks of account materials for RDE accumulate in warehouses.

The company's external environment makes it possible to take advantage of opportunities: changes in the legislation of the Republic of Kazakhstan in the field of public-private partnerships open up new mechanisms of RDE sales. New technologies of manufacturers allow supplying the market with modern equipment. The RDE market is rather capacious, as the end-user is the whole population of the country, which needs X-ray diagnostics, and the state takes measures to support health care, availability of diagnostics, in particular.

At the same time, experts point out that due to the current economic situation and instability of currency exchange rates, prices on RDE are unstable, and therefore there is no possibility

to predict RDE sales. An important destabilizing factor is a fact that post-warranty service in some cases is transferred to competing companies, and companies lose their existing customers. Dependence of solvent demand on the state budget does not always allow for presenting modern RDE models, as a rule, demand for outdated models with lower prices. Changing supplier policies are also a threat to the external environment.

There are strong formal as well as informal linkages with external sources. On the basis of the SWOT-analysis data obtained with the involvement of experts, it is possible to assume further development of the industry and make a list of strategic areas of activity of primary importance for companies operating in this industry (Table 3).

Table 3

Strategic factors of strong impact

Area	Factor (-s)	Impact significance
A	O3 - Changes in the legislation of the RK in the field of public-private partnership, opening up new mechanisms for sales of RDEs	Promising opportunities
B	S1 - Sales and installation of reliable RDEs of modern models	Actions of companies to overcome the negative impact of environmental factors
C	W4 - Flow of experienced qualified personnel	Necessary intra-company changes
D	T3 - Instability of currency exchange rates, instability of prices on RDE	Serious problems in some cases
Note – developed by the authors based on research		

The above items have a quite strong impact on companies' operations and are related to the short term.

The strong impact strategic actions are identified on the basis of strong responses, the low impact on the basis of comparatively weak responses, and the remaining relatively less strong actions and termed as medium-strategic actions.

This data will already allow for the formation of primary strategic decisions in the field of the development of the market of suppliers of X-ray diagnostic Equipment. Formation of priority areas will allow to optimizing management efforts aimed at improving the distribution network in some cases.

Besides, based on the results of expert evaluations, the strategy should take into account factors that have an average impact on the organization, as they are oriented towards the long-term perspective. A list of these factors is provided in Table 4.

Table 4

Strategic factors of medium impact

Area	Factor (-s)	Impact significance
A	O1. Emergence of modern technologies in the field of radiology that meet the needs of radiology diagnostics, such as CT, PET	More beneficial use of external factors in long-term development
	O2. The end consumer is the entire population of the country that needs to be radiographed	
	O4. Government support for the availability of diagnostics in health care	
	O7. Expanding the geography of RDE sales	
B	W5. RDE sales decline	Neutralization of negative internal factors
	W2. Participation in tenders does not always ensure regularity of RDO sales	
	W1. Purchase of consumables for RDE from own funds leads to an increase in inventories	
C	S2. Supply of wide price range equipment to the market	A promising goal for the organization (foreshight)
	S4. Cooperation with reliable RDE manufacturers	
	S3. Availability of experience of the region's companies on the RDE market	
	S6. Creation of motivational factors for advanced training of the company's engineers	
D	T2. Post-warranty service in some cases shifts to competing companies	Environmental threats that should be feared in the long run
	T3. Due to the low solvency of state hospitals and polyclinics, outdated models are supplied to the market of Kazakhstan	
	T6. Poorly qualified medical staff working in a number of hospitals, especially in rural areas	
	T4. Changing supplier policy in some cases	
Note – developed by the authors based on research		

Taking into account the impact of the factors, let us define the main strategic directions that fully take them into account:

- Increasing market share through participation in PPP contracts, preparation of relevant documentation (concentrated growth strategy - market penetration);
- Entry into new regional and national markets by strengthening competitive positions and active marketing activities (concentrated growth strategy - market development);
- cost reduction through optimization of acquisition of consumables for RDEs (competitive strategy - optimal costs);
- Development of a complex of marketing measures, management of internal resources (information, personnel, scientific and technical), maximization of profit, ensuring the financial stability of the company (offensive functional strategies - marketing and financial).

Summing up, it should be noted that the reviewed methodology of research on the development of the RDE market allowed describing a number of problems of the industry. Also

the perspective directions of development for the companies working in the given branch have been revealed. Thus, it is necessary to take into account changes in the legislation of the Republic of Kazakhstan in the field of public-private partnership, opening new mechanisms of RDE sales, using the accumulated experience of the company in the RDE market.

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Шығыс Қазақстанның рентгенодиагностикалық жабдықтарын жеткізушілер нарығын дамытудың стратегиялық бағыттары

Аңдатпа. Қазақстан мемлекет пен жеке сектордың өзара тиімді ынтымақтастығы дәстүрлі түрде мемлекеттің жауапкершілік саласына жататын салаларда, оның ішінде денсаулық сақтауды қоса алғанда, қоғамдық маңызы бар жобаларды табысты орындауға әкелуі тиіс жолға шықты. Рентгенодиагностикалық жабдықтың қазақстандық нарығы айтарлықтай үлкен және серпінді болып табылады. Бірақ, оның даму перспективалылығына қарамастан, негізгі проблема кейбір сегменттерде (компьютерлік томографтар, ангиографтар және т.б.) қазақстандық өндіруші компаниялардың мүлдем жоқ екендігі болып отыр. Нарықтың қанығуы шетелден қажетті жабдықты жеткізу арқылы жүзеге асырылады. Зерттеу міндеті ретінде авторлар Шығыс Қазақстан өңірі компанияларының рентгенодиагностикалық жабдықтарын жеткізушілер нарығының стратегиялық бағдарларын бағалау әрекетін анықтады. Зерттеудің негізгі мазмұны-SWOT талдау әдісін қолдана отырып, қоршаған ортаны талдау. Ұсынылған әдістеме негізінде осы саланы дамытудың бірқатар проблемалары сипатталған, оларды шешу жолдары анықталған. Қорытындылай келе, рентгендік диагностикалық жабдықты жеткізушілер нарығында жұмыс істейтін компаниялар үшін қысқа мерзімді және ұзақ мерзімді дамудың стратегиялық бағыттары ұсынылған. Зерттеу әдістемесі түріндегі нәтижелер маркетинг саласындағы мамандарға, экономистерге, жеке компаниялардың, сондай-ақ мемлекеттік ұйымдар мен даму институттарының өкілдеріне, сондай-ақ инвесторларға қызықты болады.

Түйін сөздер: денсаулық сақтау, мемлекеттік-жеке меншік әріптестік, рентгенодиагностикалық жабдықтар, SWOT-талдау.

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Стратегические направления развития рынка поставщиков рентгенодиагностического оборудования Восточного Казахстана

Аннотация. Казахстан вступил на путь, где взаимовыгодное сотрудничество государства и частного сектора должно привести к успешному выполнению общественно значимых проектов в отраслях, традиционно относящихся к сфере ответственности государства, включая, в том числе здравоохранение. Казахстанский рынок рентгенодиагностического оборудования является достаточно большим и динамичным. Но, несмотря на перспективность его развития, основной проблемой выступает тот факт, что в некоторых сегментах (компьютерные томографы, ангиографы и т.д.) казахстанские компании-производители полностью отсутствуют. Насыщение рынка происходит за счет поставок необходимого оборудования из-за рубежа. В качестве исследовательской задачи авторами была определена попытка оценить стратегические ориентиры рынка поставщиков рентгенодиагностического оборудования компаний Восточно-Казахстанского региона. Основное содержание исследования составляет анализ среды при помощи метода SWOT-анализа. На основе представленной методики описан круг проблем развития данной отрасли, определены пути их разрешения. В заключении представлены стратегические направления краткосрочного и долгосрочного развития для компаний, работающих на рынке поставщиков

рентгенодиагностического оборудования. Результаты в виде методики исследования будут интересны специалистам в области маркетинга, экономистам, представителям как частных компаний, так и государственных организаций и институтов развития, а также инвесторов.

Ключевые слова: здравоохранение, государственно-частное партнерство, рентгенодиагностическое оборудование, SWOT-анализ.

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