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Penetration factors and introduction possibility for image diagnostic equipment

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KEYWORDS

Healthcare needs and demand;
Healthcare markets;
Medical equipment;
Principal component analysis

Abstract

Background: This study investigated and analyzed the relationship between medical resources and economic conditions of OECD member countries and extracted factors for introducing imaging diagnostic equipment in each country. We also investigated the possibility of introducing diagnostic imaging equipment.

Methods: A principal component analysis was conducted from medical environment indices and economic situation indices; the results were visualized on a graph with the extracted two principal components as axes, and the target nations were categorized according to the possibility of introducing diagnostic imaging equipment. Next, with the number of CTs and MRIs as response variables, we visualized the probability results on a graph by conducting a multiple regression analysis with the indices as explanatory variables and extracting the most influential factors on the number of diagnostic imaging equipment introduced.

Results: We classified 29 countries into four groups according to medical environment and economic situation indices. By extracting from the four groups a group with a high possibility for introducing medical equipment then conducting a multiple regression analysis with CT and MRI unit counts as objective variables and other medical environment and economic situation indices as explanatory variables, it became clear that the factor with the greatest influence on CT and MRI unit counts is the number of hospital beds.

Conclusion: As topics of future studies, we would like to clarify the factors behind as well as the probability for the introduction of medical equipment in each nation by researching high-

Abbreviations: CT, Computed Tomography; MRI, Magnetic Resonance Imaging; PACS, Picture Archiving and Communication System; OECD, Organization for Economic Co-operation and Development; GDP, Gross Domestic Product

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growth medical equipment markets.

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Introduction

The global market for medical equipment has maintained a growth rate of about 8% due to an expanding demand for medical treatment in developing nations as well as aging trends in developed nations. Figure 1 shows a forecast for the medical equipment global market. Market scale was some \$194.9 billion in 2007, and this was forecasted to grow to about \$434.4 billion by 2017 [1,2].

According to a survey by Rohaya et al., developing nations stand to gain an extremely large latent benefit from the introduction of medical equipment, particularly of diagnostic imaging equipment, and there will be an increase in demand for this equipment in Southeast Asia and Eastern Europe [3]. Some of the triggers behind the introduction of diagnostic imaging equipment in developing nations-aside from PACS (picture archiving and communication systems) promotion, government support, and the expansion of healthcare consumerism and medical tourism-are increases in population and life expectancy, aging, and inadequate medical infrastructure and services.

These can be thought of as not just factors behind growth in the medical device markets in developing nations but also in developed countries. Particularly in terms of preparing medical infrastructure and responding to medical tourism, increases in demand are forecasted for large-size medical equipment in the diagnostic imaging fields of CT (computed tomography) and MRI (magnetic resonance imaging).

Prior studies have investigated the spread of these large-size medical equipment including CTs and MRIs in nations such as Japan, China, and Iran [4-6]. In addition, according to Raymond et al., while there are international comparisons of the spread and use of these equipment in Asian nations, this study states that there is a gap between the number of CTs and MRIs per million people [7]. Concerning factors behind the introduction of these large machines, Eun-Hwan et al. report that the spread of CTs and MRIs is influenced by the high cost of treatment per person and the piecemeal method of repayment to hospitals [8]. In an analysis of the factors behind the spread of MRIs in South Korea, Myung-Il et al. report that the average taxable income, number of physicians per person, and share of the population aged 65 or over in an area have positive effects on the popularization of MRI, while the number of existing MRIs in the region has a negative effect [9]. Medical expenses per person and payment methods differ among countries. Tuvia et al. analyze the differences in medical resources such as the number of doctors and hospital beds in the United States from geographical trends, but at present no study has been conducted concerning such matters as the differences in introduction of large-scale MRI equipment and CTs by country or nations with a high probability of introducing such machines, nor have there been studies attempting to visualize such data [10].

Looking at the current market size for medical equipment on a global basis, about 80% of the market is occupied by developed nations, but there are expectations for market growth in developing nations. Such expansion is important for further development of the medical device field as well as improvement of the global medical level.

Based on this, it is possible that the medical equipment industry, which will grow and develop further in the future, will be well-received overseas. This study investigated and analyzed the relationship between medical resources and economic conditions of OECD member countries and extracted factors for introducing imaging diagnostic equipment in each country. We also investigated the possibility for introducing image diagnostic equipment and tried to visualize the results.

Methodology

Target nations

Among the publicly available medical device market data of the world, the largest database is the OECD database. Therefore, we used the OECD database in this study. Target nations were the 29 nations for which data was obtained among the 34 OECD member countries. Below is a list of target nations in descending order by 2016 medical device market projection [11]. In the past investigation-since the report is made by comparison after 5 years-we used the 2011 data in this research as well.

Research indices

Research indices were categorized into medical environment and economic situation indices as shown below.

Analytical methodology

A principal component analysis was conducted from medical environment indices and economic situation indices; the

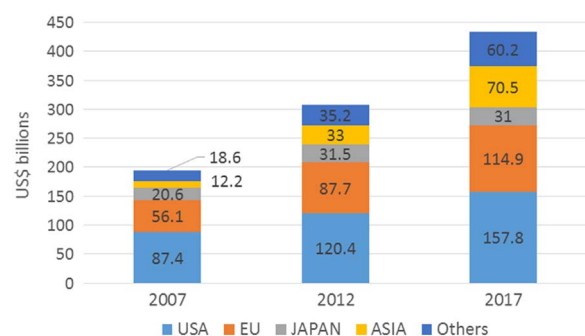


Figure 1 Prospects for the medical device world market.

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