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Dementia Response Technology Development Strategy through PEST-SWOT Analysis

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Abstract

The number of dementia patients in Korea is expected to increase to 3.30 million in 2050, and the cost of dementia management will increase sharply to KRW 106.5 trillion of GDP. In August 2017, the Moon Jae-in government announced the 'Dementia National Responsibility System' through a five-year plan for government operation and expanded the Dementia Peace Center nationwide. However, for this, strategic dementia-related technology development strategies should be established and given the role of government and the role of the private sector. Therefore, in order to derive the corresponding strategy, this study developed the government's 'dementia' response technology development strategy through the situation analysis from the political, economic, social, and technological perspective and the environmental (PEST) analysis of the strengths, weaknesses, opportunities, and threats (SWOT). As a result, the direction of technology development in the dementia-related medical device market is expected to become a trend of developing dementia self-measurement by developing low-cost and high-efficiency diagnostic technology products. It has been shown that the development of various products for consumers should begin. As a result, the dementia market approach strategy should be premised, the related technical support and legal restrictions should be minimized, and the education of related experts should be strengthened to solve the government's development of dementia technology and the social problems of dementia. In addition, by developing joint projects with major companies around the world and actively participating in the technology platform, it is important to naturally build up skills accumulation for the development of dementia technology and competence skills of dementia technology experts in the long term.

Keywords: Dementia Industry, SWOT, PEST, Dementia prevention & diagnosis.

1. Introduction

In the June 2017 Survey of the Nationals, Koreans recognized that dementia was a national issue that should be addressed as a top priority in terms of medical expenses, patient and family pain, causes and treatment alternatives. In particular, the number of patients with dementia increased from 700,000 in 2017 to 3.30 million in 2050, and the cost of dementia increased rapidly from about 13.2 trillion won in 2015 to

106.5 trillion won in 2050. In August 2017, the Moon Jae-in government announced the National Dementia System for Dementia through a five-year plan for government operation and declared a policy to expand the dementia relief center [1].

However, lowering the copayment rate for patients with severe dementia, paying high-cost diagnostic tests, and reducing the copayment of long-term dementia beneficiaries is also a question of whether the government's health insurance policy is expected to put a heavy burden on the Current National Health Insurance Finance, and thus the effectiveness of dementia management. It is becoming. Therefore, it is important for the government to have a basis for preparing a comprehensive review and policy posture in which strategic and lasting effects can be realized before implementing many response policies related to dementia. Therefore, this study examines the situational context from various perspectives and analyzes the environment of political, economic, social, and technological perspectives (PEST) and strengths, weaknesses, opportunities, and threats (SWOT) that can be returned to specific policy strategies. Through SWOT, I would like to suggest a technology development strategy for 'dementia' response that the government intends to solve [2, 3].

2. Study Method

2.1 PEST-SWOT Method

PEST analysis summarizes the first characters of Political environment, Economic environment, Social environment, and Technological environment. It is a basic macro-environment analysis method that determines the direction of future strategy establishment by analyzing external situation. SWOT is an analytical method made up of Strengths, Weaknesses, Opportunities, and Threats. It is a comprehensive environmental analysis that evaluates the suitability of external strategies such as opportunities and threats, as well as internal capabilities for strengths and weaknesses of strategies. Yoo Yeong-bong, Lee Choong-bae (2019), Jeong Sun-mi (2016), Jang Han-soo, Choi Won-jae, and Do Hyun-soo (2012) have made strategic approaches through PEST and SWOT [4, 5].

Table 1 shows the PEST analysis analyzes the positive and negative factors of PEST.

Table 1. PEST Method

Division	Internal Factor		External Factor	
	Positive	Negative	Positive	Negative
Political	IP1	IP2	EP1	EP2
Economic	IE1	IE2	EE1	EE2
Social	IS1	IS2	ES1	ES2
Technological	IT1	IT2	ET1	ET2
	Strengths	Weakness	Opportunities	

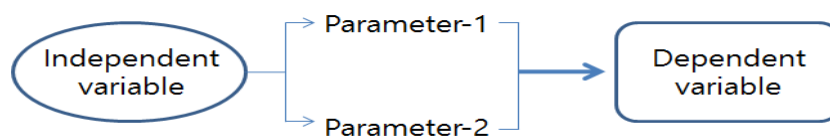Figure 1 shows Independent variables affect dependencies through parameters

Figure 1. Study method

3. Hypothesis

This study is based on the aging of the aging population (V1), the expansion of the global medical device market (V2), the development of ICT technology (V3) and the increase in the number of patients with dementia in Korea (V4). The Dementia Relief Center expansion was set to parameter 1 and parameter 2, respectively. The Dementia Diagnosis System development was composed of dependent variables. The hypothesis of this study is that the aging population, the expansion of the global medical device market, the development of ICT technology, and the increase in the number of patients with dementia will lead to the expansion of the function of the dementia relief center in Korea. To analyze this, the increase in the number of dementia patients in Korea is political, the expansion of the global medical device market is economical, the aging of society is social, and the development of ICT technology is progressive [6,7].

Table 2 shows the effects of these independent variables on the development of the early diagnosis system for dementia were divided into internal and external factors.

Table 2. PEST Method

Division	Internal Factor	External Factor
Political	+	+
Economic	+	+
Social	+	+
Technological	+	+

4. Results

4.1 Political Factor

As an **internal factor**, due to the rapid aging, the dementia population in Korea is expected to increase 4 times in 42 years. This is because the number of dementia patients aged 65 or older in Korea is 74,945 in 2018, but it is estimated that by 2060, the number of patients with dementia is 3,033, which is 4.4 times higher. **External factors** are expected to increase the number of dementia patients worldwide from 46.8 million in 2015 to 135 million in 2050 [8].

4.2 Economic Factor

Internal factors are as following; Goldstein Research analyst forecast the South Korea medical device market size is set to reach USD 5.0 billion by 2025, at a CAGR of 6.1% over the forecast years. The external factor is that the global market for medical devices is expected to grow from $39.75 billion in 2017 to $62.12 billion in 2025 [9].

4.3 Social Factor

Internal factors are important because the population over 65 years old takes up more weight than the population over 14. The elderly population is expected to rise by 320,000 from this year to 7.08 million, while the number of children is predicted to fall by 110,000 to 6.76 million over the same period. The external factor is that the number of people aged 60 and over increased from 1.82 million in 1980 to 1.96 million in 2017. This is more than double the global growth rate. The number of older persons is expected to double again by 2050, when it is projected to reach nearly 2.1 billion [10].

Table 3 shows the elderly population and the characteristics of change by continent.

Table 3. Changes in senior population by continent

	Number of persons aged 60 years or older in 2017 (millions)	Number of persons aged 60 years or over in 2050 (millions)	Percentage change between 2017 and 2050	Distribution of older persons in 2017 (percentage)	Distribution of older persons in 2050 (percentage)
World	962.3	2080.5	116.2	100.0	100.0
Africa	68.7	225.8	228.5	7.1	10.9
Asia	549.2	1273.2	131.8	57.1	61.2
Europe	183.0	247.2	35.1	19.0	11.9
Northern America	78.4	122.8	56.7	8.1	5.9
Latin America and the Caribbean	76.0	198.2	160.7	7.9	9.5
Oceania	6.9	13.3	92.6	0.7	0.6

4.4 Technological Factor

Internal factors include the development of numerous dementia-related technologies using virtual reality, facial recognition, big data, and brain wave technology [11].

Table 4 shows Domestic Dementia Prevention and diagnosis product status

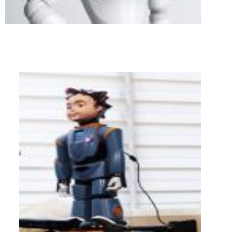**Table 4. Domestic dementia** prevention and diagnosis product status

Division	Contents	Photo
Tion	-VR cognitive rehabilitation system that can use the virtual reality (VR) technology to prevent dementia and exercise brain rehabilitation. -A system that enables intellectual stimulation to restore cognitive abilities and develop problem-solving skills for everyday life.	
Sylbot	-17 dementia prevention programs. -Recognize facial features and facial expressions for simple conversation and express more than 10 moods such as joy, anger, sadness and surprise -We are using in elderly welfare center, dementia support center.	
Dementia Care Robot	-Manage detailed schedules such as appropriate diet, medications, and exercise time based on patient data and doctor's prescriptions, which can induce dialogue and repetitive behaviors for dementia patients. -Built-in entertainment features, such as listening to music, reading, and taking pictures, allow you to set content according to patient preferences to provide personalized care services.	
Selvy Checkup	Korea's first AI healthcare solution that predicts the incidence and risk of various diseases such as diabetes, heart disease, stroke, dementia, liver cancer, stomach cancer, colon cancer, breast cancer, prostate cancer and lung cancer.	

iSyncBrain	-Standardized EEG data for Koreans and used as basic data for conducting quantitative EEG analysis, an advanced technology for preventing dementia -Early detection and treatment of dementia by comparing EEG of suspected patients with dementia with normative reference DB of same age and sex.	

The external factor is that dementia solution products based on robot technology have begun to be commercialized in various countries, such as Japan, which has strength in the field of dementia robot technology development, and Canada and France, which are strong in dementia monitoring technology [12].

Table 4 shows the main products of dementia technology development by country.

Table 4. Status of major dementia technology development by country

Division	Contents	Photo
Ninnin Pepper (Japan)	-Give Pepper the ability to naturally communicate with customers about everyday life and family to prevent dementia, check for medication after meals, and communicate with family members far away -gymnastics movement demonstration function, karaoke function, and the ability to show long-time broadcast content	
Ludwig (Canada)	-Released Pepper brain, a brain training application for Pepper -Dialogue with dementia patients to capture changes expected to be dementia -Diagnose the patient's condition by analyzing the patient's concentration on the conversation, feelings, and comparisons with the past	
Mario (France)	-Sensor installation and emergency help request to find lost personal items -Develop deeper communication with people beyond providing information such as time, weather and upcoming events -Family pictures, weddings and vacation photos of patients as recalling tools	

5. Discussions and Conclusion

5.1 PEST-SWOT Analysis

Table 5 shows PEST-SWOT Internal Factor Analysis

Table 5. PEST-SWOT Internal Factor Analysis

Internal Factor	Positive	Negative
Political	Increasing the population of elderly people 65 years or older, and the number of single-person households increased as well.	National Dementia Overcome R & D Program

	Strengths	Weakness
Economic	South Korea medical device market size is set to reach USD 5.0 billion by 2025	The management cost per dementia patient, including medical expenses, nursing care, and productivity loss, was about 20 million won in 2015.
Social	Elderly population accounted for 42.5% of the total population by 2065	Elderly medical expenses continue to rise.
Technological	Numerous technological developments using virtual reality, facial recognition, big data, brain wave technology, etc.	National Dementia Overcome R & D Program

Table 6 shows PEST-SWOT External Factor Analysis.

Table 6. PEST-SWOT External Factor Analysis

External Factor	Positive	Negative
Political	The number of dementia patients worldwide is expected to increase sharply from 46.8 million in 2015 to 135 million in 2050.	The level of treatment for dementia patients is increasing rapidly and the level of dementia treatment varies according to the economic gap.
Economic	Global medical device market from $ 39.75 billion in 2017 to $ 602.1 billion in 2025.	The response to other diseases due to the cost of dementia is weakening.
Social	The number of older persons is expected to double again by 2050, when it is projected to reach nearly 2.1 billion.	Generational conflict over dementia is growing.
Technological	It has begun to commercialize dementia solutions based on robot technology in various countries, such as Japan, which has strength in dementia robot technology development, and Canada and France, which have strength in dementia monitoring technology.	It is applied differently according to the gap between urban, rural and wealth on the application of dementia treatment technology.
	Strengths	Weakness

5.2 Promotion Strategies

Table 7 shows Capacity expansion (SO), Opportunity capture (WO), Strength utilization (ST), Threat Response (WT).

Table 7. Dementia Technology Development Strategy

	Strengths	Weakness
Opportunities	-Secured global clinical development demand for dementia patients. -Promote joint development with global companies based on various dementia technology capabilities.(SO)	-Induces reduction of dementia disease treatment cost through standardization of technology development. -Suppressing conflict factors between generations

		-Introduction of strong system for professional education.(WO)	
Threats	-Various skills are attempted by the elderly	Reinforced diagnosis of dementia and focused on developing self-diagnosis technology.	
	-Preoccupy the global technology market through product diversity.(ST)	Induce convergence of related monitoring technologies with other services.(WT)	

6. Conclusion

The results of this study suggest that the direction of technology development in the dementia-related medical device market will be the trend toward dementia self-measurement through the development of low-cost and high-efficiency diagnostic technology products. Therefore, in order for the government's strategic approach to the development of dementia technology to be achieved, it must begin with the development of various products for consumers with dementia technology. To this end, a chime market-specific approach strategy should be premised, and related technical support and legal restrictions should be minimized, and education for related experts should be strengthened. In addition, it is important to develop joint tasks with major companies around the world and actively participate in the technology platform, so that technology accumulation for dementia technology development and competency accumulation of dementia technology experts in the long term are naturally established [7]. However, since the causes of dementia around the world are somewhat different and not clearly defined by experts, the direction of technological development in these areas needs to be fully considered and further discussion and ongoing research are needed. Therefore, the limitations of the technical approach on various dementia that are not covered in this study are clear, and further research is needed to solve this problem.

Acknowledgement

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