

## IoT-based Digital Life Care Industry Trends

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### **Abstract**

*IoT-based services are being released in accordance with the aging population and the demand for well-being pursuit needs. In addition to medical device companies, companies with ideas ranging from global ICT companies to startup companies are accelerating their market entry. The areas where these services are most commonly applied are health/medical, life/safety, city/energy, automotive and transportation. Furthermore, by expanding IoT technology convergence into the area of life care services, it contributes greatly to the development of service models in the public sector. It also provides an important opportunity for IoT-related companies to open up new markets. By addressing the problems of life care services that are still insufficient. We are providing opportunities to pursue the common interests of both users and workers and improve the quality of life. In order to establish IoT-based digital life care services, it is necessary to develop convergence technologies using cloud computing systems, big data analytics, medical information, and smart healthcare infrastructure.*

**Keywords:** *Digital Life care, IoT services, well-being, medical device, health/medical, life/safety, city/energy*

## 1. INTRODUCTION

IoT(Internet of Things)-based services(including products/solutions/platforms) are being released in accordance with the aging population and the demand for well-being pursuit needs. In addition to medical device companies, companies with ideas ranging from global ICT companies to startup companies are accelerating their market entry. The areas where these services are most commonly applied are health/medical, life/safety, city/energy, automotive and transportation. However, the domestic smart health care market is very narrow, there is a limit to the modernization of the industry only basic services such as telemedicine and chronic disease management. Therefore, it is necessary to actively identify a new smart healthcare business model that can provide convenience and low cost services based on data, content, and

platform from the center of hardware such as sensors/devices and expand the market[1]. Therefore, life care services in the health/medical and life/safety sector that IoT-based application services can be activated most quickly is spreading. Life care facilities are expected to be applicable to the areas of safety management, health care, social services, and medical/nursing services. IoT technology provides a foundation that can provide customized services such as health promotion and counseling, rehabilitation, leisure activities by collecting integrated information such as health information related to the user's health/medical care and activity pattern information related to life/safety. Integrated information is a top priority in implementing IoT-based life care services. Since this is a role that supports core affairs, it is necessary to strengthen the role of the ministry in charge of information technology(public institutions, etc.). According to the current form of integrated information technology operation in Korea, the percentage of employees in charge of the general affairs, administration, and operations support is 54.3%, and the facilities with the personnel in charge of information technology are 73.7%. In particular, Life care-related facilities that operate wired and wireless networks are relatively good environments that can utilize IoT technology at about 97.1%. On the other hand, it was found that more than 30% of the facilities that operate by hand, such as resource management, case management, volunteer management and exchange management that can be seen as peripheral services to support life care services in terms of, the facilities in charge of information technology appears to be more than 25% and it has been pointed out that improvements are needed for this[2]. Thus, it is necessary to accurately identify the characteristics of Life care service users and build a foundation that can provide customized services(including disease management of chronic ally(health promotion(health care) counseling services, cultural leisure services, educational support services, etc.) and focus on modernizing them.

This study describes the trend of DLC(Digital Life Care) services(health/healthcare, life/safety) among the fastest growing Iot applications, the IoT-based life care services market and the IoT industry-related technology market and smart healthcare market trends. Based on this, it explains what is suggesting to the domestic industry in the re-care services industry, which is expected to grow in the future among IoT-based applications.

## 2. DLC Services Trends

### 2.1. Health/Healthcare Category

The trend for DLC services in the health/healthcare sector, where IoT applications are expected to spread the most rapidly, is shown in Table 1. This provides the basis for providing customized services by integrating your health-related information[2~4].

**Table 1. Digital Life Care Services Trends\_Health/Healthcare**

Company Name	Services Trends
SK-TELECOM Inc.	- Developed a smart health care platform in collaboration with Seoul National University Hospital(Healthon) - Personalized health care services
MAGICECCHO Inc.	- Development of smart healthcare devices based on IoT platform(Medication guidance device)

ARAM SOLUSION Inc.	- Development of infrared sensor/IMU sensor for smart health care services
UTAREX Inc.	- Development of smart healthcare platform (Smart Patient Care System) - RFID tags on the patient's wrist, bar-code recognition of dosing bag - Preventing misuse of drugs and medical accidents
TEREFIELD Inc.	- Development of smart healthcare platform (Health care services for chronically persons) - Real-time measurement of blood pressure/blood sugar, providing services to the guardian smart phone

\* Source : Yeon-Hee Lee et al.(December 2017), Korea Intelligent IoT Association(2017), Hyun-Ji Lee et al.(2018) / re-composition.

## 2.2. Life/Safety Category

The trend for DLC services in the life/safety sector, where IoT applications are expected to spread the most rapidly, is shown in Table 2. Through this, we collect activity pattern information, etc., and provide customized services for this[2~4].

**Table 2. Digital Life Care Services Trends\_Life/Safety**

Company Name	Services Trends
LGU+ Inc.	- Development of various convenience services based on IoT - Providing services that are closely related to daily life (IoT-based switch/plug/energy meter/thermal sensing sensor/gas lock) (Home CCTV Makaka, LTE Magic Mirror, IoT@home, etc.)
KT Inc.	- Launched IoT-related services and products that are closely related to everyday life - Providing convenience services (Ole GIGA-based home fitness/IoT home cam/IoT home manager, etc.)
SK-TELECOM Inc.	- Providing IoT-based services (Thing Plug, Smart Home, etc.)
SAMSUNG ELECTRONICS	- Using NFC(Near Field Communication function on smart phone - Developed a platform (home sync) to share content - Providing a variety of convenience services
IDRO Inc.	- Using RFID(Radio Frequency IDentification) technology for 900MHz RFID - Various systems development (Factory automation/book automatic loan return system /RFID elementary school safety maintenance service/ship

	safety management, etc.)
GNSYSTEM Inc.	- Development of smart lighting control solutions - Providing energy-saving services
TIMEVALVE Inc.	- Remote control home's gas system with smart phone application - Development of IoT-based life safety platform (Cook & Lock) - Providing home safety-related services (Temperature overheating and gas leakage, etc.)
M2MNET Inc.	- Development of life safety smart terminal (U-safe alert service) - Providing services that can be protected in the event of an emergency - Check your location and travel route via GPS and WiFi - Implementing the emergency call/phone call/text reception function of the guardian
SQISOFT Inc.	- Smart Fashion Store Platform(Smart Mirror) Development - Providing services that can be used to promote products - Smart Mirror service provided using beacon-equipped hangers - Product information service with thumbnail image of the product

\* Source : Yeon-Hee Lee et al.(December 2017), Korea Intelligent IoT Association(2017), Hyun-Ji Lee et al.(2018) / re-composition.

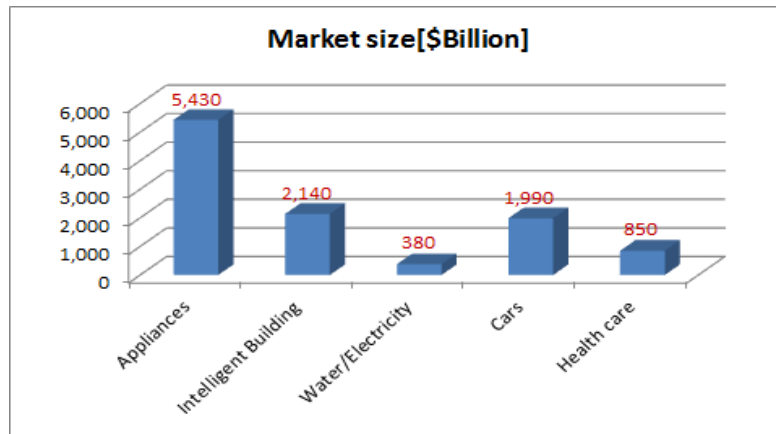
### 3. Marketability of IoT-based Industries

#### 3.1. of IoT-based Life care Market Trends

The IoT-based life care services market is growing rapidly in the healthcare and smart home sectors. Non-Life care sectors are expanding the technology market that can share and control information in various fields such as consumer electronics, electronic devices, remote inspection, smart cars. The health/healthcare and smart home sectors(intelligent building, water/electricity, etc.) which are a very large part of the IoT-based life care services market are expected to form a large market by 2020: \$85 billion for healthcare, \$252 billion for smart homes(\$214 billion for intelligent buildings, and \$38 billion for water/electricity)[5~7]. As of 2020, the market size of IoT-based life care services is shown in Table 3.

**Table 3. IoT-based Life Care Services Market Size\_2020**

	Appliances	Intelligent Building	Water/ Electricity	Cars	Health care	Total
Market size [\$Billion]	5,430	2,140	380	1,990	850	10,790



\* Source : KIET(2019), MachinaReport(2018) / re-composition.

### 3.2 IoT Industrial Market Trends

In view of the total market size of the IoT industry-related front and rear technology markets, Korea is expected to reach KRW 3.8trillion in 2015 and KRW 6.4trillion in 2017 to KRW 22.9trillion in 2022. The global market is expected to reach KRW 308 trillion in 2015 and KRW 457 trillion in 2017 to KRW 1,125 trillion in 2022. By 2022, the global IoT industry's total market size is expected to be KRW 5417.2 trillion[5~7]. The market growth trend in the domestic and international IoT industry is shown in Table 4.

**Table 4. Domestic & International IoT Industry Market Growth Trend**

Total Market-size of IoT Industry[KRW trillion]									
	2015	2016	2017	2018	2019	2020	2021	2022	Total
Domestic	3.8	4.9	6.4	8.2	10.6	13.7	17.7	22.9	88.2
Global	308	375	457	556	678	825	1,005	1,125	5,329
Total	311.8	379.9	463.4	564.2	688.6	838.7	1,022.7	1,147.9	5,417.2

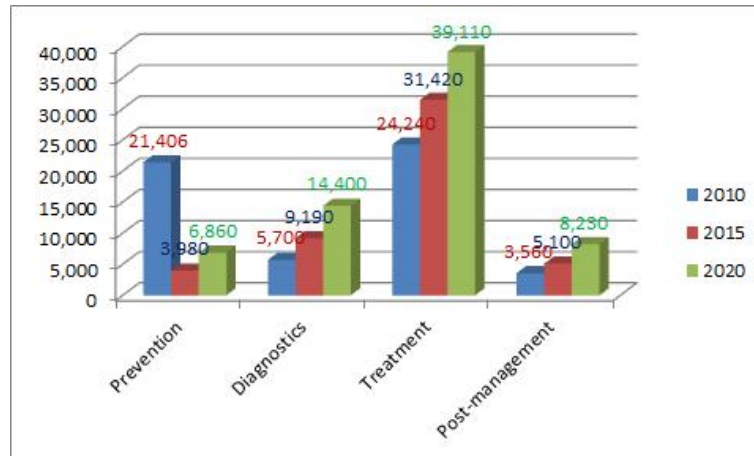
Domestic	Global

\* Source : KIET(2019), MachinaReport(2018) / re-composition.

### 3.3 Smart Healthcare Market Trends

Smart healthcare global market, a global marketplace for IoT-based life care services, saw a breakthrough growth of \$140 million in 2010 and \$1.3 billion in 2012 for the smart phone healthcare application[8~9]. Market growth trends by healthcare sector are shown in Table 5.

**Table 5. Market Growth Trends by Healthcare Sector[Billion dollars]**



\* Source : Jong-Tae Park et al.(December 2017), Ji-Hyun Lee et al.(May 2018) / re-composition.

The total health care services market reached \$92 billion in 2013. In particular, by 2020, the market for core services related to IoT healthcare is expected to be \$350 billion, accounting for 15% of the total IoT market. The health care services industry is also expected to expand from 32% in 2010 to 43% in 2020. The global market for healthcare for disease prevention, diagnosis, treatment, and post-management is expected to grow from \$3.564 billion in 2010 to an average of 8.93% per year, shaped by a massive market of \$6.86 trillion by 2020[8~10].

### 4. Implication

As of 2015, the average life expectancy in OECD countries was reported at 71.4 years. South Korea's life expectancy is 82.3 years, ranking 11th in the world and 3rd in the world with a health life expectancy of 73.2. Although life expectancy is increasing, the number of chronically ill people continues to increase. In South Korea, 54.3% of adults over the age of 20 suffer from chronic diseases and an average of 2.5 complex diseases. As a result, as of 2008, the total cost of medical treatment due to high blood pressure was 2.998 trillion won, diabetes amounted to 1.1276 billion won[11]. In particular, the IoT-based life care services industry, utilizing IoT platforms and wearable devices, continues to grow with paradigm changes in disease prevention and healthcare and advances in IoT technology. Among the areas of future IoT-based application services that are expected to grow highly, life care services in the health/medical and life/safety sectors have emerged. This suggests that the demand to ensure the safety of life from disasters/ disasters and accidents is evolving into a life care service, extending the life expectancy of health through the prevention and management of diseases. With the launch of various forms of smart healthcare products and services that fuse BT and ICT, life care products and platforms are launched with ideas ranging from medical device specialists to global ICT and start-up companies. The domestic life care market is still very narrow, limiting the modernization of the industry. Therefore, it is necessary to actively identify and expand the market by

actively identifying new digital Life care business models that can provide user-friendliness and low-cost services based on data, content, and platforms in hardware centered on sensors/ devices, etc.[1][12].

## 5. CONCLUSION

In order for DLC services based on IoT technology to be established, we need to improve the information level of life care service facilities and expand the scope of various ICT applications. i) Must be able to provide customized services through integrated management of various life care services(health/medical, life/safety, city/energy, automotive/transportation, etc.). ii) Must improve the information capabilities to provide digital life care services that are fused with advanced ICT. Institutional support is needed to strengthen the level of personal information protection management in the IoT service environment[2]. As life care features are diversified, combining smart health care and convenience services, we are developing into a digital life care service based on IoT technology. Furthermore, by expanding IoT technology convergence into the area of life care services, it contributes greatly to the development of service models in the public sector. It also provides an important opportunity for IoT-related companies to open up new markets. By addressing the problems of life care services that are still insufficient, we are providing opportunities to pursue the common interests of both users and workers and improve the quality of life. In order to establish IoT-based digital life care services, it is necessary to develop convergence technologies using cloud computing systems, big data analytics, medical information, and smart healthcare infrastructure(M2M/wearable devices and networking, etc.). In addition, it is necessary to introduce a system to manage the collection of supply chains(including personal information and personal information) to enhance the protection of personal information in IoT services[1]. The government needs to strengthen the role of life care services facilities in complementing the family's net function as a social and public place when establishing digital life care services policies. The level of use of IoT infrastructure in life-care services(including products, solutions, platforms, etc.) is almost in demand, with the exception of public institutions and government-led businesses(facilities). Policy support is needed to increase private demand in IoT-based Life care facilities. This requires a joint effort of the industry/academy/institute/government to develop into a DLC services.

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