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Overview of dental imaging equipment industry in Taiwan



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Since the discovery of X-rays by Wilhelm Conrad Roentgen in late 1895, dentistry has been quick to use this invention for diagnosis of tooth and jaw bone diseases. The first dental radiograph was that a German dentist Otto Walkhoff obtained an X-ray film of his own teeth in early 1896. Subsequently in 1905, the first X-ray machine for dental health was manufactured by the current German company Siemens. In addition to medical imaging, the application of X-rays for dental imaging has spread all over the world.^{1,2} In fact, the development of dental radiology in Taiwan is almost in sync with the world. Just 8 years after the first dental X-ray machine was invented, there was an article to introduce the value of X-ray in the diagnosis of dental diseases with photobook published in the Journal of the Formosan Medical Association by the Taiwan Government Taipei Hospital in 1913. Thus, the field of dental radiology in Taiwan has existed for more than 100 years.^{3,4} Furthermore, dental radiology is crucial to dental procedures. Since Taiwan implemented National Health Insurance (NHI) including dentistry in 1995, in addition to dental institutions and dentists, Taiwan's dentistry-related industries have developed rapidly, including dental imaging equipment industry. In this article, we explored an overview of the dental imaging equipment industry in Taiwan.

During June 2023, we searched for all companies (including manufacturers and agents) related to dental

imaging equipment in Taiwan through various methods by searching the internet, referring to dental equipment advertisements and interviews with dental business personnel, and recorded their basic information. Currently, 17 companies involved in dental imaging equipment in Taiwan. Among them, there were one manufacturer and 17 agents. It should be noted that the only one manufacturer also acted as an agent to sell its own products. The products were summarized into 5 categories. The companies and their product content, brand, and country of origin are shown in Table 1. There were 18 brands in Taiwan's dental imaging equipment sales market and these 18 brands were represented by 17 agents. Usually, one agent represented one brand only. Among them, however, one agent (C&N Med-Dent Co.) represented 2 brands. The countries of origin of various brands included South Korea (n = 6), Japan (n = 4), Germany (n = 2), France (n = 2), Taiwan (n = 1), Finland (n = 1), China (n = 1) and Italy (n = 1). In addition to the single-function cone-beam computed tomography (CBCT) produced by a manufacturer which has been terminated, there were mainly 4 types of products on the market, including dental X-ray machine for periapical radiographs (n = 11), dental X-ray machine for panoramic or cephalometric radiographs (n = 12), CBCT including panoramic radiographs (n = 15) and CBCT including panoramic and cephalometric radiographs (n = 15). Most brands had CBCT (n = 15). Among them, there were brands that also provided dental X-ray machine for periapical radiographs (n = 8), dental X-ray machine for panoramic or cephalometric radiographs (n = 12). However, there were 3 brands that only had dental X-ray machine for periapical radiographs.

According to the statistics of the Ministry of Health and Welfare and the Atomic Energy Council, there were 7134 dental institutions (including dental departments in hospitals and dental clinics) with 14,579 dental X-ray machines in Taiwan in 2021. On average, each dental institution had at least 2 X-ray machines, showing the absolute important role of X-ray machines in the diagnosis and treatment of dental diseases. In fact, according to our observation, even in

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Table 1 The companies (including manufacturers and agents) related to dental imaging equipment in Taiwan and their product content, brand, and country of origin (survey time: June 2023).

Company	Brand	Country	Product content				
			A	B	C	D	E
Manufacturer							
Po Ye X-ray Manufacturing Corporation	POYE	Taiwan	○	○		○	○
Taiwan CareTech Corporation ^a	TCT	Taiwan			○		
Agent							
Po Ye X-ray Manufacturing Corporation	POYE	Taiwan	○	○		○	○
Dentsply Sirona Inc., Taiwan branch (USA)	Sirona	Germany	○	○		○	○
Fomed Biotech Corporation	Morita	Japan	○	○	○	○	○
Mideal Technology Company	Planmeca	Finland	○	○		○	○
Dinno Technology Company	HDX	South Korea		○		○	○
Vatech Medical Company	Vatech	South Korea	○	○		○	○
Ray Company, Taiwan Branch (Korea)	Ray	South Korea		○		○	○
Top Geal Company	Asahi	Japan	○	○		○	○
ART.BIO Private Company	Yoshida	Japan	○				
Nobel Biocare Taiwan Company	Dexis	Germany	○	○	○	○	○
C&N Med-Dent Company	PointNix	South Korea		○		○	○
	Acteon	France	○				
TBMS International Corporation	Carestream	France	○	○		○	○
Chang Hsin Biotech Company	Meyer	China				○	○
Kao Tech MD Company	NEWTOM	Italy		○		○	○
Takara Belmont (Taiwan) Corporation	Belmont	Japan	○				
Osstem Corporation	Osstem	South Korea				○	○
T & C Biotechnology Corporation	Dentium	South Korea				○	○

A: Dental X-ray machine for periapical radiographs.

B: Dental X-ray machine for panoramic or cephalometric radiographs.

C: Single-function cone-beam computed tomography (CBCT).

D: Cone-beam computed tomography (CBCT) including panoramic radiographs.

E: Cone-beam computed tomography (CBCT) including panoramic and cephalometric radiographs.

^a This company closed due to bankruptcy in 2017.

general dental clinics, dental X-ray machine for panoramic and cephalometric radiographs and even CBCT are essential equipment for all institutions, not just for those in the metropolitan areas.⁵ To the best of our knowledge, this is the first report analyzing the dental imaging equipment industry in Taiwan. We found that Taiwan currently has only one dental X-ray equipment manufacturer. Although our dental institutions have a large demand for the use and after-sales services of X-ray machines, we mainly rely on imports, especially from neighboring countries (South Korea and Japan) and Europe. Even the rapid development of dentistry in Taiwan in recent decades has not led to the progress of research and development of dental X-ray equipment. After-sales education, training and maintenance services still must rely on foreign manufacturers and this is not conducive to dental services. The top priority is that government policies should focus on the research and development of dental imaging equipment industry, and further drive the overall development of Taiwan's dental industry under a more comprehensive policy plan.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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