

# **An Institutional Analysis of OLED Technology and Display Industry in Taiwan: Industrial Impact and Policy Implications**

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For display industry, OLED (organic light-emitting diode) has been recognized as the next-generation technology after TFT-LCD (thin film transistor liquid crystal display) with the enormous market potential. Taiwanese firms once enjoyed a leading position in demonstrating display applications of OLED. However, a watershed appeared around the mid 2000s as after which Taiwanese firms collectively dropped their R&D projects on OLED, leading to today's lagged position behind their (especially South Korean) competitors. Given the strategic importance of display industry to other industries as well as to Taiwan's overall exports, the losing battle on the OLED technological front has huge negative impact on the Taiwan economy.

From a perspective of national innovation system, the OLED case has far-reaching implications for technological and industrial policies on Taiwan. Although this study sets out to ask what led to the collective R&D dropout for the Taiwanese firms on OLED technology, we do not think the reason is limited on the micro-economic level, neither do we think the case is an isolated one. Instead, we presume that there are fundamental problems underlying Taiwan's overall R&D system, commonly faced by the majority of Taiwanese firms across a wide range of industries and technologies. In aggregate terms and to a large extent, this R&D bottleneck explains Taiwan's stagnation in international commercial competition in recent years.

Although technological incapability and the problems it brings along have increasingly been felt by the Taiwan society, mechanism behind the phenomenon is a complex one. In addition to the common elements in national innovation system (such as R&D institutions,

corporate strategy, financial supports, market structure, national policy, etc.), many observers have provided their own account more specific to the Taiwan context and indeed each has certain role to play in the whole picture: insufficiency of R&D commitments both on the firm- and national levels, the disintegration between industry and the educational system, disappearance of the vocational training system, and the publication-orientated criteria on the university personnel, etc. Nevertheless, to identify the factors in profile is one thing, to know how they interact and co-evolve in detail is another. Without the latter, it is impossible to propose a coherent solution to the matter.

Furthermore, we expect to gain insights from comparing Taiwan's experience with the South Korean one in acquiring the most advanced OLED technology. In many head-to-head competitions such as in global DRAM and TFT-LCD markets, Taiwanese firms falter while their Korean counterparts triumph. The OLED battle between these two countries may be seeing no exception to this trend, as the Korean key player, Samsung, is currently occupying an almost monopoly status in supplying OLED panels to the global smartphone makers (including the Taiwanese firm HTC). Be that the case, this comparison study shall shed more light not only on the interaction between national innovation system and its industrial prowess, but also on the varying development paths that Taiwan and South Korea have been taking after the end of the Japanese colonial period. The increasingly widening economic performances between these two economies after 2000 may be explained, to some extent if not all, by the implications that can be drawn from the OLED competition.