AS THE COVID-19 PANDEMIC SPREADS WORLDWIDE, ITS TOLL on the display industry has multiplied.

Although the infectious disease had already impacted more than 100 countries by early March 2020, its primary effect on the display business at that point was a significant drop in February's LCD production in China, because of a reduced workforce and delays in receiving components and materials. That caused an unexpected spike in panel pricing, with month-to-month jumps of more than 7 percent in February and March—not an unwelcome development for an LCD market that has been hampered for years by oversupply causing depressed prices. But fast-forward a month, and the situation has taken a dramatic turn for the worse. By April, COVID-19 had spread to nearly 200 countries, with millions of confirmed cases worldwide, and most economies in Europe and North America shutting down to meet social distancing protocols aimed at slowing the virus' transmission.

With a global recession underway, the display industry is now dealing with COVID-19's impact on the demand side as TV and smartphone manufacturers face shuttered retail outlets and the genuine concern that cash-strapped consumers won't be buying their wares in 2020. To make matters worse, the industry was already in a tough position before the pandemic, says Ross Young, CEO of the market research firm Display Supply Chain Consultants (DSCC). Young recently led a webinar on COVID-19's impact that was organized by SID’s Bay Area Chapter; SID members can download it at SID.org.

“arises comes at an interesting time for the display market,” he says. “Prices are at or around cash cost in TVs. We've seen large losses in the TV market for large-area LCDs, and utilization is not good in mobile OLED. This, he says, has been caused by excessive investment as a result of large subsidies from China and has taken the profit out of most segments.

LCD prices were on the wane since the first quarter of 2017 (Fig. 1), with panel makers already downsizing their LCD businesses before COVID-19 because of eroding margins, Young says. For example, although margins for Samsung Display’s OLED smartphone business have been relatively healthy, holding above 10 percent for several years, Samsung's LCD margins have been at negative double-digit levels since Q1 2019. Samsung is now shutting all LCD production in Korea by the end of 2020, and is selling its LCD fab in Suzhou, China. (Young sees TCL, which already has a 10 percent share in the Suzhou plant, as a likely buyer).

“They really have no choice but to exit,” Young says.

Young and other analysts predict that the industry's structural shift—that already was underway—will be accelerated by the COVID-19 pandemic, with a quicker reduction in LCD capacity and a wave of consolidation. Indeed, according to Eric Virey, a principal analyst for the consulting firm Yole Développement, COVID-19 will accelerate “the further rationalization of the display industry,” which he says was needed badly after the entry of "so many irrational players" into the LCD market.

LG is closing its LCD fabs in Korea, although it will probably keep its LCD fab in China. And Apple has already bought the equipment in Japan Display’s dormant Hakusan, Japan, plant for $200 million (which will go toward paying the company’s $800 million debt to Apple).

Chinese manufacturers CEC Panda and CHOT are struggling financially and are reportedly for sale, with BOE and TCL regarded as likely suitors, respectively. Young expects most LCD capacity will
be consolidated around BOE and China Star, with those two suppliers controlling 60 percent of the market next year.

**Forecasts Are in Flux**

Young and other top analysts now expect that global shipments of flat-panel displays will be down 10 percent or more for the year, with revenues taking a similar hit. Meanwhile, OLED displays will continue to gain shares in both the smartphone and TV categories.

Virey says that prior to COVID-19, he had been cautiously optimistic for the year ahead, given that 2019 was brutal in terms of pricing as the result of overcapacity, especially in the LCD market. The pricing picture began changing late last year, with Samsung and LG both announcing that they were shutting down their LCD fabs in Korea, and with Chinese manufacturers slowing the production ramp-up at their newest fabs. Demand was up for TV and smartphone displays, and prices were rising.

"So this year was looking better, and then everything happened [with COVID-19]," Virey says. "In the first quarter, we thought it might impact the supply chain and a little bit of the demand in China, and that was it. Now, of course, the story is completely different."

Currently, Virey forecasts that global display shipments will be down 8 to 12 percent compared to 2019. That represents a 10 to 15 percent drop from his initial forecast for 2020.

According to Young, LCD panel prices fell below cash cost in late 2019, before experiencing a temporary increase in the first quarter of 2020 driven by limited supply. But weak retail sales in the wake of COVID-19 spurred most TV and smartphone brands to lower their first-quarter demand by 10 to 25 percent. That quick plunge in demand caused panel pricing to drop again in April.

"All of these prices are at record lows, and at or below cash costs in many cases," Young says.

DSCC originally forecast 1 percent overall revenue growth in the global display industry for 2020 after two negative years. But it downgraded its forecast significantly in April in response to COVID-19, and now thinks global revenues will decline by 8 percent to $103 billion, a 9 percent overall downturn from its original outlook.

"When you speak with the display companies, everyone is talking about the decline of orders," says David Hsieh, senior director for Omdia Display.

"We are forecasting a strong recovery in the next year," says Young. "Of course, that's all based on the COVID-19 situation being over this year."

DSCC also sees notebook shipments declining 8 percent in 2020, from 185 million to 171, which is 7 percent lower than its initial forecast of 184 million. Furthermore, projections show automotive will be hit hard by COVID-19, with panel shipments declining 17 percent year-over-year from 170 million to 141 million—16 percent lower than DSCC's initial projection of 169 million.

The analyst and consultancy firm Omdia projects that global display shipments will drop 11.1 percent in 2020, totaling 3.2 billion units compared to 3.6 billion in 2019, based on significantly lower demand for TVs and smartphones, as consumers are unable to buy them in retail stores. The research firm says this is the biggest decline for the display industry since the 2008 financial crisis, which caused shipments to drop 8.8 percent in 2009.

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Omdia expects that LCD TV shipments will be down 9.5 percent, and smartphones will decline 10 percent. It predicts desktop monitors and notebooks will fare better, dropping only 1.9 and 5.8 percent, respectively, as remote working and distance learning drive demand among commercial and educational customers. Meanwhile, feature phones and automotive will fare worse, with both suffering double-digit declines.

"There's a very big fall on automotive displays," Hsieh says.

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DSCC also sees the display market rebounding in 2021 and predicts a 13 percent overall year-over-year growth in revenues to $116 billion, which would bring it close to its original 2021 prediction of $117 billion.

"Because we're already at such a low from a profitability and cost standpoint, we don't expect to see the kind of price reductions that we saw in previous recessions," Young says. "So we think pricing will be more stable than in the past recessions, and the

**Fig. 1.**

LCD panel prices have been falling since 2017. They rose in the first quarter of 2020, but now are reversing course because demand has plummeted in the wake of COVID-19. Source: DSCC's Weekly Review.
pent-up demand from a weak 2020 at higher prices will lead to some good growth."

Several factors will help the industry catch up on revenues next year, says Young, including better pricing and a higher mix of OLED. He adds that the Summer Olympics’ move to 2021 should drive LCD TV set sales, while the rollout of high-end 5G smartphones will spur demand for flexible OLED displays (Fig. 2).

For his part, Virey doesn’t have a forecast yet for 2021 shipments. He agrees with the general consensus that the COVID-19 situation should start to improve in the third quarter, allowing the display industry to start returning to normal with continued improvement in 2021. This assumes the medical and social issues associated with the pandemic are resolved in 2020.

"The reality is, it’s not about forecasting the display market," Virey says. "It’s about [these] medical and scientific questions that nobody has the answers to right now."

Given the uncertainty, Young studied previous global recessions in 2001–2002 and 2008–2009. Both resulted in dramatic technology shifts, with LCD monitors supplanting cathode-ray tubes (CRTs) in the early 2000s and LCD TVs grabbing the share from CRT and plasma TVs toward the end of that decade. In evaluating the current COVID-driven recession, Young doesn’t see any one technology positioned to “cross the chasm” and take over a market like LCD did in the past, although he says flexible OLED is well-positioned to gain more shares in smartphones.

Omdia also forecasts a strong growth for OLED smartphone displays, and flexible OLED in particular in 2020, despite the decline in overall smartphone shipments. It projects that shipments of OLED panels for smartphones will grow 9 percent, from 471 million units in 2019 to 513 million in 2020. Flexible OLED shipments are expected to grow 50 percent, while rigid OLED shipments will decline by 12 percent.

**LCD Sees a Structural Shift**

According to Young, LCD capacity will shrink more quickly than expected, because of COVID-19. Although in the past, DSCC saw LCD capacity rising in both 2020 and 2021, it now sees it declining 1 percent in 2020 and 2 percent next year. There will be $3.6 billion in new capital investment in LCD in 2021 and $1.3 billion in 2022, “and then that’s it,” he says.

He adds that DSCC may be “a little optimistic” by showing just a 2 percent decline in 2021 as he expects to see a slower ramp of LCD capacity this year. When COVID-19 first hit in the growing display manufacturing hub of Wuhan, China, Young assumed there would be an initial three-month delay in installing new production equipment in Wuhan from virus-related restrictions. Now he expects a four-to-six-month delay in Wuhan and a three-month delay throughout the rest of China.

With Korean manufacturers shutting down most of their LCD capacity this year, Hsieh says the industry could experience a “scary balance” between supply and demand, with both declining simultaneously. Omdia gauges supply growth by looking at the total display area’s capacity growth rate. In 2019, this rate was 8.6 percent compared to demand growth of around 4 percent. For 2020, the capacity growth rate is forecast to be 1.2 percent, compared to a demand growth rate of 0.9 percent.

"When you take the whole year in total, we forecast supply and demand reaching a remarkable balance, with the supply growth rate and the demand rate being similar," says Hsieh. "The problem is Q2. The TV makers are actually delaying their purchase to the second half because they don’t know what the new demand will be after the COVID-19 impact."

While the extent of the current downturn and timing of a COVID-19 vaccine remain unclear, Young is optimistic that the decline will be short-lived for the display industry, as an improved balance between supply and demand should result in higher prices than previously predicted.

"Because this downturn occurred after two down years, it’s going to lead to more consolidation and restructuring and tighter supply," he says. "But we think there’s potential for price increases and improved profitability for the next few years, which this industry badly needs."