The advanced driver assistance system and connected vehicle (ADAS-CV) technology may offer a promising approach to reduce vehicle crashes. However, their safety effectiveness can be affected by many factors. This will determine the ADAS-CV technology's promotion and development strategies. This study firstly summarized the major ADAS-CV technologies that were developed in recent years. By comparing the experiment and field test procedures conducted for these technologies, the study selected the most reliable results and suggested maximum safety effectiveness for each type of ADAs-CV technology. Then, this study analyzed the practical safety effectiveness of ADAS-CV technologies when they are promoted on the market and widely used in the real world. The study demonstrated that the safety effectiveness of ADAs-CV technologies were affected by features of system limitation, adoption and usage could significantly reduce further, based on association analysis, this study proposed a scenario library for the testing and evaluation of ADAS-CV technologies. Then, by using a driving simulator, this study assessed the effectiveness of ADAS-CV technologies in different pre-crash scenarios, considering the scenario heterogeneities. Two types of ADAs-CV technologies were investigated and they were pedestrian-to-vehicle technology and forward collision technology. This study analyzed their impacts on both driver behaviors and safety benefits. Finally, this study conducted a Monte-Carlo simulation and identified the parameters of ADAS-CV that may achieve the maximum safety effectiveness in different pre-crash scenarios.