The goals of this thesis are various generalizations of the classical delta theorem, in which the advantage is that we can separately investigate the analytical properties of transformation of the estimate, and independently, we can deal with asymptotic properties of the original estimate. When working with Euclidean spaces, we generalize the delta theorem for the case that partial derivatives are not continuous or they are equal to zero. When working with general normed linear spaces, we first examine Hadamard-differentiability, while formulating and proving equivalence with Fréchet-differentiability, under proper assumptions. We demonstrate the functional delta theorem on known results for empirical quantiles and median absolute deviation in the case of a random sample, together with our own result for the interquartile range and empirical quantiles in the case of AR(d) sequence. We also show why the functional delta theorem is not usable for moment estimators. In the last part, we examine the Hadamard-differentiability of a copula functional and its application to the derivation of the asymptotic distribution of the empirical copula.