Abstract. In this paper, we show that the Möbius invariant function space $\mathcal{Q}_p$ can be generated by variant Dirichlet type spaces $\mathcal{D}_{\mu,p}$ induced by finite positive Borel measures $\mu$ on the open unit disk. A criterion for the equality between the space $\mathcal{D}_{\mu,p}$ and the usual Dirichlet type space $\mathcal{D}_p$ is given. We obtain a sufficient condition to construct different $\mathcal{D}_{\mu,p}$ spaces and we provide examples. We establish decomposition theorems for $\mathcal{D}_{\mu,p}$ spaces, and prove that the non-Hilbert space $\mathcal{Q}_p$ is equal to the intersection of Hilbert spaces $\mathcal{D}_{\mu,p}$. As an application of the relation between $\mathcal{Q}_p$ and $\mathcal{D}_{\mu,p}$ spaces, we also obtain that there exist different $\mathcal{D}_{\mu,p}$ spaces; this is a trick to prove the existence without constructing examples.