For a matrix $A \in \mathbb{R}^{n \times n}$ whose off-diagonal entries are nonpositive, there are several well-known properties that are equivalent to $A$ being an invertible $M$-matrix. One of them is the positive stability of $A$. A generalization of this characterization to partially ordered Banach spaces is considered in this article. Relationships with certain other equivalent conditions are derived. An important result on singular irreducible $M$-matrices is generalized using the concept of $M$-operators and irreducibility. Certain other invertibility conditions of $M$-operators are also investigated.

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