Studies have identified numerous factors that affect firm performance, including financial, operational, and sustainability factors.DEA overcomes the single metric problem and provides a holistic approach to measuring firm performance by considering multiple productivity measures, such as financial and operational metrics (Xie et al. Citation2019).For example, Hsieh, Lee, and Shen (Citation2023), Kasbar et al. (Citation2023), Din et al. (Citation2021), Rahi, Akter, and Johansson (Citation2021) and Siddiqui, YuSheng, and Tajeddini (Citation2023) investigated the relationships between corporate governance factors (e.g., ownership structure and the attributes of the board of directors) and firm performance.A rapidly emerging strand of the literature has suggested that ESG characteristics determine firm performance and has investigated the relationship between ESG activities and firm performance (for a review see Gillan, Koch, and Starks Citation2021; D. Z. Huang Citation2021).Lu et al. (Citation2023) investigated the impact of ESG ratings and the three individual ESG elements on the eco-efficiency and profitability efficiency of Apple Incorporated's value-chain counterparts.Fatemi, Glaum, and Kaiser (Citation2018), Alareeni and Hamdan (Citation2020) and Bruna et al. (Citation2022) reported that an increase in ESG or corporate social responsibility (CSR) performance enhanced firm performance.For instance, Alareeni and Hamdan (Citation2020) and Lu et al. (Citation2023) found that although ESG initiatives improved firm performance overall, the effects of individual ESG factors differed.Friede, Busch, and Bassen (Citation2015) reviewed approximately 2,000 papers and found that the majority of the reviewed articles reported that higher ESG performance led to better firm performance.Specifically, Alareeni and Hamdan (Citation2020) found that environmental disclosure and social disclosure were negatively associated with firms' financial and operational performance, but environmental disclosure was positively related to firms' market performance.However, other studies have documented a negative impact of ESG performance on firm performance (Lahouel et al. Citation2021; Rahi, Akter, and Johansson Citation2021).Alareeni and Hamdan (Citation2020) also found that individual governance disclosure was positively related to firms' market performance and negatively related to firms' financial performance.