Unlocking potential: investigating adoption barriers to metal additive printing using a mixed methodology approach

Abstract

Adopting metal additive printing (MAP) technology holds transformative potential for various industries, promising enhanced efficiency, customisation, cost-effectiveness, and more sustainable production. However, widespread adoption remains limited despite its advantages due to multiple barriers. Understanding these barriers from the perspectives of different stakeholders is crucial for nurturing innovation and technological advancement. This study employs a mixed-methods approach, combining qualitative interviews with key stakeholders—including manufacturers, suppliers, and end-users—with quantitative surveys to gather comprehensive data and further insight. The qualitative data was analysed thematically, while the quantitative data will be subjected to one-way ANOVA and Tukey HSD tests to identify prevalent trends and correlations. Preliminary findings suggest that the primary barriers to adoption include operational barriers, high initial costs, lack of standardised processes, and limited awareness and expertise among potential users. Additionally, regulatory challenges and concerns about the reliability and quality of MAP-printed parts were prevalent. These barriers vary significantly across different stakeholder groups, highlighting the need for tailored strategies to address their concerns. This research aims to shed light on the multifaceted barriers hindering the adoption of MAP technology. By identifying and understanding these barriers, the study seeks to inform policymakers, industry leaders, and technology developers about the necessary steps to facilitate broader adoption. Ultimately, this work could benefit the manufacturing sector by accelerating the integration of innovative technologies, leading to increased competitiveness and sustainability.