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BUSINESS SOLUTIONS FOR SUSTAINABLE CLOTHING MANAGEMENT IN LONG-TERM SPACE MISSIONS

Abstract

The challenge of managing clothing in space, where water resources are limited and the cost of transporting materials is prohibitively high, poses a significant obstacle for long-term space missions. This paper explores potential business-oriented solutions to address the issue from a cost-effective and sustainable perspective. With the cost of launching each kilogram into the International Space Station (ISS) ranging from $10,000 to 25,000$, the weight of clothing becomes a considerable economic concern. Several proposed solutions have been discussed, including the utilization of physical methods such as radiation, UV light, or vacuum for cleaning dirty clothes. Additionally, the concept of odor-resistant clothing, exemplified by Yoshiko Taya's Wakata's clothes, designed to be flame-resistant, anti-static, anti-bacterial, absorbent, insulating, quick-drying, and comfortable, offers a promising alternative. Another innovative approach involves the reuse of soiled clothing for nourishing plants and cultivating bacteria, providing a sustainable cycle. This paper evaluates the feasibility and economic implications of these solutions, highlighting the role of Sigma Fit's innovative products in supporting and enhancing sustainable long-term space missions, and aims to guide businesses and space agencies in adopting strategies that optimize clothing management for prolonged space missions.