Developing pandemic prevention and control by ANP-QFD approach: a case study on urban furniture design in China communities

ABSTRACT

Background: An infectious disease can affect human beings at an alarming speed in modern society, where Coronavirus Disease 2019 (COVID-19) has led to a worldwide pandemic, posing grave threats to public security and the social economies. However, as one of the closest attachments of urban dwellers, urban furniture hardly contributes to pandemic prevention and control. Methods: Given this critical challenge, this article aims to propose a feasible solution to coping with pandemic situations through urban furniture design, using an integrated method of Quality Function Deployment (QFD) and Analytic Network Process (ANP). Eight communities in China are selected as the research sites, since people working and living in these places have successful experience preventing and containing pandemics. Results: Three user requirements (URs), namely, usability and easy access, sanitation, and health and emotional pleasure, are determined. Meanwhile, seven design requirements (DRs) are identified, including contact reduction, effective disinfection, good appearance, social and cultural symbols, ergonomics, smart system and technology and sustainability. The overall priorities of URs and DRs and their inner dependencies are subsequently determined through the ANP-QFD method, comprising the House of Quality (HQQ). According to the theoretical results, we propose five design strategies for pandemic prevention and control. Conclusion: It is demonstrated that the incorporated method of ANP-QFD has applicability and effectiveness in the conceptual product design process. This article can also provide a new perspective for pandemic prevention and control in densely populated communities in terms of product design and development.

Keyword: Urban furniture design; Public health; Pandemic prevention and control; Analytic Network Process (ANP); Quality Function Deployment (QFD)