



Anthropometry of the Singaporean and Indonesian populations

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ABSTRACT

This research collected anthropometric data of the Singaporean and Indonesian populations. The data were mainly from university students. In total, 245 male and 132 female subjects from Indonesia and 206 male and 109 female subjects from Singapore were measured. The Singapore data were divided into three sub-groups, comprising Singapore overall, Singapore citizens, and the Chinese ethnic sub-group. The Indonesians data were divided into two sub-groups, comprising Indonesia citizens and Indonesia Chinese. This study used 36 measurement dimensions. The authors made a comparison with previous anthropometric data collected in 1990 of over a thousand Singaporeans.

The main contributions of this study are: i) an updated anthropometric database of Singaporeans and Indonesians, ii) a comparison of the two samples obtained, and iii) a projection of dimensional changes over time from comparing past to more recent anthropometric data. Statistical analyses show that Singaporeans (both male and female) tend to have larger dimensions than Indonesians in general. In addition, the data reveal the current sample to be significantly larger on more than 50 percent of the dimensions measured, for both males and females.

In providing instances of possible application, the Body Mass Index (BMI) of all sub-groups was calculated. The results show both samples to have normal indexes with BMIs in the range of 18.5–25.0. This paper presents also an empirical estimation of unknown anthropometric characteristics using the Ratio Scaling Method. The purpose is to estimate uncollected anthropometric data based on a given scaling dimension. Overall, the reported anthropometric data and analyses can be used as relevant consideration in product and systems design.

Relevance to industry: The findings of this study indicate differences between Singaporean and Indonesian anthropometry in the citizen and Chinese sub-groups. The utilization of an updated anthropometric database that incorporates geographical origin and ethnic group is useful. Product designers would be able to cater to a wider range of target users.

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1. Introduction

Products can be deemed successful only when people are able to use them well. This is in accordance with the fundamental principle of ergonomics which is to fit the task to the human (Kroemer and Grandjean, 1997). In doing so, a high level of safety and worker efficiency can be achieved. This means of user-centered design involves the product, the user, and the task. However, variation in body dimension among people, between the sexes, and among different races, can make product design problematic. While it is impossible to design systems to suit all body types and sizes, it is prudent to deal at least with the important dimensions. Thus, anthropometry should be taken into account. Anthropometric data

are useful in achieving effective design for high performance and productivity (Klamklay et al., 2008). Nowadays, the collection of anthropometric had been conducted through a sophisticated technology (i.e. three-dimensional measurement) which even proposing an error detection procedure (Park et al., 2009). A lack of anthropometric consideration in equipment design may lead to work-related injuries such as musculoskeletal disorder.

There exists anthropometry data of several Asia Pacific populations. Examples include the hand anthropometry of Jordanian (Mandahawi et al., 2008), static anthropometry of Tehran University students (Mououdi, 1997), anthropometry of the elderly in Australia (Kothiyal and Tettey, 2000), anthropometry of Taiwanese women (Huang and You, 1994), anthropometry of Portuguese workers (Barroso et al., 2005), anthropometry of Turkish woman (Gonen et al., 1991), anthropometry of the Turkish population (İşeri and Arslan, 2009), anthropometry of the Thai population (Klamklay et al., 2008), anthropometry of

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