

## **Impact of mobile application data usage on energy consumption**

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Energy crisis has become a buzzword at present due to the fact that people are experiencing the first global energy crisis. On the other hand, “Affordable and Clean Energy” is one of the key sustainable development goals (SDG) proposed by the United Nation to achieve by 2030. SDG can be achieved through different approaches. As modern society is moving forward with a digital world through novel technologies, one promising way of achieving SDG is Sustainable Human-Computer Interaction (SHCI). Mobile devices are the most used digital device category by every human regardless of any demographic factor. Therefore, in the modern world, a significant amount of energy is consumed by mobile devices because people tend to establish and maintain their daily routines through mobile applications. In this research, first we systematically reviewed twenty-four (24) research papers to investigate and to analyze the mobile application usage patterns and statistics. At the initial stage, research articles were collected through mainly five (05) databases: Google Scholar, IEEE Xplore, Scopus, ACM Digital Library, and ResearchGate. Previous research studies have identified the most demanding mobile application categories by the time that research was conducted. However, the validity of those findings for today is questionable due to the rapid advancements of mobile technology over the past few years. Thus, grey literature such as statistical reports was referred to study up-to-date information as this is a rapidly updating research area. Games, Health and wellness, Grocery, Education, and E-Learning apps are found to be the most demanding mobile application categories in the world today. Moreover, data demand has been considered a proxy for energy consumption. Data demand depends on various factors such as the size of the mobile app, service provided by the app, user behavior, etc. Among them, the patterns of smartphone users are a key factor that causes the changes in the data demand. However, recent findings have shown that the behavior of smartphone usage is driven by the service and the information required for the user, not by the technology. This is a vital motivation to introduce lightweight mobile apps to address the sustainable energy issue by reducing the data demand of mobile applications that are used in daily practices. It is a common fact that mobile apps are designed for the broadest audience, and expect they work well with all users. This may indirectly consume more data and energy. For example, a heavy mobile app may have a diverse range of functionalities, but one may never use at least half of them. These applications can be redesigned in a better way to save energy and to use effectively for specific user groups.

**Keywords:** Interaction design, Mobile applications, Data demand, Mobile application designs, Sustainable human computer interaction

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