

A sustainability perspective to reduce paper consumption- Mobile phone markets

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Abstract: Any electronic gadget is sold with a copy of an operating manual. The manual is usually a hard copy and thus consumes a lot of energy in its manufacturing. Thus, indirectly these gadgets are adding to the carbon emissions into atmosphere. The paper presents an alternative to 'operating manual' paper consumption in the form of embedded memory. The paper proposes a solution to reduce paper consumption in electronics industry.

Keywords: paper, work memory, water consumption.

Introduction: Any business improvement is the outcome of a need in the society. Across Industries, profitability has motivated companies to adopt e-business solutions [1]. The availability of internet and wireless communication technology has habituated users "anytime anywhere" access to information for their work and personal communication [1].

The prime cause of sustainability is carbon capture. The paper industry is the fourth largest consumer of energy and thus releases a lot of carbon into the atmosphere [2]. Thus, this industry needs to be addressed by sustainability –reuse, reduce, recycle and re-manufacture [3].

Literature Survey: The global average paper consumption is 55 kg per person per year [2].The paper making industry results in an annual loss of 3.3 million hectares of forest land [2].The paper manufacturing sector consumes of four percent of all the world's energy use[2].The worldwide carbon equivalent of paper industry is 591,966,483kg CO₂ eq [4].The increasing presence of embedded systems is felt in the smart phone society and internet of things(IoT), as an essential element to enable smarter and intelligent systems[5].Embedded SRAM and embedded flash memory are dominant players intended for work memory in a mobile phone[5]. SRAM, DRAM, NAND-flash is the memory hierarchy of mobile phones[5]. An Android phone uses NAND flash memory devices to store data[6].

Methodology:

Hypothesis 1: electronic manuals in mobile phones replace paper manuals to reduce paper consumption

Hypothesis 2: electronic phone manual reduces ten liters of water consumption per mobile phone manual

The electronics market segment consumes paper for packaging and also print manuals for ease of operation. The paper concentrates on printed operation manual of a mobile phone being replaced by a soft copy. The viable solution is an electronic operating manual stored in the non-volatile memory. A non-volatile memory stores information for >10 years while the power supply is turned off [5]. The manual of the mobile phone could be incorporated in the library of an Android mobile phone. The android operating system could access the operating manual, stored in the phone library, once a simcard is inserted. Also, an option to skip the manual could be given. These smart phones could have videos as a part of the operating manual. But in basic handsets where there is a smaller LCD screen, the manual could be put only in the

form of a text to read through. Thus, large diagrams and videos are out of scope in such phones. However, such phones could embed customized audio of the operating manual, thus posing a problem of language. The eighth schedule of Indian Constitution recognizes twenty two official languages in India[9]. However, the audio would have a choice of English and Hindi since both of these languages are widely spoken and understood worldwide.

Parameter	Value
Mobile phones in India [7]	108 crore
Paper manuals along with the mobiles	108 crore
Manual dimensions	7.5 * 10.5 mm (28 pages) = one A4 sheet
A4 size dimensions [8]	210*297 mm
Paper waiting to be recycled	108 crore A4 sheets
Water consumption in a A4 size paper manufacture[2]	10 liters

Table 1: different variables in mobile market

Conclusion: The memory in electronic form is being cheaper by the day. And the environmental concerns in manufacturing industry are growing day-by-day, thus demanding a cleaner production. The paper states that 108 crore mobile phone users in India are blocking 108 crore A4 sheets to be recycled or reused. The paper suggests a solution to nullify the amount of paper usage and to adopt electronic means of communication. The operating manual put in the mobile phone nullifies the need to use paper thus rescuing ten liters of water per mobile phone manual. Thus, the paper also emphasizes the need to find new ways of communication and manufacturing practices. Also, the electronic manual stands an add-on attribute in mobile phone market segment. It leads to greater customer satisfaction from increased utilization of the electronic gadget. It could be replicated in any electronic product.

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