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E-waste **IN INDIA**

Management, Challenges & Opportunities

Volume II

Editor

Dr. Suresh Kumar



Electronic waste i.e., E-waste, refers to the electronic products that are not in use, are unneeded, or are nearing the end of their useful lives, is one of the rapidly growing waste streams across the globe at present. E-waste produced annually is worth over \$62.5 billion more than the GDP of most countries. According to the UN's Global E-waste Monitor 2020, the annual global production of E-waste is approximately 53.6 million metric tons (Mt) in 2019 which will exceed 74 Mt till 2030. While at present only 9.3 Mt (17.4%) of the total generated E-waste was collected and recycled globally. It means that many precious metals (gold, platinum, silver, copper, etc.) and other high-value recoverable critical materials (cobalt, palladium, indium, germanium, etc.) are worth the US \$57 billion, are dumped or burned in the E-waste every year. According to the report, Asia generated the greatest volume of E-waste in 2019 — some 24.9 Mt, followed by the Americas (13.1 Mt) and Europe (12 Mt), while Africa and Oceania generated 2.9 Mt and 0.7 Mt respectively. Besides in India, the rapidly growing population and increased disposal of electrical and electronic products have instigated serious concerns to the environment and human health. India generated 3rd highest volume of E-waste (3.2 Mt) in 2019, behind China (10.1 Mt) & the USA (6.9 Mt). However, India's per capita (2.4 kg) E-waste generation is 1/3rd the global average (7.3 kg per capita) while it is 3-times the global average in the USA. Moreover, India a country with low recycling capacity (8 lakh tonnes annually) is an indication of big loss in terms of its inability to mine precious and critical materials from the E-waste. In addition, non-collected E-waste is also serious health and environmental hazard as it contains several toxic substances. With the purpose of discretely collecting, effectually treating, and efficiently dispose-of the E-waste, and diverting it from conventional landfills and open burning, it is requisite to integrate the informal sector with the formal sector. Hence, proper E-waste management is a great challenge to all developing countries including India. It is becoming gigantic public health & environmental issue and is exponentially increasing by the day. India like other countries has framed rules and regulations, policies, and guidelines to manage the E-waste for the producers, consumers, and recyclers.

This book (Volume-II) is an anthology of scholarly articles that depicts numerous issues, challenges, prospects, and opportunities related to E-waste management and practices within India. Volume-I of "E-waste in India: Management, Challenges and Opportunities" is already published in 2021, with ISBN 978-93-91314-55-2, which is based on different sub-themes like current affairs of E-waste in India and its future strategies, E-waste: modern-day scenario and its management, environmentally affable and economical bioleaching method for metal recovery from E-waste, an overview of E-waste status in Indian scenario, issues and opportunities associated with E-waste in India, toxicity and health hazards of E-waste, impact of spent lithium-ion batteries recycling on economy and environment, clean fuel production by the recycling of E-waste plastic, E-waste legislation and legal services in India, policies and best practices for E-waste management in India, current scenario of E-waste in India: problems and solution, E-waste: a challenge for digital India, government initiatives for E-waste management in India, issues, implications, and opportunities of E-waste in India. Volume II is providing an overview of E-waste management, issues, challenges, regulations, opportunities, initiatives, etc., in the current scenario including Indian perspectives. It explores the trends & strategies in the research & practices to mitigate the environmental problems via effective recycling tactics and the emerging potential of the circular economy. It highlights many major topics associated with E-waste such as environmental treatment, toxicity & health hazards, management, challenges and opportunities, extended producer responsibility, legislations, current best practices, advanced recycling processes, and other associated issues. This book contains valuable contributions in the form of book chapters authored by renowned and emerging researchers across the country.



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Environmental and Health Issues Related to E-waste Management in India

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Abstract

It is estimated that two-thirds of the world's population is still offline. Therefore, there is a need to provide affordable access to the internet for all. In an approach to bridge this digital divide, it is necessary to get affordable, equitable, and quality access to information and communication technology (ICT). At the same time, there is tremendous growth in the use of ICT-based devices and services. This faster change in technology and frequent innovations in the ICT sector has left the world with a threat of deterioration in environmental conditions and human health. This waste of electronic and electrical equipment, which contains hazardous components, is still handled in an environmentally unfriendly manner mainly in developing countries. This waste is informally known as E-waste. These wastes are electronic products that are near the end of their useful life. E-waste products contain materials that are hazardous to human beings, depending on their condition and density. The hazardous content of these materials poses a threat to human health as well as to the environment. This is a huge challenge for the countries to handle E-waste responsibly and protect the environment. To address this issue of E-waste management in a sustainable method, the concept of extended producer responsibility (EPR) will be useful. In India electronic waste is produced in a huge quantity due to the modernisation of lifestyle. Fridge, cell phones, discarded computers, laptops, tabs, mobiles, microwaves, air conditioners, batteries, etc., if they are not disposed of properly, they can leach, lead, and other substances to soil and underground water. In addition to the technical, social, and organisational aspects of the E-waste management system, it is crucial to consider the economic aspects, if the systems have to be made financially viable and sustainable along with being socially acceptable. In



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Editors

Dr. Med Ram Verma

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A COMPARATIVE STUDY OF 1G TO 5G GENERATIONS IN THE WIRELESS MOBILE TECHNOLOGY: A REVIEW

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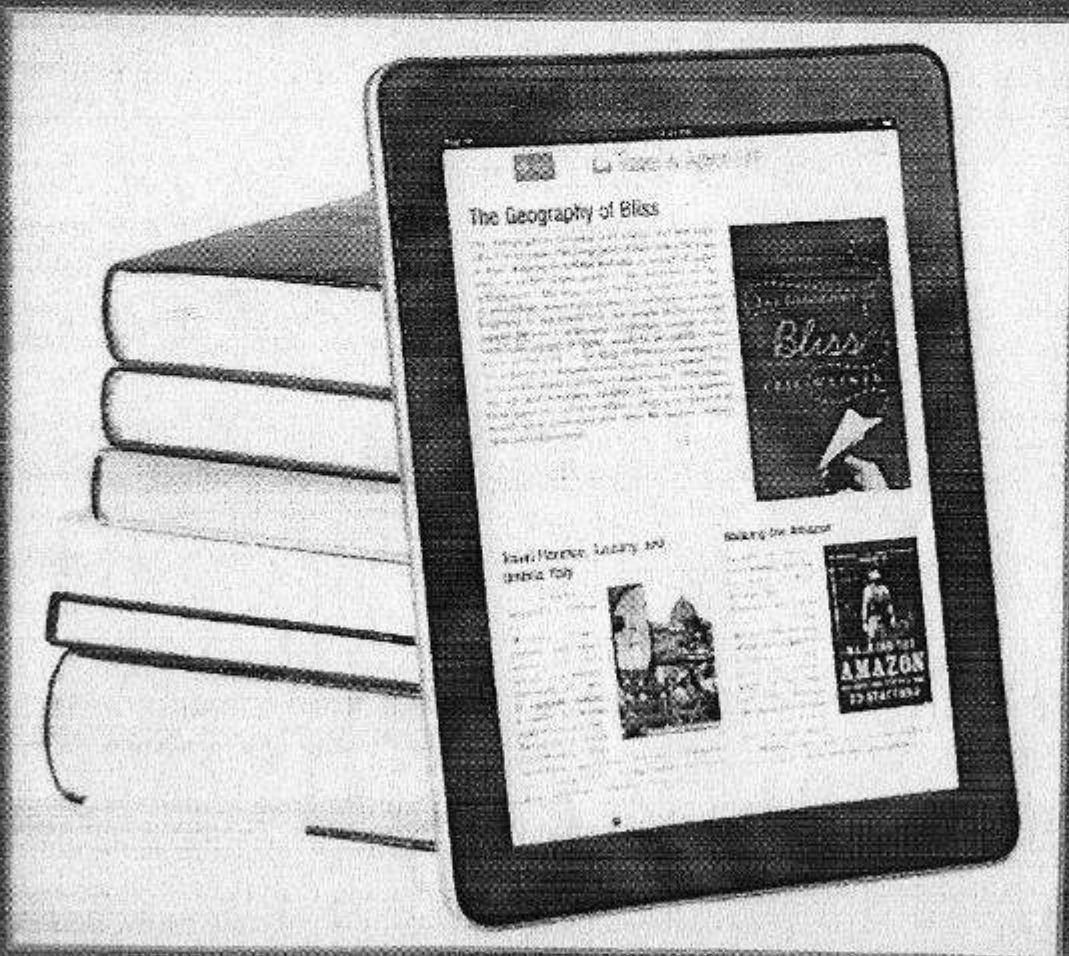
Abstract:

The wireless communication is one of the most active thrust areas of technology development of this modern era. This development starts primarily from the transformation of voice telephony into other supporting services such as the transmission of video, images, text and data. The wireless mobile communication system revolutionized the way people communicate, connecting together by communications and mobility. This communication is the most thrust areas with advanced techniques. This area is developing very fast and deals with all the fields of mobile and wireless communications. Evolution of wireless access technologies is about to reach its fifth generation. Looking past wireless communication access technologies have followed different evolutionary paths aim is to provide excellent performance and efficiency in high mobile environment. The first generation was refereed as cellular and which was later abbreviated to cell. The cell phone signals were analog in nature. The first generation device was comparatively less heavy and expensive. It has fulfilled the basic mobile voice. The second-generation mobile phones used Global System for Mobile communications (GSM) technology. The GSM uses digital modulation and it improves voice quality with limited data service. The second generation has introduced the capacity and coverage. The third generation allowed mobile telephone customers to use voice, graphics and video applications. This has quest for data at higher speeds to open the gates for truly mobile broadband experience. The fourth generation is for cell phones or handheld devices, which provides the access to wide range of telecommunication advanced mobile services supported by mobile and fixed networks. It is packet-based service along with a support for low to high mobility applications in accordance with service demands in multiuser environment. The fifth generation wireless development is based upon 4G, which at present is struggling to meet its performance goals. The most important advantage of 5G network is providing myriads of services to end users. The importance of this



RESEARCH TRENDS IN LIBRARY AND INFORMATION SCIENCE

A STUDY OF RASTRASANT TUKDOJI
MAHARAJ NAGPUR UNIVERSITY



Dr. Digambar Khobragade



**Research Trends in Library and Information Science: A Study of
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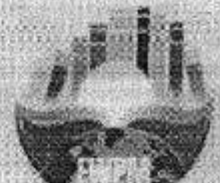
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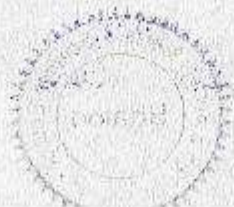
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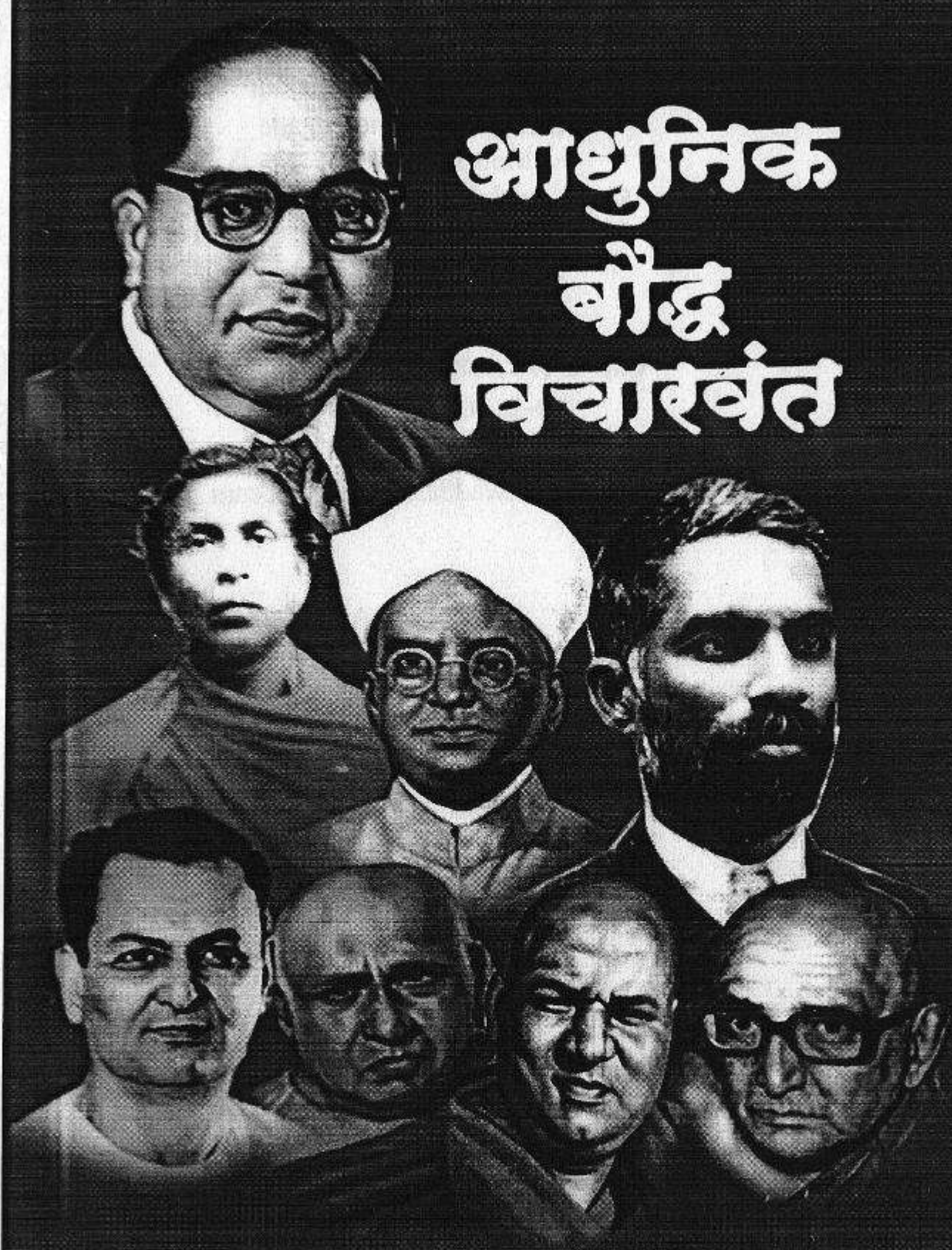


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डॉ. दिगंबर खोब्रागडे

विवेकनिष्ठ विचारधारा बहुजन समाजाच्या विचारास सर्वस्पर्शी परिवर्तनाचे बळ प्राप्त करून देते. विचारवंतांच्या प्रबोधनकारी विचारविश्वावर जगणारी समीक्षा ही समाज, साहित्य व संस्कृती यांचे पुनर्मूल्यांकन तर करतेच; त्याचबरोबर आदर्श तत्त्वसरणीचे नवनिर्माणही करित असते. बौद्ध धम्मावर आणि वाङ्मयावर भारतातील रूढीवादी सामाजिक व्यवस्थेकडून कायमचा पडदा झाकण्याचा प्रयत्न झाला. परंतु नैसर्गिक तत्त्वज्ञानावर जिवंत राहणारा विचार कायमचा झाकला जाणे शक्य नव्हते. म्हणूनच गेल्या शतकात बौद्ध धम्माच्या पुनरुत्थानाचे वाङ्मयीन संशोधन होऊन जगातील अनेक भाषांत त्याचा विस्तार करण्यात आला.

वाङ्मयाशिवाय कुठलीही चळवळ टिकाव धरू शकत नाही. म्हणूनच बुद्धाच्या विचाराने प्रभावित झालेल्या युरोपियन विचारवंतांनी आपले जीवन समर्पित करून वाङ्मय निर्मिती केली. याचे पडसाद आशियात फार मोठ्या प्रमाणात उमटले आणि बौद्ध धम्माचे चांगले पीक येऊ लागले व पाली भाषेच्या विचाराची फळे लोकांना चाखावयास मिळाली. भारताला विवेकवादी बौद्ध विचारवंतांची फार मोठी परंपरा आहे. त्यांनी बौद्ध विचारांची अखंडपणे समर्पित सेवा केली. यामुळे जगाच्या इतिहासामध्ये आधुनिक बौद्ध विद्वानांची चिरंतन नोंद राहिल. कारण त्यांनी बौद्ध वाङ्मय निर्मितीलाच जीवनाचे मूल्य समजले. यातील काही विचारवंतांच्या जीवनावर मराठी भाषेत वाङ्मय उपलब्ध आहे, परंतु काहींच्या जीवनावर नाही. त्यासाठी 'आधुनिक बौद्ध विचारवंत' म्हणजे बौद्धांसाठीच नव्हे तर संपूर्ण मराठी वाचकांसाठी उपयुक्त आहे.

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विसाव्या शतकाच्या दुसऱ्या दशकात भारताच्या स्वातंत्र्य चळवळीत रसायना वैचारिक प्रवाहाला सुरुवात झाली. महात्मा गांधींचा राष्ट्रीय राजकारणात उदय होऊन त्यांनी सत्य, अहिंसा, सत्याग्रह व असहकार ही नवी असे भारतीय स्वातंत्र्य चळवळीला दिली. १९२० साली गांधीजींनी असहकार चळवळ सुरू करून एका नव्या पर्वाला सुरुवात केली.

महात्मा गांधींना सत्य व अहिंसेवर आधारित असहकार चळवळ सुरू करण्याचा निर्णय घेतला. असहकार म्हणजे सहकार्य न करणे. महात्मा गांधींनी म्हणूनही, जगात अशी कोणतीही शक्ती नाही की; ती जन्मतेच्या सहकार्याशिवाय राज्य करू शकेल. ब्रिटिशांशी आपण प्रत्येक ठिकाणी सहकार्य न करता येते. तर ब्रिटिशांना भारतात राज्य करणे अशक्य होईल. याप्रसंगी महात्मा गांधींनी एक महत्त्व नवी घोषणा केली. भारतीय जनतेने जर ब्रिटिशांशी पूर्णपणे असहकार पुकारला, तर आपण भारताला एका वर्षात स्वातंत्र्य मिळवून देऊ. एखादा आत्मविश्वास त्यांना आपल्या चळवळीबद्दल होता. ब्रिटिशांच्या अन्याय अत्याचारांपासून सुटका करून घेण्यासाठी, त्यांच्या गुलामगिरीतून मुक्त होण्यासाठी असहकार चळवळ ही अतिशय महत्त्वाची चळवळ होती.

असहकार चळवळीवर चर्चा करण्यासाठी, ४ सप्टेंबर १९२० रोजी कलकत्ता येथे त्याला लजपतराय यांच्या अध्यक्षतेखाली राष्ट्रीय काँग्रेसचे खास अधिवेशन भरविण्यात आले. महात्मा गांधींच्या असहकार चळवळीस टिळकांटाचा विरोध होता. त्यांनी हा उपाय पास होऊ नये यासाठी बराच खटाटोप केला. महात्मा गांधींचा आपल्या धोरणावर विश्वास असल्याने शेवटी त्यांचा उपाय बहुमताने पास झाला व भारतात एका नवीन पर्वाला सुरुवात झाली.

कलकत्ता येथे झालेल्या खास अधिवेशनात काँग्रेसने ब्रिटिशांविरुद्ध असहकार आंदोलन सुरू करण्यास महात्मा गांधींना मान्यता मिळाली. असे असते, तरी या उपायास काँग्रेसच्या वार्षिक अधिवेशनात मान्यता मिळणे आवश्यक होते. त्याप्रमाणे नागपूर येथे २६ व २७ डिसेंबर १९२० या दिवशी काँग्रेसच्या अधिवेशनात महात्मा गांधींच्या असहकार चळवळीचा उपाय बहुमताने पास करण्यात आला.

३७६ | जगात गलिकेंशनस

महात्मा गांधींना पाठिंब्या जाहीर करून पूर्व खानदेश जिल्हा काँग्रेस अध्यक्ष नासुदेव विठ्ठल दास्ताने यांनी ५ फेब्रुवारी १९२१ पासून मुसावळ कोर्टात सुरू झालेली आपली वकिली बंद केली. त्यावेळी हिंदुस्थानात असलेल्या सुमारे ३०००० वकिलांपैकी ३०० वकिलांनीही वकिली सोडली नाही. तर पूर्वखानदेशातील १०० वकिलांमध्ये केवळ नासुदेव दास्ताने यांनीच वकिली सोडलेली दिसून येते. यांनी वकिली सोडली ती कायमची. पुन्हा त्याचालायात वकिल म्हणून त्यांनी पाऊल ठेवले नाही.

त्याच सुमारास मुसावळ येथे महात्मा गांधींची सभा झाली. संपला प्रचंड गर्दी जमली होती. नासुदेव दास्ताने यांनी वकिली सोडली असली तरी वकिली पंपाळाच्या शाटात ते महात्मा गांधींनी जवळ बसले होते. महात्मा गांधींनी आपल्या मापणात, आपण या निर्णयावर का व कसे आलो याबद्दल चर्चा केली एवढेच नव्हे तर व्यासपीठावर बसलेल्या नासुदेव दास्ताने यांच्या डोक्यावरिल पांढी आपल्या हाताने उतरवून टेबलावर ठेवून त्यांना उदरगत म्हणाले. 'अग्नी यह डिलमेली पांढी नहीं चलेगी, तेका नासुदेव दास्ताने यांनी क्षणाचाही विलंब न करता घोषणा केली की, महात्माजींनी दिलेली असहकाराची दीक्षा मला शिरोधार्य आहे व आपल्या वकिलीच्या त्यागाचा त्यांनी पुढाऱ्या केला. त्यावेळी त्यांची मासिक मिळकत १२०० ते १५०० रुपये होती. मात्र त्यांचा त्यांनी विचार केला नाही. त्यानंतर नासुदेव दास्ताने यांनी आयुष्यभर साधा सदस त्यांवर उपस्थानची स्वच्छ घडी, घोंतार व टोपी असा वैदराव धारण केला.'

मुसावळ येथे सर्व व्यापार्यांनी परदेशी साखरेवर बहिष्कार घातला होता. 'बाह्यरातील सर्व साखर मुद्दल भावात खरोटी करून ती विक्रीकरिता मुंबई वगैरे ठिकाणी पाठविण्यात आली. साखरेवरील बहिष्कारात मुसावळ येथील मुसलमानांनी कच्ची व्यापारीही सामील झाले होते.'

सा.प्र.बोधचंद्रिकेच्या ३ ऑक्टोबर १९२१ च्या धृतासुरास, एदलाबादच्या सर्व ब्राम्हणांनी मीस साखर व चहा वापरणार नाहीत अशा शपथा घेतल्या. इतर ठिकाणाच्या ब्राम्हणांपेक्षा एदलाबाद (मुळानगर)चे ब्राम्हण बरेच समजदार आहे. याचे अनुकरण सर्व ब्राम्हणांनी करावे अशा आशयाचे वृत्त आलेले दिसते.

मुसावळ येथे प्रत्येक चळवळीला लोकांचा उत्सर्जन पाठिंब्या मिळत असे. विलासती साखर तेंपे खपत नसे. कारण तेथील व्यापारी विलासती साखर मागावतच नसत. तेथील व्यापारी कामजी शेट हे याबाबतीत लक्ष ठेवून असत.

नोव्हेंबर महिन्याच्या दुसऱ्या आठवड्यात पूर्व खानदेशात बहुतेक ठिकाणी सरताळ पाळण्यात आला होता. त्यात प्रामुख्याने जळगाव, मुसावळ, चोपडा

खानदेश वैभव : काल, आज आणि उद्या । ३७७

