Historical Development of Low-Cost Flush Toilets in India: Gandhi, Gandhians, and "Liberation of Scavengers"

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Abstract

This article elucidates the historical process of the development of low-cost flush toilets in contemporary India, as a part of the project for the "liberation of manual scavengers." This article focuses on the specific social movements led by M. K. Gandhi and his followers or co-workers, called Gandhians, from both socio-cultural and technological aspects. Gandhi attempted to focus on the dignified notion of scavenging work. He exhorted to improve the working environments in which scavengers had engaged to eradicate the untouchability. The Gandhians intended to change the structure of toilets in which one would be totally separated from their own waste. Gandians finally introduced twin-pit pour-flush toilets into households. This process brought modern sanitation discourse and knowledge spread to the public about the cause of discrimination against "scavengers" coming from their insanitary working condition, rather than from ritual pollution. In the end, the development process of the low-cost flush toilets by Gandhians, as the project for the "liberation of scavengers," paradoxically embodied Gandhi's original claim of untouchability as a "rule of sanitation" into a practical level.

Keywords: Gandhi, Gandhian, Scavengers, Low-cost flush toilets, Sanitation

Introduction

This article aims to clarify the historical process of the development of low-cost flush toilets in contemporary India, as a part of the project for the "liberation of the Untouchables." This article focuses on the movements led by M. K. Gandhi and his followers or co-workers, hereafter referred to as Gandhians, from both socio-cultural and technological aspects. In India, various attempts, such as the reservation policy (affirmative action), vocational trainings, and other social reform movements were implemented to eliminate the social discrimination against Dalits (Untouchables); and to improve their standard of living over the past two centuries. The past decades have witnessed the rapid modernization and urbanization throughout India. This brought in the forefront the issue of India's lack of sanitation and much needed attention, particularly from policy makers, administrators, non-government organization (NGO) workers, and middle-class citizens. One of the most important attempts to cope with the lack of sanitation facilities occurred in the early 2010 decade. Initiated under the Modi-led government[1], the Clean India Mission (*Swachh Bharat Abhiyan* in Hindi) strived to develop low-cost flush toilets in households and to eradicate open public defecation as well as the use of dry latrines in rural and urban areas[2]. These attempts

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1) Narendra Modi is the 14th Prime Minister of India from 2014. He was formerly a Chief Minister of Gujarat, in Western India.
2) The coordination of *Swachh Bharat* Mission is divided into urban and rural units. The former was implemented by Ministry of Drinking Water and Sanitation. The latter was by the Ministry of Housing and Urban Affairs. The objectives of the urban campaign clearly paid special attention the "elimination of open defecation" and "eradication of manual scavenging" (Ministry of Housing and Urban Affairs 2017: 9). For the rural mission, aims are declared in a broader way, such as to

were also to help the "liberation of manual scavengers" who were thought to have engaged in disposing human waste in local communities.

Regarding the project for the "liberation of manual scavengers," previous studies mainly focused on social movements led by people belonging to the upper and general caste, especially Gandhi and Gandhians. Some studies carefully examined and discussed the projects achievements and limitations of the Gandhians' assumption that manual scavengers could be "liberated" through the installation of low-cost flush toilets as an alternative to the use of existing dry latrines (ex. Shinoda 2005; Chaplin 2011; Suzuki 2015). Others focused on attempts by governments, local municipalities and NGOs, and discussed the following two points: (1) how to effectively install the low-cost flush toilets developed by Gandhians and the government authorities at a national level to "liberate the scavengers," and (2) how to provide those "liberated scavengers" with vocational training as an alternative occupational path for improving their socio-economic quality of life.

Although more studies are being done to cope with how the scavengers and sweepers could be emancipated in both politico-economic and sociocultural levels, little explicit attention has been paid to how the low-cost flush toilets had historically been developed in a technological level. This article delves into the complicated correlation between the thinking and practice of Gandhi and Gandhians and the formation of the low-cost flush toilet technology in India. This article will describe the process of how an ideology on sanitation was ultimately embodied as a technology. It will also give special reference to Gandhi's thinking on sanitation and manual scavengers and the history of the flush toilet movement in contemporary India. By articulating the above points, I will elucidate the following two points. Firstly, I will clarify the twists and turns the process had gone through, until it finally developed and produced the low-cost flush toilet. Secondly, I will carefully examine the differences between Gandhi's original thinking and the devised flush toilet technologies by Gandhians.

In the first section, I will succinctly give a synopsis of some important background of the public health and sanitation policy under the British colonial rule. In the second section, I will first elaborate on Gandhi's thinking on sanitation and the "liberation of manual scavengers." In the third and fourth sections, I will clarify the historical process of the technological development of low-cost flush toilets and its installation into local communities, by Gandhians in particular, and argue how it differed from Gandhi's thinking itself.

1. Sanitation Policy in British India

Between the 19th and the 20th centuries, colonial bureaucrats and administrators in British India were aware of the importance of implementing effective sanitation policies. It included providing proper toilet facilities and sewer systems, especially in urban areas. Some studies suggest that a pivotal reason behind this was to protect British troops from infectious diseases such as cholera, typhoid, smallpox, and plague. After the first cholera epidemic in the Europe in 1831[3], the concept and technology of "public health" for the prevention of infectious diseases gradually spread throughout European society. Together with these movements, in Colonial India, "public health measures…were the measures of environmental sanitation…to protect the health of both soldiers and administratively important civilians" (Guha 1993: 390). In the 1880s, a relationship between cholera and lack of a clean water supply and sewer facilities was demonstrated (Headrick 1988: 156). It became essential

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"accelerate sanitation coverage" in terms of practices, facilities, technologies and awareness (Ministry of Drinking Water and Sanitation 2014: 2).

3) Europe and North America experienced a large outbreak of cholera in 1831-32, 1848-49, 1853-54, 1866, and 1873, which led them to the development of "scientific research and public health policy" (Headrick 1988: 155).

for the public to access fresh water and have appropriate sewer systems for both the removal and treatment of waste (Headrick 1988: 156). These ideas spread to the European settlements throughout the Empire as colonial officers scrambled to lower the mortality rate of European armies (Oldenburg 1984: 98-99). This is how the importance of sanitation for the prevention of infectious diseases was gradually recognized in the Colonies.

In regards to the policies on sewers and waste, particularly in Delhi, the center of the British colonial rule in India, Prashad (2001) described it as such that approximately 40 percent of the public expenditure was allocated to the military sector in 1881-82, and any development schemes needed, as long as a commercial viability could be expected to proceed (Prashad 2001: 115-116). Since sanitation schemes were mostly regarded as not commercially profitable, the colonial government "attempted to find other and cheaper ways to make the city sanitary" instead of providing proper technology (Prashad 2001: 115). At the same time, despite such budget constraints, sanitation engineers planned and promoted large-scale facilities that could not be covered by the budget (Prashad 2001: 155). It is also reported that, the colonial state identified differences between them and the natives (Prashad 2001: 125). During the latter half of the 19th century and the early 20th century, "the British officials and troops" were largely "housed in separate locations commonly called cantonments" (Ross 1910: 285). Moreover, the drainage scheme also had "a significant discrimination" as separate drains were provided for the areas of the European-dominated population and the area resided mostly by the natives[4] (Gupta 1998: 162).

In mid-19th century in colonial Bombay, there was a regulation that required "all privies should be situated in the rear of the houses" and "all solid fecal refuse" was to be "carried away in baskets by the sweepers or nightmen" (Conybeare 1855: 8, paras 37-38). In Calcutta, toilets "connected to sewers" were installed by the municipality "at mills and railway stations" as well as household toilets in some well-to-do families in the latter half of the 19th century (Headrick 1988: 158). In Old Delhi, as Prashad (2001) demonstrates, every morning sweepers cleaned the human waste of the residents from receptacles of pit latrines "near the drain" (Prashad 2001: 126). Colonial officials regarded the use of receptacles as "obnoxious" because it caused pollution, and they needed "the instant removal of filth" (Prashad 2001: 127). At that time, the flush toilet was still fairly new in the West, and colonial officers in India were doubtful whether the Indian could "properly" use this latest technology (Mann 2007: 25). Also, the colonial government claimed that the "gravitation water-supply" for flush toilets was very expensive (East India (Sanitary) 1911: 107). Besides, as Mann (2007) describes, there was an assumption by the colonial officers toward "the habit of Indians of using leaves for cleaning, which would congest the high pressure pipe system" (Mann 2007: 25).

With respect to sanitation work, colonial sanitation policy relied upon manual labor forces of sweepers and scavengers to maintain the hygiene of the cities, because of the scarcity of capital and water resources. In fact, sweepers had exercised opposition against the plan to introduce sewer systems and toilets by the colonial administration since the late 19th century[5]. This was based on their so-called "customary rights." Shinoda (2005) explains that customary rights "are hereditary rights but can also be bought and sold or transferred" (Shinoda 2005: 52)[6]. The *Report of the Scavengers' Living Conditions Enquiry Committee* (State of Bombay 1952) refers to the Government Resolution[7] of the Revenue Department dated 16th September 1938, to demonstrate the following. In

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4) This kind of facts is also referred to by Oldenburg who examined the historical process of the organization of Colonial Lucknow, North India (Oldenburg 1984: 99-116).
5) In Delhi, they had strikes in 1876 and 1886, protesting against their employment as municipal sweepers since they objected to the loss of their customary right, which made municipalities hesitate to forcibly employ them (Gupta 1998: 161-162).
6) For further details of their customary rights, see Shinoda (2005: 52-53).
7) No. 7420/33. As Shinoda writes in a footnote, the report did not mention the resolution in details any further (Shinoda 2005: 80).

villages, "the *vatandar*[8)] *Bhangis*[9)] appear to have divided the village or town into wards according to their shares and in each ward, the *Bhangis* had the customary right of cleansing streets etc. and taking the remuneration" (State of Bombay 1952: 31). The report further infers that after the bucket privies came into existence, those who had customary rights came to claim "their right to cleanse private latrines as well, which came to be constructed in their areas" (State of Bombay 1952: 31).

The colonial administration assumed that it was due to the sweepers' claim to their customary rights that further complicated addressing the lack of sanitation of local communities. And they suggested its abolition and employing the private sweepers as municipal sweepers. However, as mentioned above, the realization of adequate mechanization was hindered due to chronic deficit of their budget. Hence, local municipalities finally attempted to maintain sanitation, which included collecting human waste from dry latrines, cleaning the drains, and transporting the waste to the disposal sites, by manual systems of support from the sweepers and scavengers both in a public and a private sphere (Prashad 2001: 128, 136, 155). These policies on sewers and toilets, particularly in colonial Delhi, had officers trying to resolve the problem of technology and capital with the use of the manual labor forces of sweepers and scavengers (Prashad 2001: 155). The condition of the sweepers' working environment changed little because sweepers were regarded as "the cheapest method, though not the most sanitary" (East India (Sanitary) 1911: 107).

This is a brief description of the history on sanitation policy in British India. Colonial administration relied on sweeper labor force to maintain cities' sanitation, rather than installing modern technological facilities such as sewer systems. The administration also intended to take control over sweepers who had worked based on their customary rights, by incorporating them into the municipal employment system with "the fixed wage" (Prashad 2000: 7). Particularly, from the 20th century, along with the Indian Independence Movement, the issue on sanitation and sweepers became notably articulated with the social reform struggle, especially in Hindu society. The people who are generally believed to have been the most prominent activists in this struggle, were not only Dalits including the sweepers themselves but M. K. Gandhi and his co-workers or followers. It is important to provide a greater focus on the historical process of the reform movement led by the sweepers themselves, to really understand the complicated issues of sanitation and sweepers (ex. Shyamlal 1999).

However, in this article I will focus only on Gandhi and Gandhians, since their thinking and practices contributed in the development of low-cost flush toilets, as well as the modern notion of "cleanliness" in the present-day India. As was with the colonial municipality, Gandhi and Gandhians did not necessarily facilitate the introduction of modern, mechanized, and sanitary engineering-based technology. What they differed on with the colonial administration, was that they explored solutions that would achieve both the improvement of unsanitary conditions of local communities and alleviate the social discrimination against sweepers and scavengers. In the following section, I clarify in detail how Gandhi dealt with the problem of sanitation both in India and Indian communities in the British Empire, and the social discrimination against the scavengers who were thought to have engaged in the manual cleaning of human waste.

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8) *Vatandar* is referred to as those who held "*vatan*." *Vatan* "was like a 'share' in which the hereditary occupation is accompanied with a share/portion according the former" (Kotani 2010: 107). For further details of *vatan* and the *vatandar* system as one of "the labor division systems within and between villages during the medieval and modern periods" (Shinoda 2005: 53), see Kotani (2010).

9) *Bhangi* is referred to as one of Dalit communities, who "are also known as *Bhangia*, *Mehter*, *Mehator*, *Halalkhor* and *Halal-kheo*" (Singh 1995 (1993): 235). They are thought to have been "traditionally associated with scavenging, sweeping, basket-making, etc." (Singh 1995: 235). Today, since the term *Bhangi* is thought to imply certain kind of discriminatory sense, it tends to be eschewed especially in public spaces.

2. Gandhi and Sanitation

This section focuses on Gandhi's thinking on and his engagement in sanitation and the "liberation of the scavengers." Several attempts have been made to critically examine the limitation of his exhortations on sanitation and his subsequent struggle for the eradication of untouchability, by discussing his recognition of untouchability as a matter of upper and general castes' minds (ex. Prashad 2000; Suzuki 2015; Sharma 2017). These arguments bring to light his lack of consideration of the structural inequality within Hindu society, where Dalits cannot realize their own liberation. Others mention that Gandhi's thinking as well as the Gandhians' and their practices had a crucial impact both on the development of sanitation and the liberation of Dalits, including sweepers in contemporary India (ex. Chaplin 2011). I will point out how and by what methods Gandhi envisaged both the "liberation of scavengers" and the improvement of sanitation.

Alter (1996) argues that whilst Gandhi's *satyagraha*[10] had a direct connection with "his personal experiments with…hygiene, and nature cure and his search for Truth," there is a general lack of research that investigates this matter (Alter 1996: 302). For Gandhi, sanitation was important in order to achieve *swaraj*[11]. Here he defines *swaraj* as "self-rule or self-control" (Gandhi 1910: 103). It had not only the aspect of political independence[12], but as Parel denotes, it "had to come in all its four forms — political, moral, spiritual, and economic" (Parel 2008: 55)[13]. Regarding untouchables, Gandhi "put the abolition of untouchability…as the prerequisite for India's true independence" (Zelliot 2001 (1992): 150). Based on these backgrounds, this section intends to develop an understanding of Gandhi's thinking on and practice of sanitation, as well as the "liberation of manual scavengers" as one of the essential elements in his struggle for *swaraj* during the first half of the 20th century.

During his stay in South Africa from the early 1890s, Gandhi faced severe racial discrimination by the Whites who regarded Indians' habits as "insanitary[14]." Gandhi admitted the importance of sanitation and hygiene itself that was upheld by the authorities. This is why he suggested every Indian "to live decently and in a sanitary condition[15] without requiring the supervision of the Sanitary Inspectors" (CWMG v.4: 423)[16]. What he condemned was the pervasive discourse by the Whites on Indians being "ignorant of the first principles of hygiene" (CWMG v.4: 175)[17].

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10) *Satyagraha* literally means "a holding of truth" but it is referred to as a series of Indian resistance movement led by Gandhi. He denotes it as "the Force which is born of Truth and Love or non-violence" and argues it is different from "a weapon of the weak" (passive resistance) or "a preparation for armed resistance" (Gandhi 1928: 173, 180).

11) Gandhi says that *swaraj* comes when people "learn to rule" themselves and it "has to be experienced by each one for himself" (Gandhi 1910: 59-60). He claims that the key for *swaraj* is *satyagraha*, and for that purpose it is necessary to promote domestic products movement so-called, *swadeshi* (Gandhi 1959: 89).

12) Here Gandhi explains that *swaraj* does not mean the "English rule without the Englishman," like one who wants "the tiger's nature, but not the tiger," which "would make India English" (Gandhi 1910: 21).

13) For Gandhi, the "political freedom" and the "spiritual freedom" are linked with each other since "the pursuit of the one assisted the pursuit of the other" (Parel 2017 (2006): 18).

14) This is briefly illustrated in his articles published at the beginning of the 20th century about the plague outbreak suffered by people living in South Africa. He refers to the report "on the alleged insanitary condition of the Indian Location in Johannesburg" which "has resulted in the deprivation of the just rights of…inhabitants within the area," and rebukes this provision on the ground that although two years have passed, "no epidemic had visited Johannesburg, nor have the inoffensive inhabitants of the so-called insanitary area proved a source of danger in any way whatsoever" (CWMG v.3: 555-557).

15) Take the case on disposal of human waste for instance. When an epidemic fever spread in Johannesburg, Gandhi admired the public notice by the Municipality that required people to cover feces "with dry dust, ashes or some disinfectant powder" after using a latrine (CWMG v.5: 84).

16) CWMG means *Collected Works of Mahatma Gandhi*. See Gandhi, M. K. (1958-1994).

17) He also criticized the reluctance of the Corporation that employed Indians "to perform the filthiest work" (CWMG v.4: 363), rather than paying close attention to their hygiene. He believed that all Indians, regardless of faith "Hindus or Mohammedans (Muslims), their faith…inculcates absolute principles of personal cleanliness and…domestic sanitation" (CWMG v.4: 360).

These experiences[18] of racial discrimination and accusation against Indians' habits as "insanitary" by the Whites led to his further engagement on the issues of sanitation, both in Indian communities in South Africa and in India (Prasad 2015: 53-56).

During his engagement in the Indian independence movement after travelling back to India from South Africa in 1915, Gandhi further associated the notion of sanitation with a high self-control from people, which he regarded as necessary for India's true independence, self-rule (*swaraj*). As Alter (1996) states, to engage in "food production, consumption, and elimination" by oneself were equally essential elements in "Gandhi's project" (Alter 1996: 315)[19]. Although he could not show "the connection between *swaraj* and scavenging" (CWMG v.64: 223), was "the greatest stress on the fact that it is work of this kind that qualifies one for *swaraj*" (CWMG v.61: 111).

This is why he argued that the work of scavenging should not be carried out by "one particular class" (CWMG v.76: 82), but that each and every citizen should be engaged to remove untouchability (CWMG v.60: 303). For the people currently engaging in scavenging, he appealed to them to abolish only "the practice of carrying the filth on the head," and attempted to improve their working conditions (CWMG v.54: 125). He advocated on how the scavenging work should be done by giving some examples: (1) never to "remove excreta in a basket or carry it on his head" (2) to "cover excreta with dry earth and remove it in a metal vessel" (3) to "clean the vessels with water and a rod" (4) to "bathe immediately after doing the work" (5) to "wear special clothes" (CWMG v.76: 82).

Gandhi attributed reason that scavengers actually contribute to the health of a whole society but are located in a low position was due to the following. (1) People including upper caste fear touching their "own dirt" and it marginalized scavengers from society (CWMG v.60: 302), and (2) the occupation of scavenging is "carried on in a dirty manner" (Pyarelal 1932: 254). His perception towards the discrimination against the untouchables shared similarity with the racial discrimination against South African Indians. He regarded that scavengers are discriminated against not because they are ritually impure due to their caste. He asserted that "it has a great deal to answer for the insanitation of our streets and our latrines, whether private or public," and "untouchability was a rule of sanitation" (CWMG v.53: 268). In other words, "an unclean person or thing is untouchable, but immediately his or its uncleanliness is shed, he or it is no longer untouchable" (CWMG v.53: 268). For Gandhi, this discrimination against scavengers based on untouchability, is substantial and visible, and "can only be temporary and is always easily curable" (CWMG v.52: 259).

Therefore, he insisted on the necessity to improve the insanitary working conditions of scavengers. He requested the immediate abolition of the "physical handling of dirt" (CWMG v.54: 125) which specifically meant carrying the basket of human waste on their head. He suggested to provide manual scavengers with a special dress or "simple working costume," "receptacles, brooms," "hand-carts" to carry waste, and "dry earth" as an "improvements in latrines" (CWMG v.54: 125, v.85: 401). It must be noted here that it does not necessarily mean that Gandhi intended to transform the whole structure of toilets itself. Rather, he considered it necessary to improve their working conditions by way of low-cost tools and workwear. This is because he treated the labor of scavenging with "dignity" (CWMG v.85: 240) and believed that everyone should engage in it to eradicate untouchability.

Along with this, he creates an ideal *bhangi* (in this context, it means scavengers), who has a knowledge on

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18) Here it has to be noted that not only in a political and social level, but also in a very personal level Gandhi was interested in the notion of cleanliness in his daily life. This can be learned from what he wrote about his father in his autobiography (Gandhi 1927: 76). It is also reported that Gandhi used to suffer from constipation and headache (K. Gandhi 2016: 239-40, 247) which led him to work on health and sanitation issues as well.

19) Gandhi explained this by referring to a term "bread labour," an idea originally came from a Russian philosopher Timofei Bondarev, which was then publicized by Leo Tolstoy (Gandhi 1935: 50-54). He said "the care of the latrine and of the kitchen are aspects of the same task. If either of them is imperfectly done, bodily health would suffer" (CWMG v.42: 103).

latrine cleaning, conversion of "night-soil and urine into manure," and the method of disinfection[20] (CWMG v.64: 87). Gandhi himself engaged in his scavenging work in his *ashram*[21]. As one interviewee at *Sewagram Ashram*[22], Maharashtra, said in 2017, Gandhi became involved with checking the waste of a person who was not feeling good. He checked the waste by mixing it with water and filtering it through a cloth. Then he observed the food particles that collected on the cloth. Along with establishing the ideal *bhangi*, Gandhi urged upper caste people to participate in his scavenging campaign and to be his or her "own scavenger" in order to remove insanitation from India (CWMG v.35: 96).

I would like to demonstrate his perception toward the toilet itself. In making a farm under the name of Tolstoy, Gandhi briefly describes the structure of his ideal toilet and how to dispose human waste. According to him, dig a pit about 1.5 feet deep and cover the excreta with soil got from the time of the dig is recommended (Gandhi 1928: 359-369). There is no bad smell from the pit, flies do not stagnate, and human waste can finally be utilized on the farm as fertilizer (Gandhi 1928: 359-369). The shallower the pit is, the better the sunlight reaches the excreta (CWMG v.42: 103). He also mentioned that by drilling two pits the second pit can be used until the composting is completed in the first pit (CWMG v. 42 103-104).

It was reported that Gandhi used a variety of methods for toilet disposal at his *ashram*. The first one is called a "movable toilet," which is installed on an open drain and used on sunny days (K. Gandhi 2016: 207). This latrine may be identical to the "trench latrine" that appears in the list of the toilets in the 19th century illustrated by Gandhian organizations such as *Safai Vidyalaya* and *Sulabh* (ex. Pathak 2006 (1991): 46). It has wheels and a movable superstructure. The second one is a bucket-type toilet installed inside house and is used on rainy days (K. Gandhi 2016: 207). Above the ground level, there is a tank made of bricks or stones with a thatched cover on the top (K. Gandhi 2016: 207). Human waste from the bucket was emptied into the tank, and as the rainy season ended, manure from the tank was removed in the fields (K. Gandhi 2016: 207). Another type is a commode toilet which might have Western origins. It is used by sitting "which could be cleaned [emptied] in a pit" (K. Gandhi 2016: 208). Gandhi is said to have cleaned the toilet 20-25 minutes every day (K. Gandhi 2016: 107). Because of his ideal on sanitation, he used to cover his waste with earth and buried it in a hole/pit (K. Gandhi 2016: 87). He also became involved in "carrying a bucket and a hoe" when taking a walk, and picked up trash and human waste on the roads "in order to produce manure" from them on his *ashram* (K. Gandhi 2016: 336).

What was regarded as a "proper" and "modern" flush toilet in India at that time under the British rule was a septic tank toilet introduced by the West. As mentioned earlier, the ideal toilet Gandhi asserted, creates the "turning of human evacuations to rich manure by superficial burial" (CWMG v.60: 325). And it "is the simplest and the most effective method, whereas the activated sludge plan and the septic tank are comparatively expensive things" (CWMG v.60: 325). He also acknowledged to some extent the necessity and suitability of the septic tank toilet. He used to have septic tank toilet donated to his *Sevagram Ashram* in 1941[23]. He had no objection to having it if it is possible to have a good one and if it has "been made carefully" or "use them properly" (CWMG v.84: 262). He said that from the tank the "valuable water, containing manure" comes (CWMG v.82: 87). However, as

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20) Moreover, Gandhi believed that his ideal *bhangi* "would know the quality of night-soil and urine": "he would keep a close watch on these and give a timely warning to the individual concerned" (CWMG v.64: 87).
21) *Ashram* is a secluded place where Hindu practitioner of austerities reside.
22) *Sevagram Ashram* was first established by Gandhi in April 1936, in Wardha, Maharashtra.
23) This toilet was given by Fred Williams, an American missionary who established the educational institution *Ushagram* in Calcutta. Williams regarded septic tank toilets as "the only practical solution to India's sanitation-related public health crisis" (Williams 2008: 236). He saw "Gandhi's showpiece rural village," where villagers were not properly using the bucket-type latrines the way Gandhi exhorted, otherwise they relied on "the filthy" toilet, open defecation, or were "hiring 'untouchables' to remove their waste" (Williams 2008: 237).

the interviewee at *Sevagram Ashram*, Maharashtra, told in 2017 that Gandhi did not prefer it that much in terms of its inevitable use of considerable amount of water. But it is said that finally he decided to use the septic tank toilet, along with other type of toilets like simple pit toilet.

In regard to the instalment of flush toilets and sewer systems, he was not against as long as it is assured an "ample supply of water[24]" and "be introduced without any hardship on the poor" (CWMG v.85: 239). He was doubtful to whether the introduction of these technologies would lead to the elimination of social discrimination against the untouchables or not. Removable of untouchability, for Gandhi, "has to go from our [in this case it probably indicates upper castes] hearts" (CWMG v.85: 240). And it cannot be removed unless people "realize the dignity of the labor of scavenging and latrine-cleaning" (CWMG v.85: 240).

Overall, Gandhi's thinking on and practice of sanitation and "liberation of scavengers" can be described as follows: (1) He believed that improving sanitation and personal hygiene would eventually lead people to the accomplishment of *swaraj* (self-rule). (2) He assumed that untouchability is associated not only with the heart of upper castes, but also with sanitation. So it can be eliminated from improving their working conditions into such as cleaning equipment and costumes, which he called the "scientific," rather than changing the whole structure of toilets from the dry latrine to the flush one (CWMG v.76: 80, v.64: 87). (3) In order to remove untouchability as well as to keep one's health perfect, he thought it necessary for everyone to first become his/her "own scavengers" because the scavenging work for him is an "obvious duty" and dignified labor (CWMG v.60: 302-303, v.85: 240). Therefore, he just promoted simple toilets such as the shallow pit toilet, and did not much intend to devise or develop new toilet itself in terms of engineering.

3. Gandhians and the Development of Low-Cost Flush Toilets: From *Gopuri* Latrine to Twin-Pit Toilet

3-1. Appa Patwardhan and the Development of *Gopuri* Latrine

In this section, I will focus on several Gandhians after Gandhi, who attempted to "liberate manual scavengers" not by exhorting all to be his/her "own scavengers" (CWMG v.60: 303), but by changing the structure of toilet itself and developing new low-cost toilets. According to Ishizaka (2007), the concepts of *swaraj* (self-rule) and *sarvodaya* consist of pivotal thinking of Gandhism (Ishizaka 2007: 508). Gandhi used this latter word from the Gujarati language, his mother language, to express the "welfare of all — that is, the advancement of all and not merely of the greatest number" (CWMG v.8: 241). It has been demonstrated that Gandhism has rather become the grass-roots social reform movement called *sarvodaya*, led by such people as Vinoba Bhave and Jayaprakash Narayan, disciples of Gandhi in particular, rather than within the political sphere after the independence (Ishii 2014: 201). Bhave is known for his nonviolent engagement in the exhortation of redistribution of lands from landowners to the landless laborers starting in the 1950s. Narayan initiated *Total Revolution* movement in which he organized citizens into an anti-government movement against the authoritarian rule of the government led by Indira Gandhi in the 1970s[25]. Aside from these movements, there are other social reform movements by Gandhians focusing specifically on the liberation of untouchables, rural development, women's empowerment, and environmental issues (Ishizaka 2007: 508-509).

The Gandhians' approach for the development of the low-cost flush toilet technology and the "liberation of

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24) Not only for toilets, Gandhi was cautious about saving water in every possible way in his daily life at the *ashram*. For example, he suggested not to use water directly from the water tap but to carry it in one's own pot (K. Gandhi 2016: 263).
25) For the details of their movements, see Ishii (2014: 212-223).

scavengers" in India, is thought to have started with the economist[26] Appa Patwardhan. He is thought to have been the first to engage in devising new toilets "which requires no services of professional scavenger" and "prepare compost manure from the night-soil and urine" (State of Bombay 1952: 2, 132). He was detained as "a civil disobedience prisoner in Ratnagiri Jail[27]" in 1932 (CWMG v.52: 88). At that time, Patwardhan is said to have organized "high-caste Hindus" into the "conservancy work," that is scavenging (CWMG v.52: 145), which later the government ordered him to suspend. He fasted to protest that order and Gandhi asked the government officers on behalf of Patwardhan to allow him to resume his work (CWMG v.52: 89). It was also reported that Patwardhan "had the intention on coming out of the jail, to work for some time as a regular paid scavenger under some municipality in Ratnagiri District, but found the scavenging work outside the jail too dirty" (State of Bombay 1952: 2).

In order to liberate manual scavengers, Pathwardhan attempted to change the structure of the dry latrine into one that creates compost manure and does not require the service of manual scavengers. In the late 1940s, he developed a simple toilet called "*Gopuri* Latrine[28]" in which human waste was utilized as manure. In the *Gopuri* Latrine a pit is divided into two rectangular parts for storing excreta, and a wooden thick board is laid on the top of the first pit on which both feet are placed (Figure 1). Excreta from rectangular-cut board would fall into the pit. The thick plate covering the first pit is moved to the second pit after the first becomes full in about 3 to 4 months. The size of the pit is about 2.4 m × 1.2 m and 30 cm in depth (Patel 2008: 29), and bricks or stone are the desired material. Since human waste in the pit becomes manure by an "aerobic digestion", air-inlet pipes are provided for taking oxygen into each pit (Patel 2008: 30-31). Due to the production of gas in the process of putrefaction, a ventilation pipe of 2.1 m in length is incorporated into a hole of 5 cm diameter emptying through the wooden board (Patel 2008: 31). After the toilet, "feces should be covered with ash, dry leaves, husk, straw, earth, etc to absorb the water" (Patel 2008: 31). Raw excreta in the used pit can be utilized as compost after 2 or 3 months. From the viewpoint of its shallowness of the pit, covering of the waste with soil and leaves, and the short period for its compost, the *Gopuri* Latrine is similar to Gandhi's ideal toilet, which in theory is simple and easy to set up by individuals.

In the *Gopuri* Latrine, there is a "channel made on top of 35 cm thick dividing wall" between the two pits and a 7.5 cm diameter pipe for letting urine and ablution water flow outside (Patel 1970 (1968): 74, 2008: 29). This is because the amount of water accompanying the human waste is sufficient to produce manure, and there would be odor if liquid exceeded the limited (Patel 1970: 79). As Rybczynski (1981) highlights, this aspect of "urine separation" has an advantage in that "the amount of organic waste (carbon) that needs to be added is very small since most of the urine (nitrogen) is no longer present. As a result, the volume of the vault is smaller than that of... with organic waste" (Rybczynski 1981: 14).

The *Gopuri* Latrine was scientifically improved by Krishna Das Shah, who was a Public Health Advisor of the state Government of Bombay (now Mumbai). He was a follower or co-worker of Patwardhan. It was recommended to be introduced within the state after approval (Patel 2008: 29). The *Gopuri* Latrine is considered the prototype of the twin-pit pour-flush toilet, which is currently becoming popular as one of the low-cost flush toilets in India.

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26) Patwardhan is a writer of a Marathi book under the title of "*Chalanshuddi Mhanjech Satyatar Yug*," "Pure Currency Means beyond *Satya Yug* (the Golden Age)," in 1966. As one interviewee at *Safai Vidyalaya* said in 2017, he, as an economist, gave a consideration to currency in which he contended the system of interest rate is an exploitation of the poor and argued money should be managed by a rural community.

27) Ratnagiri is a district located in southern part of Maharashtra.

28) Patwardhan established his ashram called "*Gopuri* Ashram" in 1948, on the bank of river in Vagade village in Konkan region of Maharashtra (http://www.kankavalips.mahapanchayat.gov.in/hidden/-/asset_publisher/oeubhyDlJ4TQ/content/gopuri-ashram-wagade/1758824, Accessed September 3, 2018). Gopuri is a name of a village where Patwardhan established his *ashram*.
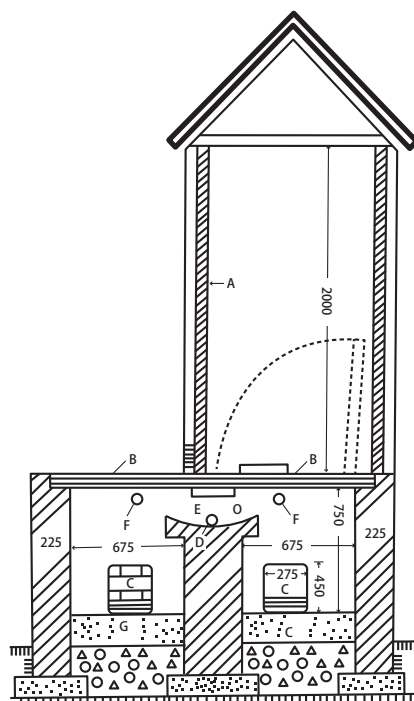
Figure 1. *Gopuri* Latrine.
Source: Author (January 2017, from the exhibition board at *Safai Vidyalaya*)

In the *Gopuri* Latrine, however, although human waste is covered with soil and ash, the odor problem was not resolved. It is because the pit in use was not sealed and it requires, for many people, a large amount of land to install. Hence, this toilet was installed only in rural areas with affordable lands in Gujarat and Maharashtra.

3-2. Development of *Sopa Sandas*, and Other Toilets by Non-Gandhians

Based on these disadvantages, Patwardhan developed an improved version of the *Gopuri* Latrine in the late 1950s which is called "*Sopa Sandas*[29)]." It has to be noted that before Patwardhan, Dr. Kessel at *Sevagram Ashram* had developed *Sopa Sandas* type toilets (Rybczynski 1981: 9). He introduced a pan with a long tin pipe and attached a soft rubber on its end (Patel: 1970: 57). This rubber works as a trap to prevent flies from entering (Patel 1970: 57). Some studies also reported that the *Sopa Sandas* was developed by *Gandhi Smarak Nidhi*[30)] in Pune, Maharashtra, under their programs "taken up for the Centre of Sciences for Villages at Wardha" (ex. Mistry and Bery n.d.: 25). This may be due to his commitment to this organization. According to Pathak (2006), Patwardhan assumed the chairpersonship of the establishment of the Central *Gandhi Smarak Nidhi* in Delhi in 1956 (Pathak 2006: 71). After its separate unit was founded in Maharashtra in 1962, it engaged in the construction of the *Sopa Sandas* based on Patwardhan's work (Pathak 2006: 71).

The *Sopa Sandas* toilet has a twin-leach pit. Pits "are built partially above the ground level" (Mistry and Bery

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29) *Sopa Sandas* means a convenient toilet in Marathi. In Hindi it is translated as "*Sulabh Shauchalaya*."

30) Originally this organization was founded by Indian National Congress in 1948 as a memorial trust. In the 1950s, the trust's work was conducted from Delhi and significant amount of organizations were set up to engage in social activities of Gandhi's constructive program. In the beginning of 1960s, branches at state level were established (http://www.gandhismaraknidhi.org/about-trust.html, Accessed September 3, 2018).
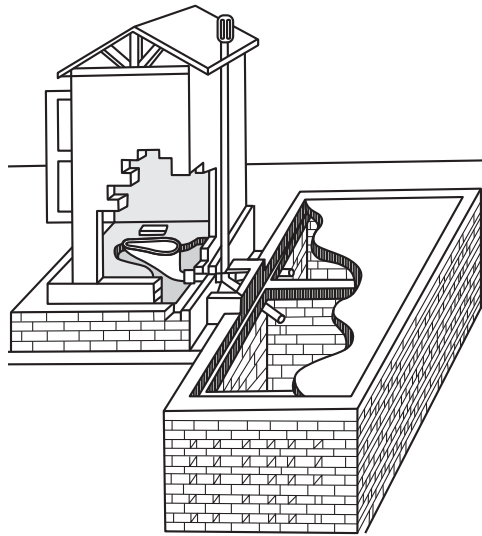
Figure 2. *Sopa Sandas (Sulabh Shauchalaya).*
Source: Author (January 2017, from the exhibition board at *Safai Vidyalaya*)

n.d.: 25). The squatting pan is not located right above the leaching pit, but instead "in close proximity to" the pit (Rybczynski 1981: 12) and connected there by a pipe inside (Figure 2). Human waste accumulated is delivered to the pit by pouring water and flushing to the connected pipe. The *Sopa Sandas* was made especially for rural areas and two pits are honeycombed walled structures made of stone materials such as brick. According to an exhibition board at *Safai Vidyalaya*, size of the pit is 1.2 m × 0.9 m × 1 m. Leach-pits are covered by concrete. A space of 25 cm × 25 cm as a small junction chamber is provided "to divert the flow" (Mistry and Bery n.d.: 25). In the chamber, Patwardhan set a tin flap (Patel 1970: 58). It was observed that "the tin-flap prevents bad odor from entering the toilet and prevents the passage of flies" and it works like this "instead of a water-seal trap" (Consortium on Rural Technology and Institute of Social Studies Trust 1981: 10). The exhibition board at *Safai Vidyalaya* says that in a *Sopa Sandas* it is possible to connect a water seal trap, but a limited use of water is desirable. The *Sopa Sandas* became popular, especially in Maharashtra and Madhya Pradesh (Mistry and Bery n.d.: 25). However, in the *Sopa Sandas*, the gas pipe for ventilation had to be set in a pit due to lack of water-seal trap and malfunctioning of the tin-trap (Patel 1970: 58; Rybczynski 1981: 12). Moreover, the problem of odor and flies cannot be solved without the water-seal, and "flies and caterpillars are produced in a rainy season" (Patel 1970: 58).

Unlike the *Gopuri* Latrine, the *Sopa Sandas* requires less area, but due to lack of a water-seal trap, gasses and odors emit. The structure of the *Gopuri* Latrine was the one that took over the model Gandhi had idealized. It enables individuals to dispose human waste on their own and utilize it as manure. Regarding the *Sopa Sandas* toilets developed in the latter half of the 1950s, pits and pan are separated, and human waste is flushed with water through the pipe connected to the pan, which constantly made the waste disappear with water. Gandhians from then on attempted to "liberate manual scavengers" by focusing on changing the structure of toilet itself by introducing a technology of "flushing" human waste. The attempt differed from exhorting people to become *bhangis* (scavengers or sweepers) and to "realize the dignity of the labor of scavenging and latrine-cleaning" or providing equipment such as brooms and uniforms to current scavengers to improve their working conditions the way Gandhi did (CWMG v.85: 240). They avoided direct contact with excreta for both the scavengers and other local people, by draining the excreta with water into the underground pit. They emphasized on developing a toilet that accumulate waste in the pit after flushing and then composting it to be taken out as manure.
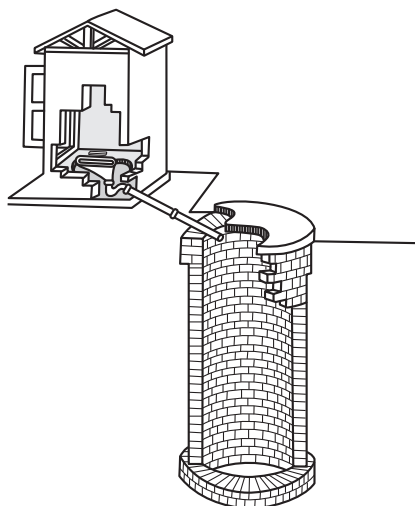
Figure 3. PRAI Latrine.
Source: Author (January 2017, from the exhibition board at *Safai Vidyalaya*)

As far back as mid-1940s and slightly apart from Gandhi's and Gandhians' time, it is reported that pour-flush water-seal leach pit latrines were developed in India for the first time "at the Singur field center of the All-India Institute of Hygiene and Public Health (AIIHPH), Calcutta" (Roy et al. 1984: 2). It was a single pit latrine and called "dug well latrine" (Srivastava 1997: 57). During the mid-1950s, similar types of single pit toilets with water-seals were adopted in several parts of India (Roy et al. 1984: 2). It was "adopted in the Research-cum-Action Projects (RCA) sponsored by GOI [Government of India] at Poonamallee ([in] Madras[31]), Najafgarh ([in] Delhi) and Singhur ([in] Calcutta)" (Roy et al. 1984: 2).

In the late 1950s, another pit toilet called the "PRAI Latrine" was developed by a government agency in Lucknow, Uttar Pradesh called the Planning Research and Action Institute[32] (PRAI) (Figure 3). It was developed to replace basket type latrines for a reasonable price (Patel 2008: 18-19). This toilet also had water-seal technology. To save costs, it was a one-pit toilet like those toilets above. It was suggested that when the first pit became full, another pit was to be constructed (Pathak 2006: 69). Due to this restriction, it is said to have been introduced only in rural communities and not to have received widespread popularity (Pathak 2006: 69).

In the 1960s, in a village called Bavra near Ahmedabad, Gujarat, a government-led public health training center is said to have established and developed a pit toilet called the "*Bavra* Toilet," "Hand-Flush Toilet." In the *Bavra* Toilet pit was dug under the toilet seat and its size of 0.75 m × 0.85 m × 2.5 m, required 1.22 m × 1.22 m for construction. 1.5 liters of water was needed per flush (Patel 2008: 25). Because the stone wall was set at the top 50 cm of the pit, installation costs were low. As the interviewee at *Safai Vidyalaya* told in 2017, this toilet is thought to have been developed using Patwardhan's technology. In addition, it had a water-seal technology that resolved the problems of flies and the backflow of odor. Unfortunately, the depth of the pit was too deep and the stone walls did not reach to the bottom of the pit. This caused groundwater contamination. The Public Health Department decided to discontinue this toilet design.

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31) Now it is Chennai, in Southern India.
32) This was sponsored by WHO and UNICEF, and supported by the Government of India and the Government of Uttar Pradesh (Roy et al. 1984: 2).

3-3. Reports by the Committees and the Development of Twin-Pit Pour-Flush Toilet

In 1949, "the Scavengers' Living Conditions Enquiry Committee" was appointed by the Government of Bombay under the objectives "to study and enquire into the living conditions of the scavengers in this Province [it might mean western part of India] and suggest ways and means to improve their present condition of work and to fix their minimum wages" (State of Bombay 1952: 3). The committee submitted the report in 1952. As with Gandhi's aversion against the carrying of human waste on one's head, the committee regards it as "the climax of the whole tragic performance" (State of Bombay 1952: 60). Therefore, they advocated "mechanical devices, such as wheel barrows, suction pumps and scamper's lorries" (State of Bombay 1952: 62). However, for achieving the objectives above, the committee further placed significance on the "substitution of a latrine which will not involve hand-removal" (State of Bombay 1952: 58). That is to say, they accentuated the importance of the construction of "septic tanks, *Aqua Privies*[33] or other suitable substitutes" that "will not require the services of a professional scavenger" (State of Bombay 1952: 58).

In 1958, "the Scavenging Conditions Enquiry Committee" was established by the Ministry of Home Affairs, Government of India. Senator N. R. Malkani, a Gandhian, was appointed as chairman. The Committee's approach to the "liberation of scavengers" was congenial to that of Gandhi to some extent. For example, they attributed the social discrimination against scavengers to their insanitary working conditions. Thus, they attempted to reform scavengers' situation by improving their cleaning tools. However, as with the case of the Committee of Bombay above, the opinion of the Report submitted by this Committee in 1960 differed from the perspectives of Gandhi in some aspects. Gandhi actively exhorted every citizen to be responsible for their own waste disposal regardless of the type of toilet they used. He advocated the improvement of cleaning equipment used by scavengers. It was because he viewed the untouchability as "a rule of sanitation," especially in terms of the cleanliness of scavengers' working conditions when they engage in latrine cleaning (CWMG v.53: 268). Since he underscored manual labor and therefore, people's voluntary commitment to the scavenging work, he advocated simple and easy methods of cleaning toilets, not necessarily devices that will minimize the whole scavenging process. Contrary to that, the Committee directed focus onto the abolition of dry latrines and instalment of flush toilets. After exemplifying some models of existing improved toilets, the report stated that the twin-pit pour-flush toilet meets all sanitary standards and its simplified diagram was described (Ministry of Home Affairs, Central Advisory Board for Harijan Welfare 1960: 188-190).

In the latter half of the 1960s, a team led by Ishwarbhai Patel, the Director of the *Safai Vidyalaya* (Environmental Sanitation Institute), a social organization in Ahmedabad, Gujarat, upgraded *Sopa Sandas* (Rybczynski 1981: 12). Patel is a follower and co-worker of Pathwardhan. He emphasized the importance of improved scientific tools for cleaning human waste (Patel 1970: 9). He contends that "cleaning work should be made in a way in which every people can easily do" and it does not have to "be the one which belongs to a particular caste" (Patel 1970: 9). He believes that the practice of manual scavenging "can be eliminated for good by constructing simple/convenient toilet (water seal)" (Patel 1970: 9).

In his book first published in 1968, Patel demonstrates the upgraded toilet as "*Sulabh-Swacch Shauchalaya (Saral Septik)*" which means "Simple-Clean Toilet (Simple/Easy Septic)" in Hindi. According to Patel, this toilet is developed by connecting a longer pipe to leach pits[34] so that inside pit would "remain dark[35]" and there would

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33) The *Aqua Privy* is regarded as "the improved form of the septic tank" (Patel 2008: 14).
34) Unlike *Gopuri* Latrine, a "pan can be a small distance away" from the pits because of this longer pipe (Rybczynski 1981: 12).
35) It seems to mean that the oxygen would not enter pits and promotes anaerobic decomposition of human waste. This may be why the toilet was called "simple septic."
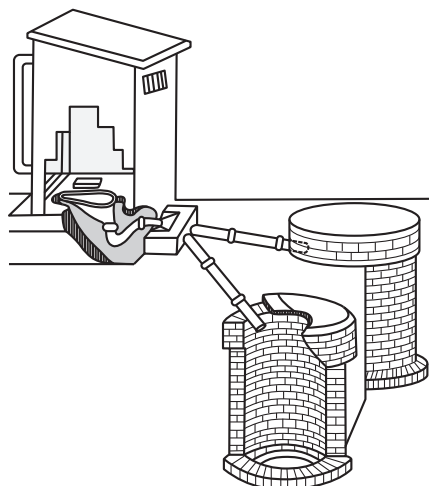
Figure 4. Low-Cost Water-Seal Latrine.
Source: Author (January 2017, from the exhibition board at *Safai Vidyalaya*)

be no "fear of flies and caterpillars" (Patel 1970: 59). It also applied a cement pan and water-seal trap, which was developed by PRAI (Patel 1970: 59). Patel states that trash and grass or any other materials to produce manure are put inside the pit (Patel 1970: 60).

This may be the same type toilet as the one called a "Low-Cost Water-Seal Latrine" (Figure 4) which can be found on the exhibition board at *Safai Vidyalaya* and in a recently-published guidebook for sanitation written by Patel (2008). The size of the pit is about 1 m in diameter and 1.5 m in depth. The pits are located 1 m distance from each other. A space (junction chamber) is made for each pipe from the pan to be intersected. 1.5 to 2 liters of water is required per flush (Patel 2008: 41). The water-seal pan-trap makes a ventilation pipe installation unnecessary, since both the gas and moisture generated during the putrefaction of human waste are absorbed into the soil (Patel 1970: 59). Like the PRAI Latrine and the *Sopa Sandas*, a honey-combed wall of "brick work in cement mortar" is used (Patel 2008: 50). However, the addition of the organic refuse into pits is not mentioned in either on the board or in the guidebook. Although "it is unclear what effect the lack of carbon will have on the anaerobic decomposition of the excreta," Rybczynski (1981) explains by referring to some previous studies, that "the lack of organic wastes is affecting the quality of the compost" (Rybczynski 1981: 12, 14). The same is mentioned by the interviewee working at *Safai Vidyalaya* in 2017, that the quality of compost manure from this toilet is not as high of quality as that of the *Gopuri* Latrine. Overall, this toilet is regarded as the model of the twin-pit pour-flush toilet in contemporary India, in which the compost manure is available after 2 years of rest and does not contaminate the groundwater.

Around the same time, Bindeshwar Pathak, a founder of the NGO *Sulabh* International, claiming to be based on Gandhism, participated in the Bihar Gandhi Centenary Celebration Committee in 1968 in Patna, Bihar. At that time, Rajendra Lal Das, a Gandhian who is said to have engaged in the *Sarvodaya* movement, published a book. The title of the book is "*Sulabh Swacch Shauchalaya*" (it means "Simple and Sanitary Latrine" in Hindi). He presented in the book a model of a toilet for the "liberation of scavengers." He describes that Gandhi believed that all people should engage in cleaning toilets, "which would end the tradition/custom of making one particular class do this inevitable work or toilet should be constructed through research and experiment, in which collecting and relocating human waste will not be required" (Das 1968: 5). He also demonstrated in depth the structure, price, and precautions of a twin-pit pour-flush toilet with low-cost water-seal technology. Pathak initially started introducing this model of toilet as the *Sulabh* Toilet in Bihar State. This twin-pit toilet is morphologically similar to the one

developed by *Safai Vidyalaya*, but Pathak claims that it is not clear where the model originally came from.

The specific origin of the twin-pit pour-flush toilet differs amongst Gandhians. However, Table 1 suggests that it was Patwardhan who developed the *Gopuri* Latrine and the *Sopa Sandas*. And it was government agencies such as AIIHPH in Calcutta and PRAI in Lucknow that developed water-seal technology. Also, it was the "Scavenging Conditions Enquiry Committee" that submitted proposals of appropriate toilets, with a schematic plan of these models. Finally, it was members of social organizations led by Gandhians who introduced these toilet models into the community with repeated experiments and improvements. In this process, some problems such odor, gas, or flies so-called nuisance issues, and scarcity of available lands and contamination of groundwater were found. Gandhians tried to introduce twin-pit pour-flush toilet at first, and then, added in it water-seal technology to address with the former problem. They succeeded in preventing odorous emission and fly increase by constantly keeping water in the trap. They resolved the problem of underground water contamination by providing a precaution for the construction site selection (Patel 2008: 41). It also changes waste into manure the way Gandhi preferred.

With regards the advantages and features of the twin-pit low-cost toilets, some manuals and guidelines by the government and international agency demonstrate it in detail. The promotion of the twin-pit pour-flush toilets accelerated after "a Technical Advisory Group[36] (TAG) was formed in 1983, drawing members from the Government of India, the World Bank, UNICEF and UNDP" (UNICEF 2002: 8). A manual[37] on the construction of the twin-pit toilets by TAG in 1984 highlights the advantages of this toilet as "economical, and offer a long-term and appropriate solution for excreta disposal until provision of a sewer system can be afforded" (Roy et al. 1984: 1). According to the manual, "it has been observed that all pathogens will die off in a period of about two years and thereafter the cleaning operations can be organized depending upon the weather conditions and demand for humus" (Roy et al. 1984: 6). It also demonstrates that leaching pits of the toilet can be constructed not only inside house but on a "verandah or even in a room" (Roy et al. 1984: 7). Thus, twin-pit system is suitable to urban areas as well without the extra work of constructing another pit when the first pit is filled (Roy et al. 1984: 3).

Another improved guideline[38] was prepared by Regional Water and Sanitation Group-South Asia (RWSG-SA), UNDP/World Bank Water and Sanitation Program. It gives close attention to the "pollution safeguards" when constructing the pit (Ministry of Urban Development and RWSG-SA, UNDP/World Bank Water and Sanitation Program n.d.: 17). For example, "if the soil is fine, the pits can be located at a minimum distance of 3 m from the drinking water sources" (Ministry of Urban Development and RWSG-SA, UNDP/World Bank Water and Sanitation Program n.d. 17). But "if the pits are located under a footpath or a road,…the invert level of the pipes or drains connecting the leach pits should be kept below the level of the water main, or 1 m below the ground level" (Ministry of Urban Development and RWSG-SA, UNDP/World Bank Water and Sanitation Program n.d.: 17). The policy's "full reliance" on twin-pit pour-flush toilets started moving away towards "hardware options with education and health linkages" from the early 1990s (UNICEF 2002: 17). However, Gandhian organizations continued to introduce the toilets in rural and urban communities. In the next section, I will clarify how Gandhian organizations installed the twin-pit pour-flush toilets into local communities at a practical level. I also focus on its attempt to promote various social projects and awareness programs to "liberate manual scavengers" as well as to mobilize sanitation and hygiene at a local, national, and global level.

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36) It was "established under the United Nations Development Programme Global Project GLO/78/006 (renumbered on January 1, 1982; now UNDP Interregional Project INT/81/047), executed by the World Bank" (Roy et al. 1984: i).

37) This manual is reported to "have been prepared for agencies, contractors and individuals involved in various aspects of the low-cost pour flush water seal latrine program in India" (Roy et al. 1984: i).

38) It might have been prepared in 1992.

Table 1. Models of Toilets.

Model	Year	Inventor or Developer	Antecedent	Water-Seal	Pit	Disadvantage	Manure
Dry Latrine				×		Requires daily manual service by scavengers	×
Septic Tank Toilet	19c	From the West		○		Requires plenty of water, occasional service by scavengers	△
***Gopuri* Latrine**	1940s	Appa Patwardhan		×	2	► Gas and odor problem without water-seal ► Requires large space	○
Sopa Sandas	1950s	Considered to be Appa Patwardhan; *Gandhi Smarak Nidhi*, Maharashtra	*Gopuri* Latrine	×	2	Gas and odor problem without water-seal	○
***Bavra* Toilet**	1960s		Considered to be *Gopuri* Latrine and *Sopa Sandas*	○	1	Contamination of underground water	○
PRAI Latrine	1950s - 1960s	PRAI		○	1 or 2	Requires construction of second pit after the first is filled	○
Low-Cost Water-Seal Latrine	1960s - 1970s	*Safai Vidyalaya*	Considered to be *Sopa Sandas*, PRAI Latrine for water-seal technology	○	2		○
***Sulabh* Toilet**	1970s	*Sulabh* International (in the book written by Das)		○	2		○

4. *Sulabh* International and Generalization of Low-Cost Flush Toilets

4-1. "Liberation of Manual Scavengers" through Flush Toilets and "Social Reform"

In this section, by focusing on the NGO *Sulabh* as a case study, I will clarify how Gandhians introduced the twin-pit low-cost pour-flush toilet into society as a mass movement. This case study demonstrates the process of the generalization of the low-cost flush toilet to a practical level and the movement for the "liberation of manual scavengers." *Sulabh* was reported to have made efforts to (1) disseminate the technology of the twin-pit pour-flush toilet along with awareness programs for the sanitation in both rural and urban areas, as well as to (2) step up their social campaign for the "liberation of manual scavengers" by providing them with rehabilitation programs. It has received many awards from India and international organizations for its achievements. I will briefly present how *Sulabh* has been implementing the above, by referring to primary sources *Sulabh* published in its pamphlets and brochures.

In 1970, *Sulabh* was founded in Patna to "liberate manual scavengers" engaged in the disposal of human waste in dry latrines. During his stay of about 4 months in the residential area of scavengers in the city of Bettiah, Bihar, Pathak "realized that the Gandhian philosophy alone would be of no avail until the campaign for the uplift of

untouchables was accompanied by action-oriented policies and programs" (Sulabh International Social Service Organization n.d. b: 3)[39]. He saw the need of an alternative technology to replace dry latrines that required manual scavengers and started to promote the introduction of a low-cost twin-pit pour-flush toilet (it is called *Sulabh* toilet). In 1973, *Sulabh* installed two *Sulabh* toilets in Arrah, Bihar, to demonstrate their effectiveness. Soon after, in collaboration with the Government of Bihar, *Sulabh* devoted its attention to persuade local households that dry latrines "are health hazards and sources of many diseases, such as diarrhea, dysentery, hookworm" (Pathak 2006: 87). *Sulabh* claims that it has converted more than one million dry latrines throughout India, achieving the liberation of more than one million manual scavengers, and accomplishing the abolishment of dry latrines and the "liberation of manual scavengers" in about 640 towns (Sulabh International Social Service Organization n.d. a: 4-5)[40]. While the installation of twin-pit flush toilets in households occurred, *Sulabh* promoted the establishment of a pay-and-use system of public and community toilets[41] throughout India. It was in 1974 that Pathak developed such a system[42], which covers the maintenance and cleaning cost of the public toilet with its profit.

From 1984, some public toilets[43] were linked to biogas plants (Sulabh International Social Service Organization n.d. a: 5). *Sulabh* also did investigative scientific research in wastewater treatment technology. For example, it created technology from the "Duckweed Project." In 1994, it utilized duckweed for waste water treatment that also increased the yield from fish farming. And also in 2002, the "*Sulabh* Effluent Treatment[44]" (Sulabh International Social Service Organization n.d. a: 24). From the 2010s, influenced by a national sanitation campaign called *Swachh Bharat Abhiyan* (Clean India Mission), whose antecedent is traced back to the "Total Sanitation Campaign" in 1999 and the "*Nirmal Bharat Abhiyan*[45]" in 2012, *Sulabh* has been promoting the installment of *Sulabh* toilets, especially in rural area. Moreover, the *Sulabh* toilet gained international popularity, starting with a national seminar on "Conversion of Bucket Latrines and Liberation of Scavengers." This seminar was done in collaboration with organizations such as WHO and UNICEF in 1978. In 1985, UNDP and World Bank provided with the "Technology Evaluation" of the *Sulabh* twin-pit toilet as well as the public toilet. In 2007, *Sulabh* organized World Toilet Summit (Sulabh International Social Service Organization n.d. a: 9).

It was 1985 that *Sulabh* initiated "a training and rehabilitation program for the wards of scavengers in different trades like…typing, motor driving, mechanics…etc." with the support of government authorities (Sulabh International Social Service Organization n.d. a: 6). It established several vocational training centers for "liberated scavengers" in Bihar, Uttar Pradesh, and Rajasthan (Sulabh International Social Service Organization n.d. a: 9). For example, in 1997, the Ministry of Social Justice of Empowerment started the scheme of "National *Safai Karamcharis* (sanitation workers/sweepers in Hindi) Finance and Development Corporation." And its partial project came into operation under the name of "The Self-Employment Scheme of Manual Scavengers" in 2007. Then, *Sulabh* established vocational training programs for "liberated manual scavengers" through collaboration

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39) This book by *Sulabh* International might have been published after 2010.
40) This booklet by *Sulabh* International might have been published after 2000.
41) Public toilets have been installed in places such as at hospitals, bus terminals, and tourist places and in large to small cities.
42) This system was regarded as a solution to the serious problem of Indian free public toilets at that time. They were insanitary and had a low usage frequency. Under the contract with the government, *Sulabh* was subsidized the installation cost of the *Sulabh* public toilets by the former and it operated their maintenance by employing caretakers and local sweepers in a contract basis or handing over to private contractors. For the problems reported regarding this system in terms of proper management, see Singh (2012).
43) *Sulabh* claims that it has over 7,500 public toilets across India with 160 linked to biogas plants (Sulabh International Social Service Organization n.d. a: 22).
44) The *Sulabh* Effluent Treatment system "is based on filtration of the effluent through activated charcoal followed by ultraviolet rays" and reduces BOD "down to < 10 mg/l after treatment" (Sulabh International Social Service Organization n.d. a: 22).
45) It is a renamed version of Total Sanitation Campaign. *Nirmal Bharat Abhiyan* literally means Stainless India Campaign.

Table 2. Brief Chronological Table of the *Sulabh* Movement.
Source: Author (based on Sulabh International Social Service Organization n.d. a)

Sulabh Activities	Government Policies and Schemes
1970s: ▶ Installing two *Sulabh* Toilets in a city in Bihar for demonstration (1973) ▶ Initiated pay-and-use system at community toilets (1974) ▶ Seminar on "Conversion of Bucket Latrines and Liberation of Scavengers" (1978)	1960s-1970s: ▶ "Scavenging Conditions Enquiry Committee," Ministry of Home Affairs (1960)
1980s: ▶ Public toilets linked with biogas plants (1984) ▶ "Training and rehabilitation program for scavengers" in Bihar (1985) ▶ Technology evaluation by UNDP and World Bank (1985) ▶ "Temple entry campaign for scavengers" (1988)	1980s: ▶ "Integrated Low-Cost Sanitation Scheme," Ministry of Home Affairs (1980)
1990s: ▶ Movement for "Social Upgradation of Scavengers" set up "English medium school for children of scavengers" in Delhi (1992) ▶ "Sulabh International Museum of Toilets" in Delhi (1994) ▶ "Duckweed Project" (1996)	1990s: ▶ "The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act" (1993) ▶ "National Safai Karamcharis (sanitation workers/sweepers) Finance and Development Corporation," Ministry of Social Justice and Empowerment (1997) ▶ "Total Sanitation Campaign" (1999)
2000s: ▶ "Vocational training center for scavengers" in Alwar, Rajasthan (2003) ▶ Organize World Toilet Summit (2007) ▶ "Vocational training center for scavengers" in Tonk, Rajasthan (2008) ▶ "Scavenging-free city" in Alwar, Rajasthan (2008) ▶ "Mission Sanitation" in New York (2008)	2000s: ▶ "The Self-Employment Scheme of Manual Scavengers," Ministry of Social Justice and Empowerment (2007)
2010s: ▶ "Scavenging-free city" in Tonk, Rajasthan (2010) ▶ Visiting a Hindu sacred place, Varanasi, Uttar Pradesh (2012) ▶ Promotion of Sulabh twin-pit Toilet in rural areas	2010s: ▶ "Nirmal Bharat Abhiyan" (2012) ▶ "Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act," Ministry of Social Justice and Empowerment (2013) ▶ "Swacch Bharat Abhiyan" (2014)

with the state government in 2008.

Along with the "liberation of scavengers" from the cleaning of dry latrines to the rehabilitation programs for them, *Sulabh* hurled itself into the task of a "social reform movement" with enthusiasm. For example, in 1988, in Udaipur, Rajasthan, *Sulabh* practiced a campaign to resolve the problem of untouchables barred from entering a temple and dining with upper-castes. In this campaign, Pathak "with 100 scavengers and…Brahmins" entered the temple, "offered prayers" and "the whole group took their meal together" (Sulabh International Social Service Organization n.d. a: 6)[46]. In addition to the temple entry campaign, various kinds of "social reform

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46) Another type of "social upgradation of scavengers to improve" their "social status" started in 1990. *Sulabh* encouraged

movement" have been done. One of them was the visiting during the "special cultural event" of "a fashion show" of "rehabilitated women scavengers," sponsored by the United Nations Department of Economic and Social Affairs in 2008. Another was a common dining experience with families of "upper social strata…in presence of Prof. Rajmohan Gandhi, the grandson of Mahatma Gandhi," and also the visiting to Hindu sacred places like Varanasi (Sulabh International Social Service Organization n.d. a: 10-11).

4-2. *Sulabh*'s Perspective of Scavenging and Generalization Process of Twin-Pit Flush Toilets

Sulabh positions itself as an organization that is following Gandhi's way of thinking by recognizing that scavengers were discriminated against because of their engagement in the carrying human waste, particularly on their heads. It is a commonly understood in *Sulabh* that Pathak engaged in the installment of twin-pit flush toilets to eliminate the human waste collection from scavengers. For inspiration, they used Gandhi's experience on his *ashram* of digging a pit to deal with human waste by oneself and using another pit when the current one in use became full. *Sulabh*'s declared purpose in its efforts is the "fulfilling one of the dreams of Mahatma Gandhi to get the scavengers relieved from the sub-human occupation of cleaning human excreta manually, to restore their human rights and dignity" (Sulabh International Social Service Organization n.d. b: 2).

Sulabh regards that the manure after the composting process in the pit is harmless and can be touched by everyone. Thus, for *Sulabh*, it is not justifiable to discriminate against scavengers because they touch manure. With the public toilet pay-and-use system, constant maintenance or cleaning is necessary for cleanliness. Though there is not a caste-based restriction on the employment of workers who clean these toilets, the majority of the cleaning is done by sweeper caste people. *Sulabh* has been criticized by Dalit activists and previous studies on Dalit movements, for its failure to liberate the sweeper caste from the sweeping jobs itself (ex. Prashad 2000; Suzuki 2015). However, *Sulabh* considers that the discrimination against sweepers who clean a "sanitary" *Sulabh* toilet is not reasonable from the perspective of Gandhi. Gandhi attributed discrimination against sweepers to their insanitary working conditions and therefore, this discrimination can be resolved by improving their working environment. This is why *Sulabh* uses various efforts to eliminate social restrictions on "liberated scavengers," such as dining together with upper castes and temple-entries.

As regards the actual process of the installation of twin-pit flush toilets, it was demonstrated by Pathak (2006). Pathak suggested installing twin-pit flush toilets in households be undertaken at a community level. The construction of two pits simultaneously, not like PRAI Latrine, would "save the house-owners from the difficulties of constructing another pit just after the first one got filled up" (Pathak 2006: 91). From the 1970s to the 1980s, *Sulabh* attempted to install this style toilet in households in Bihar. It had service contracts with household owners to undertake the role of "obtaining loans and grants from the local bodies or collecting materials for the conversion of bucket privies" (Pathak 2006: 88). However, as Pathak claims, the funds from the local government were insufficient to complete converting all dry latrines into Sulabh toilets, to accomplish the "liberation of scavengers" in the entire state (Pathak 2006: 93)[47].

Regarding the installment of the twin-pit toilets, especially in nearby Delhi, one interviewee at *Sulabh* explained in detail in 2017. He pointed out that *Sulabh* promoted the installation of the twin-pit flush toilets in an area where residents were engaging in farming in the late 1980s to the early 1990s. He said that there were

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that "one high status family in society has to 'socially adopt' a scavenger family who will be treated like family members" (Sulabh International Social Service Organization n.d. a: 7).

47) Pathak makes an assertion that from 1974-1988, that 189,000 dry latrines were converted to *Sulabh* toilet in Bihar State and that "the non-availability of funds has been the main constraint, otherwise, all the 4 lakh dry latrines would have been converted and entire State declared '*Bhangi Mukti*' (in this context it means the liberation of manual scavengers who engaged in manual cleaning of dry toilets) by this time" (Pathak 2006: 93).

no scavengers. This indicates that there were no service latrines/dry toilets which scavengers cleaned on a daily basis. He further mentioned that *Sulabh* also became involved in introducing the twin-pit pour-flush toilets in areas where the scavenging work was done. Twin-pit toilets were installed there due to the problem of odor from open drains. These drains were cleaned by pouring water into them and then collecting the waste. It was possibly sweepers who engaged in this cleaning work. The interviewee said that recently these areas became urbanized and due to the decrease of available lands and the introduction of sewer systems, people jointed toilet pipes directly with sewer lines. According to him, the installation of the *Sulabh* toilets also declined with the popularization of septic tank toilets and sewer lines[48].

Aside from the case of Delhi, one interviewee working in a branch office of *Sulabh* in Jaipur, Rajasthan, also explained about the installation of *Sulabh* toilets in 2017. He mentioned that after the enactment of "The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act" in 1993, installment of *Sulabh* toilets increased, by collaborating with the local municipality. As for procedures, at first the government "finds" the households that do not have toilets, then *Sulabh* initiates the construction of the twin-pit toilets. However, the staff also claimed, as did Pathak, that economically it is difficult to bring forward the quick installation of toilets, because the government covers less than half of the construction costs. From 2014, when the "Clean India Mission" launched at a national level, the installation of the twin-pit toilet shifted immensely into high gear in rural areas. In the process of these attempts by *Sulabh*, they convinced local residents of the importance of daily hygiene. They also kept local residence at a distance from their own waste by installing low-cost flush toilets. In that process, *Sulabh* did not focus on the popularization or universal application of cleaning latrines or scavenging work itself the way Gandhi did.

These results from *Sulabh* and other Gandhians provide important insights on how its ideas and practices for the "liberation of scavengers" differs from that of Gandhi. As Pathak put it: "Gandhiji [*ji* is a honorific in Hindi] wanted the scavengers not to carry night-soil on head and advocated the adoption of some safer method for the disposal of night-soil, so that the manual handling of night-soil could be done away with" (Pathak 2006: 41). It is likely that *Sulabh*'s primary intention here is congenial to that of Gandhi. However, there are significant differences between the two in terms of their recognition toward scavenging. Gandhi stressed the importance of the engagement in scavenging work by all. He believed that realizing the "dignity of the labour of scavenging and latrine-cleaning" would lead to the eradication of untouchability (CWMG v.85: 240). He regarded the work of scavenging as "no dirtier than any other occupations" but it is "carried on in a dirty manner" (Pyarelal 1932: 254). This is why he focused in particular on doing away with the method of carrying the basket of human waste on their head, which he called "physical handling of dirt" (CWMG v.85: 401). And he advocated to provide them with a special dress or "simple working costume," "receptacles, brooms," "hand-carts" to carry waste, and "dry earth" as an "improvements in latrines" as mentioned earlier (CWMG v.54: 125, v.85: 401). He thought it was a "safer method for the disposal of night-soil" (Pathak 2006: 41).

Contrast this with *Sulabh*, as well as other antecedent Gandhians. They attempted to change the structure of toilets instead of changing the method of carrying the waste. Overall, mass installment of the twin-pit pour-flush toilet ironically made it impossible for Gandhi's "ideal *Bhangi*" to "know the quality of night-soil and urine" or to "keep a close watch on these and give a timely warning to the individual concerned" (CWMG v.64: 87). They believed that the scavenging "is a sub-human job and negates the principle of social justice" (Pathak 2006: 149). They made human waste invisible by flushing it to the underground pit and separated people "from the

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48) He said that last *Sulabh* toilets in Delhi might be the ones constructed in 2000.

composting feces" by "a permanent water-seal" technology (Rybczynski 1981: 12)[49].

As the case of *Sulabh* shows, they faced the necessity to persuade local municipalities to obtain funds to install toilets in households. In that process, modern notion of sanitation and its scientific knowledge were also spread both to municipal officers and local residents. And local households succeeded in having new sanitary pour-flush toilets with less effort in collecting materials and funds. Their attempts eventually led to the popularization of modern discourse on sanitation and hygiene in a public sphere. They claimed that any kind of social discrimination against untouchables is no more applicable since "scavengers" are "liberated" from the manual scavenging work which they regard as the cause of discrimination. Here, they regard the cause of untouchability not as religious impurity, but as their sanitary working environment and hygiene habits. Paradoxically, this is identical to what Gandhi claimed in that untouchability is "a rule of sanitation" and once their "uncleanliness is shed," they are "no longer untouchable," though Gandhians did not intend to make all people their "own scavengers" (CWMG v.53: 268, v.60: 303).

Conclusion

This article discussed what Gandhi and Gandhians intended for the "liberation of manual scavengers" and how it embodied the development and use of low-cost flush toilets. Gandhi's intentions were to eradicate untouchability from people's "hearts," and to teach that it is essential to "realize the dignity" of scavenging for it leads people to "know how to treat" themselves (CWMG v.60: 303, v.85: 240). This is why he strongly advocated the improvement of methods for carrying waste for the current sanitation workers who engage in scavenging. For example, rather than changing the entire structure of the toilet itself to minimize the process of scavenging labor, the introduction of brooms for cleaning, receptacles, hand-carts, and uniforms was necessary for Gandhi. Gandhians recognized the difficulty of introducing Gandhi's idea into practice to all citizens the way he attempted. They believed that the work of scavenging is an insanitary and inhuman job, as shown in *Sulabh*. Eventually, they focused their attention to do away with scavenging and change the structure of toilets, and finally developed the low-cost twin-pit pour-flush toilet.

It is certain that this toilet is scientifically more sanitary than dry latrines and also a benefit because it finally produces manure, which Gandhi preferred. However, its design made people's own feces invisible to them and unable to "throw earth on them," which Gandhi did not profess (CWMG v.61: 50). By installing the low-cost flush toilet in local households on a large scale, Gandhians "liberated manual scavengers" from cleaning "dry latrines" on a daily basis. This included the carrying of human waste on their heads. Gandhians also "liberated" scavengers by rapidly introducing the modern and scientific notion of sanitation and personal hygiene to local communities. In the public sphere of contemporary India, it brought about the value of "personal cleanliness and uncleanliness" to eradicate untouchability in lieu of religious impurity that is thought to have been upheld by upper and general castes. This is congenial to Gandhi's original perspective of untouchability. In other words, while Gandhians attempted to "liberate scavengers" in a series of struggles against untouchability, they did not necessarily make every citizens their "own scavengers" as Gandhi did (CWMG v.60: 303). Paradoxically, they eventually succeeded in prevailing Gandhi's idea that "untouchability was a rule of sanitation" (CWMG v.53: 268), into society by way of low-cost flush toilets.

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49) Rybczynski writes in his references that this perspective came from "H.N. Todankar in conversation with Vikram Bhatt (1981)" (Rybczynski 1981: 26).

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