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Water management of the British Government in Delhi

Rakesh[1]
[1]*Assistant Professor Department Of Histor Satyawati College (Eve)University of Delhi*

Abstract: ***The water in Delhi had been a major cause of distresses for the rulers because there was only single Yamuna River. Water management in the medieval period provided enough satisfaction to people. But during the British period, due to bad water management begin water crises in Delhi and tussle over water supply increased. Delhi always faced problem scarcity for the water in summers and winters because rainfall always has been seasonal, fluctuated and for the short time. Such as in the climatic condition, water evaporation rate has been high but it does not mean that low availability of water was big problems in medieval period because water management throughout the history of Sultanate period was based on the decentralized. The local communityused all source of water such as wells, step-wells, canals, tanks, lakes and other sources for social benefits. British map showed that natural and men made water sources in Delhi was plenty till 1857. The idea that water too can become a private property and ownership over the water was absent in India but British made water as a source of income for the Government. The neglected attitude of the British Government towards natural water sources or men made water sources led to ruined or dried up water sources in Delhi. Many canals and channels converted into drainage or closed to forever. Instead of social responsibility, British Government imposed administration machinery on the people and introduced water pipeline service. British Government snatched all responsibly from the local community and transferred into the hand of Municipal Committee. Municipal Committee could never full fill their duty because Municipal always was in the financial crises. British Government reluctant to expended money on development of water facility.***
Key words: Thand iSarak' Quila, Wuzu' jhils, baolis, mohalla, ghat,, zamindars, Bunds

Water management had been a big issue for the Delhi rulers. As we know that before the British, management of the water was a decentralized but British make changes in the water management and started control system on the water system. During the sultanate and Mughal period, storage of water was practiced in whole Delhi, due to this practices; water was always available in also worse condition for the people. Before British, many famines happened in Delhi but these did not much affect Delhi because rulers, nobles, rich people, religious people and village communities constructed tanks, wells, bawadi (steps well), canals etc. These type of the practices were suitable for the Delhi's climate because through these practices they maintained underground water table and managed of rain harvesting. 'Such storage of water was practiced not only in the alluvial plains of Delhi but also in the hilly terrain in at such as Mehrauli, Vasant Vihar, Vasant Kunj, Tughlaqabad, Chirag Delhi etc.' [1]In them edieval period, water management was fully in the hand of village community who acquired territorial rights on water sources. Apart from these, private ownership was also practiced in the water management. Many people constructed wells on the roadside and every inn own costs. Many people had own separate well but sometimes wells constructed by the ruler, nobles, or sometimes rich or religious people. But in the village water management was in the hand of the village community. Village communities were comprised of different caste and dominant caste of the village was enjoying maximum rights in the village since the ancient period. Medieval rulers of Delhi were also provided patronage and protection to village communities because they were not also provided revenue to the state but also at the local level they maintained administration. This type of the decentralized nature of the state motivated the decentralized water management. The statewas also provided sufficient financial help and construction of tanks, bunds, or wells own expenses. In the context Mayank Kumar said that 'mostly practiced at the individual level, some method requires larger community participation along with political support.'[2]

Delhi was always a highly irrigated area in which there were enough natural and artificial water sources. There were no any accounts which could hows thescarcity of water in Delhi because rulers of Delhi took interested in the construction of many canals, tanks, bawadi or boali, (step wells) and many natural channels were existed since the old time. But British Government made water as a market commodity. It was new phenomena for the native people because they were considered water was free god gifted for the people. Water management in India was a societal responsibility and they were enjoying privileges right on it since ancient time. The state was only motivated and provided financial assistance to them. Moreover, rulers and their nobles incurred ofall expenditure

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of construction of canals; digging tanks and wells. If we look historical map and visited historical villages, sarais, markets, mosques, and other important building then we found that all these were situated near about the natural water sources such as channels, river, boali or lake. Every village had men- made wells or tanks. Rulers, nobles, rich people were taken interest in digging wells or canals, tanks for the public purpose. Religious inspiration was also motivated them by public welfare work. British settlement reports explored that every village's community had own wells, which was used to supply drinking water. Most of the Delhi village had own bunds, tanks or small ponds which was used for the irrigation. Map of 1857 showed that in Delhi had many natural channels which provided water to Delhi gardens and drinking water. British records show that city had many wells which after the capture of Delhi in 1857-8 were demolished. In the context, Ghalib writes that 'Here, we have two roads: 'Thandi Sarak' (Yamuna Road) and Iron road (Railway line), both are apart. Moreover, a barrack for 'Goras' would be constructed in the city and in front of Quila, a ground would be cleared, where the LalDiggi is presently situated. The shop in south, the house of bird-catchers, elephant stables (HathiKhana), from the entry of KuchaBulaqi Begum till the moat of fort, no building would be spared except LalDiggi and Some wells.'[3]LalDiggi was a small pond built of Red stones which were situated in the front of Red Fort. It was filled with water Nahr-i-Bahist which was followed by Chandni Chowk to Red Fort. Later on, this pond leveled by the British Government and soonNahr-i-Bahist was dried up. A Channel of Nahr-i-Bahist filled a well which was situated at the behind of the Jama Masjid but this water was not used for the Jama Masjid because of salty water. That's why 'Lad Diggi and through a Persian Wheel it was lifted from the well to be sent to Jama Masjid for 'Wuzu'(ablution).' [4]Apart from LalDiggi, there were many wells in the front of Red Fort which provided drinking water and many gardens were used to wells water. For example a well at Begum Bagh which was filled in 1858. But still in the British period, there were enough natural water sources and wells were still major sources of irrigation. 'British settlement report of 1872-75 showed that there was about 37 percent area was come to the under of the irrigation. Well, canals, bunds, lakes etc., were major sources of the irrigation in Delhi, in which 18 percent irrigated by canal, 15 by wells, and 5 percent by bunds and jhils (lakes).[5]These wells and canals were very important sources for the Delhi people because maximum people were depended on the wells and canals. Since Medieval period uses the wells, bunds, and canals were increasing but since after the transfer of capital in Delhi, the usages of water from wells decreased. There were numbers of factors which contributed decreased practices of wells. British Gazetteer reports show that by 1912, the total irrigated area of the district (Sonepat, Delhi, Ballabhgarh,) had reached at the 52 percent, in which 19 percent from wells, 18 percent from canals and 20 percent from bands etc. But Delhi had about 12 percent total irrigated area from the wells, canals, bands, and ponds. In 1872 -75 a settlement report showed that there were 2,256 wells in Delhi. There were four types of wells and every well was unequal degree of efficiency in irrigation. There was first the ordinary masonry well, pukka Kua (wells) made of brick, or stone, and mortar. These wells were of course very cheap and in meet places last only one, two, or three years. Archival records show that digging wells method was much popular in Delhi, however, in the someplace such as in south Delhi, the water table was much lower, especially south Delhi that's why 'a lower water table necessitated the deployment of water-lifting devices.'[6]Gazetteer of the Delhi District: 1883-84 described two type of wells in Delhi kuchcha (unconstructed) and pucca(constructed) these could be used for households and irrigations purpose. 'The entire Delhi area was a mass of wells, most of them pakka. Within the City and its suburban area, there were said to be about 797, of which 675 were private ownership. On it's taking over by the Imperial Government there were about over 600 within the New City area.' [7]People preferred to drink water from wells and boali then other sources. The character of south Delhi wells and boalis were in deep because this region was part of Aravali hill area that's why wells, boalis,and tank construction required intense labour. Construction of the wells was very expansive for the people because sometimes wells do not provide sufficient water and after some time it becomes dried or mostly well's water was salty or brackish in the test. In the context Nirmal wrote about available water in Delhi that 'to compound the matter further the availability of fresh water is only 30 percent of all the water, rest being brackish or saline.' [8]For the drinking and fresh water, rulers and people had made special efforts and constructed has or tanks, boali, wells etc. Apart from wells, boali wereother important sources of the fresh water which were most popular among the people. The first evidence of boaliin Delhi can be trace in Mehrauli where Sufi saint Khwaja Qutbuddin Bakhtiyar Kaki built a baoli in Dargah compound. Baolis were permanent water reservoir and its used could be private or public. It was assumed that 'more than three hundred such baolis are known; about one hundred and twenty are listed in the protected monuments list of the Delhi circle of the Archaeology Survey. Gazetteer of the Delhi District: 1883-84, reported that these Baolis, as these were freshwater reservoirs in the Aravali region where sub-soil water is often brackish, supplemented the big tanks as water reservoir providing drinking water to the settlement in the immediate vicinity and through cracks and fishers in the rocks, helped in keeping general underground water table high.'[9] Numerous Archival, epigraphs, traveler accounts and literature testified this account. Generally, construction of boalis and wells was a benevolent act which was mostly supported by merchant class or affluence section of the community such as Jain community, Even today, we can easily detect that every Sarai in Delhi had a well or boali which was built by any pious or generous person. Mayank

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Kumar also observed that 'the religious merit attached to the construction of water storage system for the public seems to be one reason for the greater proliferation.' [10]In the absence of any perennial river in south Delhi, wells after the sometime dried up and due to low water table they compelled to collaborate with each other for the protect wells and boalis. They become more depended on other sources and used maximized the rainwater for the irrigation system. As practices of rain harvesting system occurred in every village. It appeared that in the form of small tank or pond were used for different purposes such as for irrigation, cattle's drinking, and bath. A bund might be man-madepucca but mostly were existed in natural form; these were also provided water during the whole year. The rocky area of South Delhi was suitable for the bunds because these lands had a thick layer of rock and this layer checked the percolating rainwater into the deep. The bunds were not only retained rainwater but also maintain underground water table. During the summer, when the sun was to be heat and dampness in the air was absent then bunds provided water to the people for farming and cattle. This was an important method for water conservation which was based on the direct accumulation of rainwater. In the report of 1848, Mr. E. Battie (in charge of Najafgarh Jhill) gives an interest description about the bunds; he wrote that there are two of the largest of the hill circle bunds, Chhatarpur and Khirki (South Delhi). But there are numerous others, which only a good local knowledge gives an acquaintance with, for most of them are in the semi-ruinous condition.' [11]However, South Delhi was always for less revenue area for the British Government. Agriculture system in south Delhi was mostly in the hand of Jat community. Most of the villages in rural Delhi were used the rainwater for agriculture. They were also encouraged habitation of lower caste in own village because they had required unskilled labour for farming works. Lower caste labour that migrated from Rajasthan or North-West Province (Uttar Pradesh) could only have been cultivators and labours. Apart from the Jats, there were other communities such as Gujjur, Rajput, and some Muslims community were also engage in agriculture. They had separate colonies and wells in the same village. All communities encouraged lower caste to settle in their village and they had not only of fered labour work in agriculture but also offered their unskilled labour in the construction of bund and other work. Village community in every village was responsible to provide them shelter and security to them. But lower caste had their own separate well in the village. In spite of increasing population in Delhi, we did not find any complaint of the scarcity of water in Delhi. Settlement report of the British Government shows that management of the bunds was under the control of village community and British Government recognized their right on bund's water. It seemed that without conservation of rainwater Jat and other agriculturist community could not increase agriculture production. The settlement reports of British Government shows that Jat community held maximum cultivated land in Delhi. However, British Government recognized the importance of the bunds but they did not take interest into repaired of bunds and wells. The state had withdrawn their duty from the repair of wells and bunds. Village community had been keeping up withbunds and wells since ancient times and state provided financial support to community time to time. But British Government neither repaired nor allowed maintains bunds to the peasants. Mostly bunds required more attention because most of them were in dilapidated condition by the British time. It was estimated in 1872 that Ambarbai bund irrigated about 215 acres area; while Bijwasnbunds about 300 acres were moistened but they had Brocken and required repaired but Government considered that it would be more harm than good. The reason was not clear of it, in the result of Khirki, Mahipalpur, Manakpur, Palam, Rajokhri, Sultanpur, Tughlakabad etc. bundshad reached in the ruin condition. There was might be one reason to level them that malaria was one of the major causes of the close of the bunds. When an Act passed in 1873 through this all management on water sources had to be shifted in the hand of the British from the villages communities. In the consequence, soon all bunds reached in ruin condition and dried up because village community had no right to repaired to it. British Government had a right to repair but they did not show any interest in the repaired. The reason was that Government wanted takes only tax but did not want to expend money. A similar condition was also facing the Najafgarh Jhil (lake); it considered to be most important for revenue and irrigation aspects. Mr. Maconachic (1856-57) recorded in his settlement Report that "It is sufficient to note that a drained by it is estimated at 3,072 square miles, and its water surface with a depth of 12 feet in the water gauge at Nanak Heri is 56,657 acre or about 88 ½ square miles."[12] In 1833, its area was estimated at 52 ½ square miles. It flows to the north-east by Kakrola, Nilauthi, and Basie across the Rohtak road about three miles west of Delhi, and emptying itself into the Jumna River just above the village of Wazirabad. By this time Najafgarh Jhil was neglected and an account for this jail had mostly dried up. If we trace the history of Najafgarhjail then we found that initially, this jail was a type of bund which was surrounded by hills and later it converted into a big lake in 1839. That time Najafgarhjhil management remained in the charge of the local people. This jhil irrigated Delhi and Gurgaon lands, however, its water had been fluctuating but irrigated areas of the jailwere provided revenue to the Government. Some people showed some type of crops in this area. In the 1877-78, Najafgarhjhil management hand over from the Canal Department into the Public Work Department. Many reports described that many vegetables were grown in the bank of jail. Revenue Rate Report of 1877 described that 'sixty-five villages were more or less benefitted by Najafgarhjail.'(NajafgarhJhil Drain, File, No. 79, 1886, Vol I, DC, Delhi Archive,) Soon this jail become avictim and dried up. British Government did not renovate Najafgarhhill because they

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abandoned own responsibility. However, Canal Department which was responsible for the take care of the Najafgarhjail, but this department did not show any interest in the resurrection of jail. Moreover, Canal Department put a proposal of transfer of the management of the Najafgarh jhildrain from the Public Work Department into the hand of the Deputy Commissioner of Delhi. W.S Hamilton, Esquire, Senior Secretary to the Financial Commissioner, Punjab, believed that Deputy Commissioner will take more interest in it than the Canal Department.'(Ibid) In 1899, management of Najafgarh Drain transferred to the Deputy Commissioner with the hope that he would be improving the condition of the drain. But jail had been neglected. The fact was that income of the Government from the jail was consistently decreasing and by 1899, the annual income average was reached at the Rs. 2,900. The government wanted to raise income from the revenue. Major Device wrote that the drain irrigated about 36 villages that were why Government started to work towards the repairing jail. But Najafgarhjhil constant shrunk their area because Government had abandoned old system of regulating which were using local people. Since 1803, British population was consistently was increasing in Delhi. First, they choose their settlement in Dariyagunj, Civil lines and another northern part of Delhi because there was fresh water channel which gets fresh water for daily uses. Initially, Government of India did not make any policy on water management in Delhi, they followed old policy. Their first priority was that water must be supply in Europeans colony from these channels. Channel and wells were enough for them in the initial period. But after 1858 they faced problems of drinking water in the city. After 1866, they brought change in the Government water management policy and Government took interest in the water controlling. They thought that water perhaps might be a big source of income for the Government. But most important fact that water management still was in the hand of the local community. Since the Medieval period, rulers of Delhi took only tax from the farmers and instead of they built wells, boalis, canals, etc. If villagers constructed canals, wells, bunds, boali or tanks then rulers could have exempted from the tax. It was a decentralized system in which state constructed water bodies but water management was in the hand of local people. Only canals or big lakes were under the state. British Government adopted a different perspective on the natural resources; they deliberately controlled over all natural resources. In order to British Government brought "The Northern India Canal and Drainage Act" in 1873. Through this act, Government was entitled to use and controls for the public purpose the water of all river and stream flowing in natural channels, and all of all lakes and other natural collection of still water. Through the act, they claimed that British had right to constructed, maintained and control of all canals, channels, and reservoirs. It means that the old system of the decentralized systemof water management was to be finished. The government established a centralized system on water management. A canal officer was appointed and hand over jurisdiction over the canal, tanks etc. All the rights of people over the water such as navigation or fishing were diminished. But the most important fact was that people of Delhi did not show any resistance against this Act. Natives had lost all rights over the water resources. Perhaps, this act did not affect villagers because villagers were not fully depended on canals, river, or channels. They had own wells in villages and these wells were enough in rural villages. For their animals purpose, they used to ponds which were an adjacent village. They were still managed own water sources in villages. But because of "The Northern India Canal and Drainage Act, 1873" all natural bunds, ponds of Delhi soon reached in the dilapidated condition. On the one side villagers of Delhi had lost all rights over the canals, drains, channels or ponds and another side British authority did not also give heed towards the protection of natural water resources. Rain harvesting system which was the backbone of all natural water bodies had neglected by British Government.

In lieu of, they introduce water pipeline supply system in Delhi. But these water pipelines were available only for city's people. All the Delhi's canals, channels, and Najafgarh drain had now turned into these wage line. However, water pipeline supply was much easier instead of digging new wells or constructed canals. The Delhi was blessed with perennial Yamuna River which was providing enough water in every season. Most probably reason was that through the water pipeline system, Government could have easily imposed water tax on the people. For them, free water can be sources of income. The system of the supply of pipeline water was much cheaper than repaired old channels. They were also considered that through the supply of water pipeline, they can avoid many diseases which generated from contaminated water such cholera and malaria. When they shifted their capital in Delhi then first priority was provided to fresh and pure water to the British citizens. They deliberately closed or dried up channels and canals as wells as many wells and boalis because they considered these were not fit for good health.

Since 1866, When Government had started seriously mull over the management of water supply. Since 1858, the demand of water was constantly increasing in Delhi and Government could not have avoided this situation because sanitation officers suggested in his report that contaminated water was amajor cause of large number death of people. They found that people were still using unfiltered water from canals and wells. Lieutenant General R. Maglagan, Secretary to Govt., Punjab, Public Work Department, made a scheme for the water supply in which water was to be drawn from the series of wells in the bed of the Jamuna River in the same manner as in the Lahore scheme. At the start, they select a place for the new wells which was situated near about Salimgarg but later on, they found that it was not a good idea for this scheme. They found that by this time Western Jumana Canal which was

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flowed between Salimgarh Fort and Red Fort by this time had become a Nallaor sewer. When Lieut. General R. Maglagan visited in the Delhi in1877 then he found that this channel was covered with a foul scum and water had contamination. For the worse condition of this channel was responsible only for British Government because since 1873 Government snatched all rights of repairing and maintenance of canals, tanks, channels from the local people. People could neither have used water of channels for drinking and agriculture. In the consequence, without maintenance and repairing most of the canals and channels had dried or changed into the drainage. For example, a great canal which was run through the center road of Chandni Chowk. Once a time, it was provided pure and cold water to the people of Delhi. But later on, the great canal remained choked, and some part of it encroached and damaged. In 1817, Lord Hasting took interest to repair of the canal and task was entrusted to Captain Blane. Thomas Bacon wrote 'the expense incurred by the Government in the work scarcely amounted to two lakh and ahalf, about £ 25,000, and this was repaid by the increased revenue in very few years.' [13]Finally this canal was open for public but later on, this canal again becomes neglected and dried.A British Officers ask for permission to open to this canal but permission was not granted. After 1857 this canal was neglected by the Government and by 1911 this canal was only nulla (sewage) and finally, this canal was to be closed forever. In 1877 British Government proposed that water supply should be from wells because due to their water management's policy most of the channels and canals had dried up or their water was not fit for health. Another channel which was run off by Roshan Aara Bagh, Mithaika Pul, and Civil Line was also closed although this channel was provided water to many gardens and colonies.

The governmentwas an expansion of water pipeline service in the city because it was much easy for them to impose a new water tax on people. But a problem was that people of city and countryside were still using wells for drinking. When channels and canals in the name of sources of many diseases were dried up then city people neither show any resistance nor tried to save water sources. City people were involved in a business that's why they did not resistance against the control of the Government over the water. British authority was with the strength of mind to control over all type of water resources. They know very well that due to the existence of wells in the city; water cannot become a source of income for the Government. Almost every mohalla or colony had own well which was avery important role in people's cultural life. Every community of city fully depended on wells and they were also responsible for the caretaker of wells. It was a big dilemma for the Government that how does popularize water pipeline system in the city. Without the tax, they can't expansion pipeline service and it might be an extra financial burdenon the Government. British Government did not wantto incur any financial burden. In order to Government launched a campaign against the wells of the city and tried to prove that wells were the main cause of malaria, cholera and other diseases. However, some people were against this campaign and they were not ready for British interference in their wells culture system. The wells were not only important for drinking water but also religious matters were also associated with it. But rich people of the city took interest in water pipeline connection because cleaning and repairing of the wells was very expansive and tedious task.

Water supply through the pipeline was not an easy task and soon it becomes a big challenge for the Government. To provide drinking water to people. In 1884, an officer Mr. Morley was appointed for the Delhi water-supply and he had already worked with Mr. Binnie who had good experience in the water management. G.S Morley, Assistant Engineer to the president and members of the Municipal Committee, presented a report before the Government, in which he estimated that at the present Delhi population had reached at the level of 167,000. There were about 3,200,000 gallons water per day required for the city. At present, as the daily provision, there were about16 gallons per head water available. He recommended two sites for constructed new wells for the water supply. First, he recommended that wells should be established near the government plantation, known as the Bela plantation. The site was to be found, opposite the Kudsia garden above the Hindu burning ghat. The second site was selected near the IdgahSerai on the Ridge. But after few months, he found that both sites were not appropriate for the water supply and both sites were abandoned. New two other sites were discussed and examined first Bhojla Pahari which was near the ChitliQubr and Turkman Bazar. The second site was selected near the Mutiny Monument (Ridge). The first site was abandoned due to lack of enough space for a large reservoir; however, it was elevated so that it could supply pure drinking water to Sabzimandi and the Sadar Bazar. Most important reason for given up that this site was situated inside the city and its maintenance was very expensive for the government. Another reason was that Government wanted immense space for the reservoir but in the pack place was not available enough place. Mutiny Monument (Ridge) was also rejected due to two reasons: - first, there was not enough space and secondly, it was a historical spot that was why Government did not allow constructed reservoir here. Finally, he found suitable place Hindu Rao's house. This place was elevated because there was only one mile far away from the Yamuna River. In spite of all efforts, Government failed to full fill scarcity of water in the city. However, this scheme was good but later on, scheme proved failed to provide sufficient water. Soon this scheme becomes center of criticism such as Mr. Parkes, who was Executive Engineer of Delhi; he criticized the Mr. Binnie and Morley's scheme because by 1882 this scheme could not full fill demands of water in the city. C. Poolard also indicated the weakness of Morley's water management scheme, he points out that placing the wells in one long line was a major cause of

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decrease of water in the wells. He argued that wells should have disposed of in two lines and each line should have connected with sumps or pumping well. The pipes were laid too high while Poolard wanted laid pipeline nearer the bottom of the well.

In 1889, Lieutenant Governor of Delhi called a meeting for discussion on the project of water-work and sewage arrangement in Delhi. At this time, Municipal Committee wisely decided to undertake the whole scheme but for it, they required a loan. The first time British Government made a loan of Rs. 9, 00,000to the Municipal Committee for the water work and drainage projects in Delhi. The Punjab Government also sanctioned 10 to 11 lakhs rupees for these workers. But the budget was not enough for the water and drainage work in the city because both Government and Municipal Committee were reluctant to spend money on this type of work. Whatever Government spends money which was only for European and urban colonies. While most of the populations were lived in rural or villages, there was no minimum sanitary and water pipeline service. All villages were ignored by the Government and all sanitary and water work tasks were left in the hand of local bodies. But lack of financial sources local bodies could do nothing because Government did not provide sufficient budget. Moreover, water requirement in the city was consistently increasing. There was about 1,730, 000 gallons daily was required for the city and it was cleared that with the time met of the demand of water would be increased. But soon, the supply of water pipeline faced as evere problem of unfiltered water because water pipe sucked up sand in the trench wells. There was a major problemwith water pipeline which Municipal Committee had been facing time to time. It was a type of emergency because most of the people in the city had habitual of water pipeline. They made many complaints of unfiltered water which could be generated a diseases. As soon as possible water pipeline system put into working order. The second problem was that water was not regularly supplying in thecity because filter water was not supplying frequently from the Yamuna River. This was partly due to that water pump sucked up sand with water in the trench wells. Municipal Committee compelled to spend a sum of Rs. 1, 66,100 for water supply. To meet this additional expenditure Committee Municipal demand a financial add from the Government but Government did not provide funds. Instead of funds Government show interested in given only loan. The government does not want to be incurred any financial burdened that was why they made a loan of Rs. 1, 65,000 to the Municipal. For the Delhi water work required about Rs.7, 57, 240 but Municipal Committee could arrange only Rs. 5,24,028 The expenditures of the Municipality on water work was continually increasing, therefore, it was necessary for Municipal Committee that imposes anew tax and the increasing sale of water.

Municipality always faced some problems such as decreaseof water in the wells and after the sometimes most of the old wells were also sunk or dried up. Moreover, Yamuna River was also had been changed their course and the water level of river fluctuated in the season. In this condition pump was doing much work, due to excessive work, pump sucked River's sand with the water. Sand or soil through the pump reached in wells and recouped and the river water was clogged. In 1894, E.E. Oliver, Esq. C.E., Chief Engineer, Punjab, presented a memorandum regarding the wells water-supply. He stated that there were about 242 wells in Delhi, in which half of the wells sunk. It was assumed that by 1894, the supply of water would be required about 10 gallons per day and per head. According to Delhi's population, it was estimated that 173,000 or 1,730,000 gallons per day would be required. Old wells had sunk and new boring wells were digging at the bank of Jumna River. The pressure of extra expenditure on the new wells was increasing while supplying of water efficiency of old wells were regularly decreasing. It was estimated that by 1893 efficiency of supply of water from these wells had thrown down still 25 percent. River water also probably as much as 40 percent had reduced in the wells. First, they made immediate steps for improved water supply and a number of pumping working hour increased. But it could not be beneficial for along time and they had to be a permanent solution. Finally, they reached theconclusion of the cause of falling off water in the wells. For it they started work, first of all, they found that all wells carried down very near the clay and there being no sufficient opening in the staining, causing percolation to be very slow. Second, there was the closing up of space between wells and river and then making connections between them more or less watertight. There was a common problem of clogging of the soil between wells and river due to the bund itself becoming more and more watertight, and to the narrow strip of sand between the toe of the bund and the wells becoming partly chocked by particles of silt. Now, there were few options for them, digging new wells or repaired old wells. Unfortunately, they did not heed towards repairing or resurrection old water sources. This could be very helpful to erase of the water problem in the city.

In 1896, Messrs. C.E.V. Goument and B. Parkes submitted a joint report in which they described the causes of the reduction in yield of the trench wells in the Delhi. G. E. V. Goument, Esquire, Executive Engineer, Amaballa City water work Division, wrote to J.M. Campion, Superintendent Engineer, 2nd Circle, Punjab, Amballa, that 'This note contain my views regarding the cause of the reduction of yield of the Delhi wells, and experiments I have just concluded with Mr. Parkes, confirmed the opinion I expressed therein, i.e., that the soil through which the wells are recouped from the river has become clogged by acting as an over-worked filter.'[14] He found that the cause of the falling off the yield of the Delhi's wells was the increasing dirtiness of the filtering medium between the wells and the water in the river. By this time, new urban centers of Delhi were emerging very fast such as Sadar Bazar,

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Karol Bagh, Paharganj, Subzimandi etc. The government faced pressured to supply water in new urban centers. The government was laid water supply pipeline but these could not fulfill the met demand of water of the people. They have still considered that scarcity of water in the city was due to changeable nature of Yamuna River. It was surprising that all British authorities could not understand that shortage of water was not due to the change the course of water but they were responsible for it because their policy on water did not collaborate with Delhi's environment. Their centralized water policy was responsible for the shortage of water because they did not corporate with local traditions. They would not have considered that in future their centralized policy quick will give reverse results. But they did not learn alesson from their failure policy, they tried to the expansion of the supply of water pipeline system in new emerging urban center of Delhi. They focused popularized water pipeline system because maximum new water connections were beneficial for the Government. New connection of water pipeline could have become sources of income of the Government that was why they supported water pipeline system in Delhi and other cities. It was not the first time then British considered that water could become a source of income while in India because they had started water pipeline system in Lahore. Water pipeline system was to be successful in Lahore that's why they introduced the same system in Delhi.

With the water pipeline policy, water had become of a market product for the sell and Government tried to control over it through an imposed tax on it. Initially, since 1892 to 1905, Government expend scanty of money on maintaining of the water work. They were single-mindedness that water would not be free distributing to the people, subsequently since 1906, income from the water consistently increasing. For the last ten years, figures are described atrue picture of income from the sale of water.

Year.	Maintenance Charges.	Income.	Year	Maintenance Charges	Income.
	Rs.	Rs.		Rs.	Rs.
1901-2	41,300	26,540	1906-6	54,168	67,839
1902-3	46,682	36,757	1907-8	53,920	58,111
1903-4	37,572	40.349	1908-9	66,775	65,345
1904-5	39,283	29,734	1909-10	61,033	57,591
1905-6	46.726	42,624	1910-11	41,282	62,698
Total					
Annual Average					
	2,11,563	1,76, 034		2,77,178	3,11,586
	42,315	35,207		55,436	62,317

Source: - Extension of Water Delhi Works, 197/1909, Commissioner, Delhi Archive

This table illustrated that the expense of maintaining the water works was high then income. Through table, we can see most gratified improvement in income in the last five years. The result shows that popularity among the people, thewater supply had been increasing and with the time improved efficiency in water management. The demands for the private connection were consistently increasing because people undoubtedly recognized the advantage of a pure water pipe supply. In actual fact, due to British policy maximum traditional water source had disappeared from the Delhi's geographical map. In the consequence, there could have been seen a shortage of water in the city. Municipal Committee already was under a lot of pressure shortage of supply for pure water. On the other side, the population of Delhi had increased than which was in 1881. However, demand for the pure water was still required a little more than 10 gallons a day per head, but the population of the city had reached by this time at the level of 2, 32,000 but water supply was still only 7 1/2 gallons per day. Due to inadequate water supply, the discontent among the people could be seen in the city. People made many complaints against the inconsistent water supply. Municipal Committee had been receiving many complaints from the people on the subject but Municipal Committee was incapable to extend new water pipeline in the suburban area. It was very interesting that on the one side demand of water in the city were constantly increasing and another side British authority consistently encouraging the people for new connection of water pipeline. In July 1909, another special committee appointed so that it could be the considering on this matter. Committee modified some of the rules regarding water supplied to the

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private consumers, and the committee recommended for increasing of rates of water supply so that annual loss of Municipal Committee could be reduced."[15] Mr. Aikmen, who was a prominent member of in this committee, estimated that there were required7 gallons daily per head of the city's population in 1881. And now water required in the city had reached15 gallons daily per head. It was absolutely necessary in the case of Delhi which there was no hope demand could be reduced in near future. While Delhi Municipal Committee estimated25 gallons water daily per head was required in the city. In 1905, Major Parsons noted that the water pipeline had to lay to the Sadar Bazar but water reached only at Deputy Gunj town. Merchant classes of that Sadar Bazaar were frequently doing complaints about ashortage of water.

Many British officers indicated towards the appalling condition of poor water management of Municipal Committee but British Government did not give heed to the water problems. They neither provided enough water nor encouraged the people for water conservation system. There was a huge demand for the water in the city and Municipal Committee could not have full fill demand of pure water. Municipal Committee compelled to supply of unfiltered water so that shortage of water could become less. The municipal committee had used to with this type of situation was a common scenario in every summer season. Mr. Humphreys also pointed out towards poor condition of water supply in the summer of 1908.He wrote that 'over 2,000,000, gallons per day were being regularly pumped. The present filter beds were designed to filter only 1,200,000 gallons daily and in order to comply with the demand, water had been forced through them too quickly without being properly filtered. This is circumstance might be dangerous.'[16]

Municipality Committee hadal ways been shortage of funds and due to a shortage of funds they could neither spend money over the improvement of water system nor repaired old existed water pipeline system. They had only one way to put extra the water charge on the people but people were not easily ready pay more. They comprehended that charge on water was very low on private consumers, while poorer people enjoying free of thecoast of water. However, Municipal Committee was under the large debt but their first priority was not expenditure on water. Municipal Committee did spend Rs. 10, 37, 800 on water facilities in 1891. Since 1910, the sanitary Engineer and the Sanitary Commissioner to the Punjab Government were putting pressure on the Municipal Committee for increasing the water supply in the city. Municipal Committee had only one way to an increased tax on water because Government was not keen to provided funds for water facilities. An announcement put another pressure on Municipal Committee that Government decided Durbar ceremony will be held in Delhi in 1911. It was assumed that about one to two lakh people would be assembled at Delhi and for the huge crowded there would be required of a large quantity of water. The first time, Government recognized the urgency of the matter and gave a loan of 4 ½ lakhs at 4 percent to Municipal Committee. Durbar committee also paid to Municipal Committee a sum of Rs. 90,000 to meet its share of the expenses, and the cost of the temporary plant required to provide the enormous amount of water to be furnished to the campus. New water engine was provided to the Municipal so that it could be installed before the Durbar ceremony.

Imperial Durbars were always a big challenge for the authorities because lakhs people were to be assembled in Delhi. During the Imperial Durbars, authorities did hard work to managed to meet the demandfor water for the guests. On the third Imperial Durbar was required immediate action because in 1902 was required about 9, 00,000 gallons water daily. And it was assumed that during the third Durbar ceremony, drinking water in the city would require about 2,200,000 gallons. At present requirement of the city for the water had increased from 9, 00,000 to 1,300,000 gallons per day. It was estimated that on this occasion, vast crowds will be flock to Delhi. Sanitary Commissioner of Punjab estimated that requirements of water would be double that of the previous Durbar. The ordinary consumption of water at Delhi now had reached the level of 1,500,000 gallons daily so it was assumed that without making any provision for increasing water supply would be very difficult. It was also estimated that the minimum daily requirements during the' durbar will amount to 1,500,000 + 2,600,000 = 4,100,000 gallons.'[17] So the total amount of water requirements was estimated about 5,000,000 gallons daily for the Durbar ceremony. Due to the high demandfor the water, they compelled constructed are servoir on the Ridge, this reservoir could have held containing 2,500,000 gallons water. But this reservoir also could not full fill the city's demand for the water. In 1909, Mr. Aikman, the Sanitary Engineer to Government, Punjab, had already made a proposal in which he required immediate actions for increasing the water supply 3,500,000 gallons to 5,000,000 gallons daily. He also proposed for new tanks, three new sand filters, a clear water reservoir, a new main pumping engine and anew auxiliary pumping engine for the whole city. There were existing two filter beds; each had about 9000 sq. feet in area and capable filtering at 40 gallons per 24 hours. By 1911, there were 2,700,000 gallons water per day was supplied to the city. In addition, there was required 5,000000 gallons water daily for the Durbar ceremony. Total an additional 2,300,000 gallons was required.

On the other side, urban people too were very keen for the new connection of water pipeline that's why their wells were not clean due to lack of proper maintenance. Cleaning of wells was not easy because it was very tidy and expansive task for the people. Many of the wells had dried up or left in the ruin condition. There was much easy to take new water pipe lane connection then cleaning

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and repairing of the wells. Moreover, people were not keen to protect their natural and artificial sources of water while these were constantly going to deterioration. British report tells us that bunds, canals, wells, and tanks were in dilapidated condition and people were not interested in the preserved of the natural sources. It was the main reason that people's dependency on new water pipeline was increasing but Municipal Committee unable provided pure water. By 1911, out of a total number of 2,449 unmated private connection as many as 1, 866 had ¼ in ferrules. The number of ¼ in connection had increased very rapidly in the last three years, in 1907-8 there were 1,145 connections while 1,500 new connections added in 1908-09, by 1909-10, 1,866 more new connection installed in the city. With the extension of the supply of water pipeline, put huge pressure on the Municipal Committee. Municipal Committee took advantage of this situation in the enhanced the tax on the water supply. People had no choice, however, some members of Municipal wanted increase charge on water but others opposed of this scheme.

After transfer the capital from Calcutta into Delhi, the area of the city stretched out in every corner, new colonies emerged as dense colonies. New capital provided good employment opportunity that's why migration was very fast in Delhi. New colonies were fully packed with the new were why poor and lower migrated people took shelter into dirty colonies. Slums areas in the city had become big problems for the Government and Municipal Committee was already under the enormous pressure. Municipal Committee was unable to provide pure drink water in the emerging slums. The government tried to check migration in Delhi and made a plan to remove slums but failed. Time to time they made a plan to clear the slums in the Ajmeri Gate but they failed. For new migrators, a new colony Karol Bagh was established in the western city.

In the meantime, First World War (1914) broke out, in which Britain was doing participating. All developing work in Delhi had been suspended and Municipal Committee too could not much work in water supply due to a shortage of funds. By this time Delhi had become more congested in which north and east Delhi had enough developed till 1921. Shahadara was a large and crowdedcolony; it was the new hub for the new migrated people. Large-scale constructions in new capital attracted in the large scale of labours and artisans from every corner of India. Famine and epidemic diseases were also responsible for this migration in the capital. Municipal Committee felt a lot of pressure to full fill the huge demandfor water in the city. Shahadara which had become crowded place of east Delhi, it was suffering from the inadequacy of water since a long time. People of Shahadara were used water of two or three wells of the neighborhood. Executing Engineer, Eastern Jumna Canal, showed intimated for his inability to supply of canal water in the Shahdara. But due to the public pressure, he allowed only ten million gallons water from the tail of the canal. However, he had cleared that it was not possible in future for the Canal Department could some arrangement for a regular supply for Shahdara. Delhi Municipal's Engineers make a scheme of constructing a big tank which could be pumped daily quota of water. They had to be drawn water from the canal and stored into the tank by pukka channel. Canal Authority found out an easier plan for water supply that tube well was a good option for the Shahdara. They found that borings well was much cheaper. It was assumed that the cost of boring was approximately about Rs. 300/- per boring well. Whole Delhi was divided into sixteen wards that water could be supply through the pipeline. The population of the city had reached the level of 2, 46, 987 in 1921. By this time, a large number of existing water pipeline had decamped, most of the old water pipelinewas leaking in different places. The Leaking water pipeline had become a big problem for the Government because sewage water was being mixed into drinking water. In the consequence, contaminated water had affected public health, due to highly contaminated water, sickness-rate and mortality rate from typhoid fever were very high in the city. Statistical data of the Government revealed that out of 939 deaths that occurred in the month of May 1928 (as compared with 696 in the corresponding month of the previous year) 531 deaths were verified as to their causes and no less than 98 deaths were traced to typhoid fever and 43 to infantile diarrhea. The government investigated then found that water was supplied with contaminated in many places of the city. Due to contaminated water, acid and gas were generating bacteria which were detected in water of Pahargunj, Chawari Bazar, Jama Masjid, Matia Mahal etc. They found that contaminated within the city was being through water pipes which were passing through drains, drain pits sewer etc. Thence, water was being in direct contact with sullage water. In the emergency water supply had to stop for some time because water pipes were liable to get corroded and the joints were leaky. Water was intermittently supplying due to strong suction foul-water or foul air through the leaky joints. This problem was not new, in the previous year many complaints had been receiving from the public about the unsatisfactory nature of the filtered water. Dr. K.S Sethana, who was Medical Officer of Health Delhi, reported on the contaminated of the filtered water-supply within Delhi City. He wrote in 1921 that "I have already remarked that the water pipes in some places of the city are passing through drains and sewers and that contamination of the water supplied in curtained areas of the city."[18]

Municipal Authority took two type of temporarily and permanent measures to remove the cause of contamination in these areas. They started work on the entire street hydrants were opened full bore with a view to flush the water-mains. Chlorine plants installed

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and remove water mains and water pipes passing through drains, sewers and drains pits. Achlorination tank was installed at HauzQazi to deal with the water main that passes through Jama Masjid, Matia Mahal, and Kamra Bangash. R.B Sohan Lal, who was Secretary of Municipal Committee, Delhi, put an estimated cost of Rs. 20 lakhs for all these work. Even we never heard about the contaminated water before the British Government, while, there were existed many open canals, wells, boali etc. which were used to drinking water. In the earlier time, sewage and drainage lines were constructed separately from main wells, canals, or tank. British Government abandoned old Indian tradition and laid water pipeline adjunct the drainages. The year of 1928 was great stressful for Delhi because a severe famine occurred in northern India and it also gave a great pain to Delhi's people. Fodder and crops of the peasants had devastated from the famine. There were about 361 villages directly affected by the famine. First time Government realized about the utility of old Indian tradition of water conservation system which they had been neglected. The bunds which were neglected from British policy, they had reached in the dilapidated condition. Now Government gave attention towards the resurrection of old bunds, tanks and provided funds for the repairs. Tekhandbund which was situated near the Badarpur, Government proposed to construct of it so that local zamindars could use for irrigations in their field. Another thing was that these types of the works would be generating employment for local people. Another tank was shamshi tank in Mehrauli which was built by SultanIltutmish in C.A. 1229, it was cleaned and digging up. The government also promoted to local zamindars to constructed local water sources. Two zamindars of Delhi submitted a petition to the chief commissioner of Delhi about the constructed of bunds in the villages of Maidangarhi, Deoveli, and Neb Sarai. But District Board was fully responsible for maintenance of bunds. By this time there were about 20 bunds existed but District Board neither maintained nor allowed to local people. The financial condition of the District Board was not good for such as could undertake big scheme in which involving heavy expenditure. Government attitude was responsible for it because they were not keen to provide sufficient funds for the repairing of bunds. However, bunds were beneficial for the Government and people as well as these were maintained ecology balance. In the rainy season, bunds were held maximum water whichwas provided water in hot weather to the farmers and their animals. As well as these maintain underground water table in every season and due high underground water table, water in the wells found on the high label. British revenue report reveals that wells were major sources of irrigation in Delhi. Instead of resuscitating of bunds, Government took little interest in the construction of new wells and revived old wells because they considered that repairing of bunds put the huge financial burden on Government revenue but wells could be repaired with the little funds. Major Webb asked for a grant of Rs. 6400/- for the construction of new wells as well as for repairs to the existing wells. The government considered that wells could be more beneficial than bunds because wells were main sources of drinking water. It was assumed that construct of wells in the Shahdara tract would be at a rough cost of anything from Rs. 200/-to Rs. 400/-While a digging wells in the Najafgarh area would be at a cost about Rs. 800/-. In the short, a new well could be digging at the cost between Rs. 400 to Rs. 1000, while repairing or construct of bunds would be highlycost. The government made grants for new digging wells for the people but grants were not for zamindars because they had enough money and they can construct own expenditure. But Government makes some provision for the zamindars that they could have taken aloanat the interest from the Government. Major Webb given data of existed wells in his report that there were about 31 new wells and 183 repairs to wells required in the city and the approximate cost was assumed Rs.6400.Due to good facilities of irrigation, cultivated area of Delhi had reached 228, 647 acres in 1927. Next year, the weather was not favorable and rain average in the 1927-28 fallen, due to the scarcity of rain, agriculture production fell down in 1928-29. Peasants were under the great stress that was why Government sanction loan of Rs. 36, 675 under the Land Improvement Loans Act, so that peasants could improve their lands and constructed of new wells. This fund was not sufficient while groundwater table was consistently felling down and cost of digging well was increasing. Moreover, only big zamindars or peasants took benefits from the Government loans and remains farmers were still depended on rainwater or bunds, which already had been drying up. In the consequence, dependencies of the farmers on wells were increasing, as well as the demandfor water growing. Moreover, Western and Eastern Jumna canals which were still a major source of irrigation was not providing sufficient water for the purpose. Administration report of the Delhi Province in 1928-29 demonstrated that land revenue was consistently decreasing due to the scarcity of rain. Since 1921 to 1931, the population of the city had increased about 44 percent and urban areas including Shahdara had increased about 47 percent. While the growth rate of the population of the rural areas was very slow. The pressure of population was putting an extra burden on Municipal Committee which was unable to full fill demand of drinking water of citizens. Census Report of 1931 showed that the urban areas had enough congested, there were 98, 483 houses were occupied by 447, 442 people or there were available on average of 454 persons per 100 houses. Aforementioned, it was estimated that there were 7 gallons daily per head for the population of 1881. In 1921, water demand had reached about 15 gallons daily per head. While Delhi Municipal Committee estimated water demand was required about 25 gallons daily per head. Water demand was required between 15 to 30 gallons daily per head but Municipality could not have full- filled the demands of the city. With the time, the population of the city was growing that was why

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city expansion was necessary. City wall between the Delhi Gate and Ajmeri Gate was an obstacle in the city expansion. Municipal Committee tried to fall down city wall but Military Authority wanted to preserve the wall. According to thecensus of 1931, the populations in the Delhi Municipal areas were 3, 47, 539. Trade and industries were emerging very fast in old city and space was limited in the old city. British Government considered that city expansion towards the western side could have been suitable. Karol Bagh was established as new colonies for lower caste, migrated people and labours. Municipal Committee gave theduty to provided drinking water to Karol Bagh. It was assumed that next 20 years population would be add about1,33, 000, and total population 3, 47, 539 + 1, 33, 000 =4, 80, 539 will reached in 1951. But water supply in every house was very difficult for Municipality. Municipal Committee was under the great pressure which was already crying for the shortage of funds that's why the expansion of water pipeline was very slow. In spite of all problems, the demandfor new water connection was consistently increasing but only ironic people had private water connection and rest of the people were depended on public water tape.

Due to huge met of demands of new water connection form the city people, Municipal Committee's income from the sale of water had reached Rs. 1, 01, 227 as against Rs. 93, 012 in 1937-38. Municipal's income increased due to the increased sale of water but water availability was still a difficult task. The annual expenditure of the Municipal on water supply consistently was increasing but water pipe expansion still unsatisfactory. However, Municipal Committee praised himself about the expansion of water pipeline in the city. Municipal Committee maintained 84 miles length water pipeline in a year, it was much increased about 1.3 miles than last year's figure. The Municipality sold a quantity of water 83, 74, 08, 246 gallons in 1938-9 year as compared with 77, 04, 54, 833 gallons in the previous year. Income from the sale of water amounted to Rs. 4, 50, 861 as against Rs. 3, 41, 929 in the previous year, the increase in part due to an enhancement of 0-2-0 in the rate per thousand gallons. facilities of drinking water. By 1947, Delhi still had been facing water problems, overpopulation also aggravated water problem. Many schemes were launched after 1947 but all scheme failed because of lack of water conservation system.

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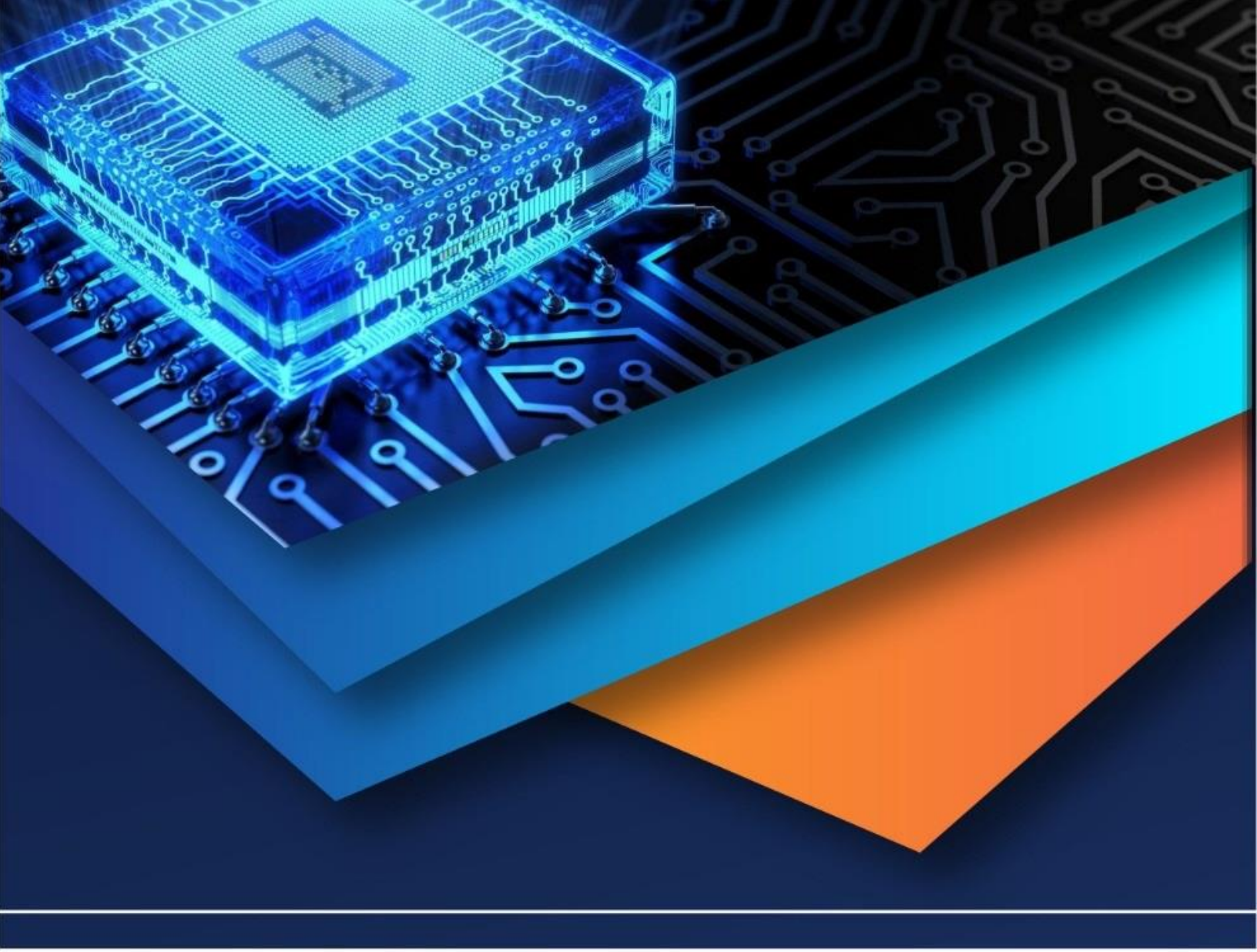
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