Journal of Entrepreneurship & Organization Management

Yadav and Dahal, J Entrepren Organiz Manag 2020, 9:1

Review Article Open Access

A Review of Issues Associated with the Construction of Irrigation Project with Special Focus on Sikta Irrigation Project in Nepal

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Abstract

The study A Review on Issue and Problem Associated with Sikta Irrigation Project of Banke District in Nepal was conducted during the period from March to August, 2019. The main objective of this study was to find the problems of Sikta Irrigation Project in Banke district of Nepal. Published literature from different sources such as thesis, papers, manuals, database, and reports were collected and thoroughly studied. The study found so many problems associated with the Sikta Irrigation Project (SIP). Of all those problems, environmental, socio-political, technical and financial problems are the major ones. SIP is the project of national pride, and it is under-construction in Banke district of Nepal. The most important and ever observed problem in the construction field is the failure of canal bed and sides due to dispersive soil. The study would like to suggest that soil test should be conducted as per the expert's advice before construction of the canal or other structures. Monitoring and control system from the concerned agency should be properly implemented for the construction of Sikta Irrigation Project in the days to come.

Keywords: Sikta irrigation project; Dispersive soil; Canal failure

Introduction

The construction of the projects is an important phase where socio-political, environmental, technical as well as financial problems arise. The under-construction project "Sikta Irrigation Project" in Banke district is facing socio-political, environmental, technical and financial problems. The Sikta Irrigation Project was planned with a view to relatively high incidence of rural poverty in Banke district in the mid east-western development region where 40 percent of the rural households fall below the poverty line [1]. Most of the land is covered by forest and only small areas are covered by urban area [2]. The socio-political problems are the cause by the stakeholders or local society. Some of the local people are giving pressure to change the alignment of the canal based on their personal interests. Thus, the Sikta Irrigation Project team is seeking solutions for that socio-political problem. While refering to the literatures, it is noticed that local political people are manipulating the jobs created by the project. To run the current project smoothly, the social-political problem should be solved immediately by the management team [3]. The management of the excess soil from the excavation is seen as another environmental problem. Deforestation of the land through which the canal passes in the jungle is also an important environmental problem. The assessment of the environmental impact is required for deforestation and canal passing which is taking more time and delaying the time schedule of the project. Dust polution, production of smoke, noise, vibration, disturbance of road due to transportation of materials, water table disturbance, imbalance in local society etc are the signs of environmental problems created by the under-construction project [4].

Similarly, the technical parts of the under-construction project such as design calculations, cost calculations, drawings and detailings, specifications, implementations, supervisions, monitoring as well as controlling of the activities etc are disturbed due to technical problems in the project [5]. One of the technical problems is of dispersive soil in Sikta Irrigation Project. The treating of the dispersive soil is going on which is taking more time delaying the schedule of the project. Financial problem is also a problem for this project [6]. In such situation the bill of the vendors as well as contractors is not payable on time [7]. Generally, the progress of the running construction project is always affected by socio-political, environmental, technical as well as financial problems directly or indirectly.

To maintain the required schedule, quality as well as cost of the running construction project, the problems should be solved immediately [8]. The Sikta Irrigation Project which is the project of national pride is also a running construction project which is situated in Banke district of Nepal. The main objective of this study was to find the problems of Sikta Irrigation Project in Banke district of Nepal.

History of irrigation in Nepal

In 1923, Chandra Nahar (Canal) was constructed. Similarly, in 1940, Judha Nahar was constructed [9]. As a matter of fact thousands of Farmer Managed Irrigation Systems (FMIS) were scattered in the mountains, river valleys and Terai. In 1950s, many FMIS were in Kathmandu valley, which used to be one of the fertile valleys of Nepal. Due to the network of irrigation systems, the Department of Irrigation (DOI) was established in 1952. Many of these irrigation systems which were constructed in 1960 and 1970 were made Agency Managed Irrigation Systems (AMIS). The FMIS were converted into AMIS. In 1980, the FMIS were first recognized by the government. In 2000, irrigation played an important role in increasing agriculture production.

The irrigation, which is the backbone of agriculture, consumes a large proportion of water. The demand of food is increasing day by day due to the population growth. Multiple uses of water such as for drinking, irrigation as well as hydropower, etc contribute to the shortage of water. The sources of water are drying up due to forest depletion. This situation puts more pressure on the irrigated agriculture which

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Recieved November 08, 2019; **Accepted** January 27, 2020; **Published** February 03, 2020

Citation: Yadav B, Dahal KR (2020) A Review of Issues Associated with the Construction of Irrigation Project with Special Focus on Sikta Irrigation Project in Nepal. J Entrepren Organiz Manag 9: 277.

needs the management of irrigation system [10]. The farm owner tends to manage irrigation through locally available sources. When the local sources are not available or insufficient for the farm, alternate sources are tried, such as from the perennial river, deep boring system etc. The irrigation from the perennial river is required for the irrigation system. So, for permanent irrigation system, all the components of the irrigation system such as weir or barrage, main canal, secondary canal, cross regulator, head regulator etc are constructed, which is known as construction of irrigation project. The irrigation system helps to irrigate the farm as well as the hydroelectricity can be generated by using that reservoir if the situation permits [11].

In 1923, Chandra Nahar (Canal) was constructed. Similarly, in 1940, Judha Nahar was constructed. Thousands of FMIS were scattered in the mountains, river valleys and Terai. In 1950s, many FMIS were in Kathmandu valley, which used to be one of the fertile valleys of Nepal. Due to the network of irrigation systems, the DOI was established in 1952. Many of these irrigation systems which were constructed in 1960 and 1970 were made AMIS. The FMIS were converted into AMIS. In 1980, FMIS were first recognized by the government. In 2000, irrigation played an important role in increasing agriculture production [9].

Types of irrigation system used in Nepal

There are mainly two types of irrigation systems in Nepal. These are FMIS and AMIS.

Farmer managed irrigation systems (FMIS): The (FMIS) covers special status in the national economy and food security system of the country. Out of total irrigated areas in Nepal, almost 70% fall under Farmer Managed Irrigation Systems. They are the vibrant systems. The history of FMIS is long and they are still active as well as beneficial institutions for farmers of Nepal. So, FMIS is the national heritage of Nepal [12]. Secondly, FMIS is the symbol of democratic values. Furthermore, the community owning the systems manages the resources on their own. They evolve the rules and regulations on their own and implement them with consensus within the community. Thus, FMIS has a special place in irrigated agriculture of Nepal [12]. The irrigation system of Nepal is facing new problems or challenges. FMIS is not an exception. FMIS is facing the challenges brought about by the population growth, pressure on increased demand on food, environmental degradation and unavailability of local construction materials and competition on the allocation of water [13]. There are internal and external challenges to FMIS. The internal problems or challenges are of design, construction materials due to the depletion of the local construction materials, competition on the use of water, stagnated economic development, new legislation either ignored the existence FMIS or attempt is made to bring these systems under the control of local administration ignoring the need for development of polycentric system to strengthen the democratic values at the grassroots level and the process of assistance by the government to FMIS.

Agency managed irrigation systems (AMIS): The (AMIS) through Irrigation Management Transfer (IMT) Program is reported to have poor performance as compared to the others, and there are potentialities for their performance improvement through appropriate type of IMT [13]. IMT is a process in which some functions and responsibilities of management, formally exercised by a state agency, are transferred to an organization of the local users of the irrigation system. Appropriate IMT with well-defined objectives to the users addresses the target of increasing agriculture productivity and better irrigation infrastructure performance [14]. Thus, IMT attempts to address the problem of below capacity, poor operation as well as maintenance, negligible cost recovery, inadequate funds for management of irrigation systems and finally the problems hindering increased agriculture production. IMT is one of the most important methods of irrigation systems [15]. It is recognized that there is a scope for performance improvement of AMIS by improving the service delivery through responsibility division between the agency personnel of DOI and water user associations (WUA), in order to strengthen the WUA, the agency needs to consider that IMT is not just physical improvement, but it also includes the institutional reforms and agriculture productivity improvement. These components have to go together. One of the important features of IMT in the new approach adopted in Nepal is the signing of agreement between the farmers group and the agency with the responsibility division between DOI taking charge of maintenance and management of headwork and main canal, and WUA taking charge of below the main canal. The agreement thus signed between these two parties includes the provision of penalty for failure with legal action [15].

Socio-political problem of irrigation project

The pressures emerge from the owners of the properties that are near or adjacent to the construction project, community as well as urban organizations. The challenges in construction projects are caused by the issues like liabilities, avoidance, claims and mitigations, government issued permits, safety as well as labor laws [16].

The relocation of homes from the construction site to other places is a social problem [17]. Nearly, 1.3-1.9 million people were forced to move their homes which mean that there was inadequate information and thus funding for resettlement. About 1000 villages, two cities and 100000 acres of fertile farmland were affected in Three Gorges Dam Site, Hubei, and China. Construction project consumes energy and produces noise, dust and pavement damage etc. It produces large quantity of waste. Civil infrastructure project is major consumer of raw material and energy. The commercial as well as residential building projects consume nearly 40% of the total raw material. The construction project may affect the community growth, land use pattern. It may replace the residents near the construction project and brings about inconvenience to community nearby [18].

People's requirements donation, asking for job etc during the construction project are the examples of political problem. Similarly, repudiation, contract problems, labor unrest, hostile press, and delay in permit approvals also affect the construction project [19]. The political risk was viewed as emanating from an adversarial attitude of the host government but of late the source of these risks is considered environmental rather than governmental [20,21].

Environmental problem of irrigation project

The soil erosion, Sedimentation, hazardous waste materials, noise pollution etc raise environmental concern in Construction Project [22]. For example, the construction of dam has significant negative impacts on the environmental [19]. The three gorges dam is no different. The creation of the dam and associated reservoir has impacts both upstream from the dam and downstream. It affects water quality, and may increase the likelihood of earthquakes and mudslides in the area. The forests and towns located in that areas should be demolished in order to increase navigability on the river. And the destruction of the villages leads to problems of pollution.

Construction projects can have a significant problem on local environments and nature [23]. There are numerous sources of water pollution in the building sites, including diesel and other fossil fuels, paints, solvents, and toxic chemicals. Even minor chemical spills

leech into the ground and may enter waterways where they pollute the water and harm aquatic life. In the developing world, there are often less stringent requirements for the disposal of toxic construction waste products, resulting in significant local environmental damage following a building project [24]. Reducing the environmental effects of construction requires a collaborative effort from many different stakeholders. While legislators work to create regulations surrounding construction waste management and green building construction many global construction firms are taking the initiative to create, study, and enforce their standards for limiting the environmental impacts of construction projects [25].

Technical problem of irrigation project

The problems related to the design, drawings, specifications, rate analysis, cost estimation, improper implementation of method statement etc. seen during construction project are the technical problems [26].

On the other hand, quality problem, delay due to technical decision pending, etc are also the technical problems. Most of the construction projects get delayed due to the application of traditional construction practices. Similarly, cost overspendings, poor productivity as well as inefficient control action also occur due to the application of the traditional construction practices. The project fails to deliver on time, within budget and specifications due to traditional construction practices [27].

Following are the problems which should be managed properly to improve the construction project in right direction. Deficient Organizational Structure: The decision making of the construction project management is not getting the support from the procurement processes [28]. Deficient Communication: The contractors, subcontractors and owners are not having a common understanding of the project's state at any given time [29]. This is due to lack of a central data system. Weak Performance Management: It happens due to inadequate communication and lack of accountability. Connection Gaps: Absence of coordination among stakeholders [30].

Financial problem of irrigation project

Following are the categories of main financial problems during the construction project [30]. Payment Failure: It is classified into the following: Client's poor financial and business management, Withhold of payment by client, Contractor's invalid claim, Delay in valuation and certification of interim payment by consultant, Inaccuracy of valuation for work done, Insufficient documentation and information for valuation, Involvement of too many parties in the process of honoring certificates, Heavy work load of consultant to do evaluation of variation order, Cash flow issues: It is classified into the following. Contractor's handling of many projects at the same time, Contractor's unstable financial background, disqualified contractor underbidding the project cost, Lack of regular cash flow forecasting, Poor credit arrangement with creditors and debtors, Capital lock up, Financial resource issue: It is classified into two categories: Difficulties in getting loan from financers, Allocation of government budget. Market issue: It is classified into three categories. Increment in interest rate on repayment of loan, Inflation (material prices, labor wages, and transportation costs), Increment in foreign exchange rate (imported materials and plants). The problems such as payment failure, cash flow issues, financial resource issues, market issues during the construction project are the financial problems [31].

The problems related to the payment in the construction project are a general phenomenon [32]. Such type of problems has been widely acknowledged for more than four decades by previous research. An exploration of the key causes of payment delays and losses is undertaken in this study with the ultimate objective of seeking mitigation solutions. The study adopted a survey approach using an online questionnaire administered to practitioners from the New Zealand construction industries, comprising consultants, head contractors and subcontractors [33]. All the data obtained were analyzed using inferential statistical techniques, including comparing means and factor analysis. All the factor analyses enabled clustering of the related causes of payment delays and losses in order to find reduced number of causes [34].

Global Context of Irrigation Project

Lack of credibility, selfishness, anxiety, over work, habitual distrust, antisocial behavior etc. is the social problems in China [35]. The political problems such as corruption, income inequality, party governance etc. are more difficult. Corruption in china has certainly become more of issues as the communist party of china's policies, institutions and norms have clashed with recent market liberalization. The Chinese government owns the majority of china's assets that they spend without much oversight into the budget process. The Chinese government has wasted money on high profile infrastructure projects and government office buildings and invests in industries with high resource consumption, high pollution and low job creation. There has been a crackdown on corruption and many high political people have been jailed for getting caught up in the net of bribery abuse of power and other corrupt practices [36]. To manage the environmental problem, china has relevant environmental impact assessment such as taking discharge of major pollutants and the environmental impact into account during the construction period following pollution prevention and continuous improvement, proposing pollution control measures [37].

Lack of expertise or resources was found to be the major obstacle to improving the performance of Pakistani's construction project. As per Pakistani government's plan, infrastructure expansion project is of main concern. A rigid attitude as well as behavior of executive management towards quality, safety and risk management, plus more management and emphasis on employees' commitment toward project performance, better education and training are important for improvement. Lack of professional construction management implementation is common in the construction project. The insufficient contract administration, lack of professional planning, lack of competent project control, slow decision making, and lack of communication as well as lack of leadership are obstacles to improvement of Pakistani project. The project management tools and techniques are frequently used only in preconstruction and construction stages, which is not within acceptable range [38].

Pakistan is facing the problems such as political, socioeconomic and energy crises, security, crises suicide, bombing, foreign drones' attacks as well as worst situation of law and order [39]. Due to worst situation of law and order as well as security, small industries are in closing state. And cutting down the number of workers, unemployment situation is created there. Unsafe feeling as well as bad situation for survival, good skilled technical resources are migrating to the other places or countries, which is a big problem for development of the country. Rapid industrialization has imposed severe pressures on the environment. Air pollution, soil erosion, etc are the main elements of environmental problem.

In Japan, most of the theorists of sociology are concerned with specific types of social malfunctioning. They have considered forms of social behavior, such as crime, suicide, and divorce as indices of social dislocation. Sociologists have also concerned themselves with demographic effects of shift in population from rural to urban areas and change in population density. Environmental impact is defined as the impact caused by the proposed development activity which has including effects on human health and safety soil, air, water, climate, landscape and historical monuments, or other physical structures [40]. Generally, this type of environmental impact is due to running of construction project. Hazard is seen as the situation that in particular circumstances could lead to the loss of human being and its adverse impacts on the health of the people of the society. The adverse impacts of construction projects include resource depletion, biological diversity losses due to raw material extraction, landfill problems due to waste generation lower worker productivity, adverse human health due to poor air quality, lack of supply of portable water, lack of proper sanitation facilities. The environmental impacts during construction processes consist of ecosystems the impacts on natural resources and public.

Poverty, corruption, crime, illiteracy, unemployment, drug addiction etc are the main social problems seen in Bangladesh [35]. Corruption as well as rise and fall in political situation is seen unfavorable for development of the country. Due to unemployment situation as well as financial condition of the country, technical resources are migrating to other countries for better opportunities of life which is not suitable for development of the country. Noise is unwanted annoying and damaging sound. Tools and equipment are the major source of noise at construction sites. The use of excavation equipment machinery, pile driver and trucks or heavy vehicles is very common in many construction projects. The brick crusher as well as concrete mixture at the site of construction creates heavy noise. Water is essential for various purposes at the construction site such as for controlling dust, making concrete etc.

Illiteracy, poverty, child marriage, child labor, caste system, low status of women, gender inequality at work, sanitation and cleanliness, religious conflicts etc. are the main social problem observed in India. The construction project is a user of resources. Materials are derived from sources and suppliers, and minimization of waste presents particular problem. Although most of the materials in use are common to most sites, the fragmented nature of development constrains the practical extent of recycling. Further, despite the long life of its products, their eventual demolition or redevelopment can produce significant waste for land disposal [41].

The mass of resources used in the UK construction project is dominated by stone and primary aggregates: sand and aggregates extraction of these primary resources implies major environmental impacts from loss of habitat and ecosystem, damage to the landscape, potential subsidence problems and release of methane gas. Noise and dust heavy transport through populated areas confer local nuisance and contribute to restricted awards of extraction licences by local authorities. The same issues arise in the disposal or processing/recycling of waste. Construction project also has a major impact on the environment in its consumption of energy, both directly and indirectly. The large bulk of materials used consume a great deal of energy for transport. Taking into account both direct and indirect energy, the construction project consumes about 4.5% of resources of the national total. As a consequence of this energy consumption, construction generates over 40 million tons of carbon dioxide with equilibrium between the ground water as well as air and introduces the risk of pollution to create environmental problem [22].

Environmental problems bring about environmental change [42]. Climate Change: Due to greenhouse gasses, there are changes in the climate. Ecosystem & Endangered species: Both ecosystems and species are affected due to environmental problems on the planet. Deforestation: Nearly, 15% of greenhouse gas emissions come from the deforestation. The forests should be preserved. Pollution: Soil, air & water pollutions are the types of pollution. Water Scarcity & Water Pollution: Water scarcity is a major problem now-a-days. Loss of biodiversity: The lack of biodiversity put the food chain, water resources at risk. Overpopulation: Overpopulation should be controlled to maintain the environmental problem. Waste Disposal: Waste Disposal should be managed properly to get better environment. Land management & Urban Sprawl: Uncontrolled expansion of urban areas is a modern problem [43]. Public health: The health of human beings is an important issue to watch.

Similarly, the problems related to the design, drawings, specifications, rate analysis, cost estimation, improper implementation of method statement etc. seen during the period of the Construction Project are the technical Problems of the project [44].

The financial problems during the period of the construction project are payment failure, cash flow issues, financial resource issues, market issues etc [7]. The problems related to the payment in the construction project has been widely acknowledged by the previous researches of nearly more than four decades an exploration of the key causes of payment delays and losses is incorporated into this study with the ultimate objective of seeking mitigation solutions. The study adopted a survey approach using an online questionnaire administered to practitioners from the New Zealand construction industries, comprising consultants, head contractors and subcontractors. All the data obtained were analyzed using inferential statistical techniques, including comparison between means and factor analysis. All the factor analysis enabled clustering of inter related causes of payment delays and losses in order to find reduced number of causes. The payment problems mainly related to contractual issues financial strength of industry players, disputes, shortcomings of payment processes and domino effects. Among them, the financial strength of critical industry players was considered central to payment problems.

Regional context of irrigation project

In china, it is observed that lack of credibility, selfishness, anxiety, over work, habitual distrust, habitat disturbance and antisocial behavior are the social problems [35]. Corruption, income inequality, and party governance are the political problems. Corruption in china has certainly become more of an issue as the communist party of china's policies, institutions and norms have clashed with recent market liberalization. Bribery, kickbacks, theft and misspending of public funds cost at least three percent. The Chinese government owns the majority of china's assets that they spend without much oversight into the budget process. The Chinese government has wasted money on high profile infrastructure projects, different buildings of the government office and invests in industries with high resource consumption, high pollution and low job creation. There has been a crackdown on corruption and many high political people have been jailed for getting caught up in the net of bribery abuse of power and other corrupt practices [36]. The foreign investors are generally happy to see this cleanup work some have expressed fears that the crackdown also lacks transparency. Nonetheless, it is step in the right direction

for foreign business. The environmental problem in china has relevant environmental impact assessment such as taking discharge of major pollutants and the environmental impact into account during the construction period following pollution prevention and continuous improvement, proposing pollution control [37]. The environmental impact during construction the land excavation, soil fetching, and land occupation, appeared contractors at the working site, vehicles transportation and equipment installation at construction site and so on. The environmental problems are construction's dust, noise which has adverse impact on traffic, residents and ecological environment. The negative impact during the construction period of the construction project is temporary and short term which can be mitigated or prevented by engineering methodology and construction management.

The majority of the related stakeholders or owners including clients acknowledge the negative impact of low bids by the local consultants and contractors on foreign firms seeking work in Pakistan. The cost overrun factors, quality nonconformance factors, safety factors as well as nonperformance factors attribute to low bid environment. The major need of the construction project is to develop the attitude of the clients towards an active and mature project management system. So, a change in the views and attitude of the clients through awareness programs is very important [38].

Worst situation of law and order as well as security are seen in Pakistan, small industries are closed. And cutting down the number of workers, unemployment situation is created there [39]. Due to unsafe feeling and bad situation for survival in Pakistan, good skilled technical resources are migrating to the other countries, which is a big problem for development of the country. Rapid industrialization has imposed severe pressures on the environment. Air pollution, soil erosion, etc are the main elements of environmental problem. The increasing impacts of Japan's imitators and the possibility that Japan will follow such American measures may give the impression that the Japanese are being punished. But that will not be the case at all. By preventing waves of uncontrollable retaliatory protectionism, these measures will most probably preserve the health of the Japanese economy, considering how dependent it is on exports, and thereby continued political stability [39].

This type of environmental impact is due to running of construction project [40]. Hazard is seen as the situation that in particular circumstances could lead to the loss of human being and its adverse impacts on the health of the people of the society. The adverse impacts of construction projects include resource depletion, biological diversity losses due to raw material extraction, landfill problems due to waste generation lower worker productivity, adverse human health due to poor air quality, lack of supply of portable water, lack of proper sanitation facilities.

Corruption as well as rise and fall in political situation is seen unfavorable for development of the country in Bangladesh [45]. Unemployment situation as well as financial condition of the country, technical resources are migrating to other countries for better opportunities of life which is not suitable sign for development of the country. Noise is unwanted annoying and damaging sound. Tools and equipment at construction sites are the major source of noise at construction sites. The use of excavation equipment machinery, pile driver and trucks or heavy vehicles is very common in many construction projects. The brick crusher and concrete mixture at the construction site of construction project creates heavy noise. Water is essential for various purposes at the construction project site such as for controlling dust, making concrete etc. The construction workers consume water for their daily life activities such as drinking, bathing, washing, cooking and sanitation.

In India, illiteracy, poverty, child marriage, child labor, caste system, low status of women, gender inequality at work, sanitation and cleanliness, religious conflicts etc. are the main social problems. There are many independent states in India. And the technical people are searching good options for settlement and for migrating to other countries. The shifting of the good technical skilled people to other countries or places is not good for development of the country [46].

Environmental sustainability: The construction industry continues to face issues combating their effect on the environment as they produce 25–40% of the world's carbon emissions [47]. As these problems become more at the forefront of the global agenda, they will have to make changes to avoid negative attitudes from the public. This is not an easy feat for the construction industry and will take many years to accomplish [48]. Making significant changes in carbon emissions requires an entirely new project management approach focused on reducing in carbon emissions and water consumption. Taking care of the environment is a social obligation that the construction industry holds and must make steps to maintain that [5].

Project complexity: Construction projects are becoming more demanding and complicated in the design. This trend will only continue in 2017 and will pose a challenge for the scarce workforce. Therefore, firms must be selective in what projects they choose to accept. Taking too many projects may prevent companies from completing the job on time or cause them to lose all profitability from date slippage. According to Accenture, only more than 30% of firms currently deliver projects on budget and only 15% deliver on time. But this number of firms will only decrease as the number of skilled workers decreases and demand increases [49].

National context of irrigation project

Deforestation, pollution, water scarcity, water pollution, loss of biodiversity, overpopulation, and waste disposal are the examples of environmental problems. Most of the above environmental problems are also created by construction project [50]. Noise is unwanted, annoying and damaging sound. The brick crusher as well as concrete mixture at the construction site of construction project creates heavy noise. Tools and equipment are the major source of noise at construction sites. The use of excavation equipment machinery, pile driver and trucks or heavy vehicles is very common in many construction projects. The adverse impacts of construction projects include resource depletion, biological diversity losses due to raw material extraction, landfill problems due to waste generation lower worker productivity, adverse human health due to poor air quality, lack of supply of portable water, lack of proper sanitation facilities [51]. The problems such as corruption, drinking alcohol, misbehaving in public place, theft, robbery, kidnapping, violence, drug abuse, gambling, smoking in public place, are the examples of social problems of Nepalese society. The rise and fall of political situation Nepal is affecting the construction project easily and that is affecting the development of the country. Illiteracy, poverty, child marriage, child labor, caste system, low status of women, gender inequality at work, sanitation and cleanliness, religious conflicts etc. are the main social problems.

The problems related to the design, drawings, specifications, rate analysis, cost estimation, and improper implementation of method are the technical problems of the construction project. Such types of problems should be solved immediately for timely completion of the

project. And quality control refers to the ongoing activities that the construction project team will perform to ensure that the deliverable is of high quality [52]. This can include deliverable walk through, testing of subcomponents, complete checklists, and so on. Quality assurance processes are the activities designed to ensure that the overall processes used to create the deliverable are of high quality. These types of activities include third party audits, checklists to ensure that all parts of a process were complete and deliverable approvals. The team needs to have a quality mindset to ensure that work is completed with a minimum amount of errors the first time around [53]. The management team should understand that the goal is to catch any errors as early as possible. If you can build the deliverable with as few errors as possible and then find those remaining errors as early as possible, your overall construction project will have much fewer problems. Quality problems tend to slow up late in the construction project usually during the testing process. However, if you have a good quality process in the place, testing should only confirm that everything is working correctly. Then you can work quickly toward final approvals, implementation and a smooth production cycle. Cash flow is the main important force to move the work forward to complete the project in time. So, the financial problem should solve immediately to move the project forward smoothly [49].

Sikta irrigation project

Sikta Irrigation Project which will irrigate about 42766 ha. Of land Banke District [54]. The water source for this project is the West Rapti River, which originates from the mid-mountains in the Mid-Western Region of the country. In this district there is a small number of irrigation facilities such as the limited local surface and groundwater resources which would be suitable for small or medium scale irrigation development. There is no perennial source of surface water within this area and groundwater resources are limited. The closest perennial source of surface water is the Rapti River, about 34 km. from the project area. Thus, the government has given a high priority to the implementation of the large scale. The overall goal of the Sikta Irrigation Project is to contribute to the National Development Objectives of the government. The provision of irrigation facilities, together with the improvement of agricultural, support services which would improve the productive capacity of farmers so that agricultural production income would be increased. And the living standard of the people in Banke district will be increased [54].

Banke district is in the mid-western development region, and it has large potential for the agriculture development. The district could provide food grains for food deficit hill districts of Mid-Western Development Region such as Jumla, Mugu, Dailekh, and Kalikot. This would be only possible if agricultural production is increased. The total area of the Banke district is 235,980 ha. Out of which 58,990 ha. Is suitable for agriculture, 167,190 ha. Is covered by forest and the remaining 9,800 ha is covered by urban areas and industries [2].

After finishing the construction of the required irrigation infrastructure, the Project would put emphasis on assuring sustainable operation and management of the created infrastructure. This would be achieved by the establishment, activation and strengthening of Water User Associations who would assume responsibility for system operation and management. Women farmers would be encouraged and given preference while forming these user associations. The Project would also coordinate with the Department of Agriculture for the needed agricultural support services [54]. Sikta Irrigation Project is situated in Banke district in the mid-western development region of Nepal. The detail of the Sikta Irrigation Project (Figure 1) has been presented below.

This project is of national pride. Sikta Irrigation Project (SIP) is a new development type of project having 242% of future cropping intensity and 168% of present cropping intensity [54].

The total cost of the project is 7.3 billion having the internal rate of return 18% [54]. And the cost per hectare is NRS 215,450. The implementation period is 7 years. The aim of Sikta Irrigation Project is to increase the per capita income from NRS 1492 to per capita income NRS 4565 in future [54].

According to DOI, the main structures and their details are described here under.

Headwork: The diversion structure is weir-cum-bridge type with weir height of 5 m having the length 317 m across the west Rapti river, which is perennial type of source. It is located in Agaiya village 200 m from east west highway and nearly 58 km from Nepalgunj. Pond level is

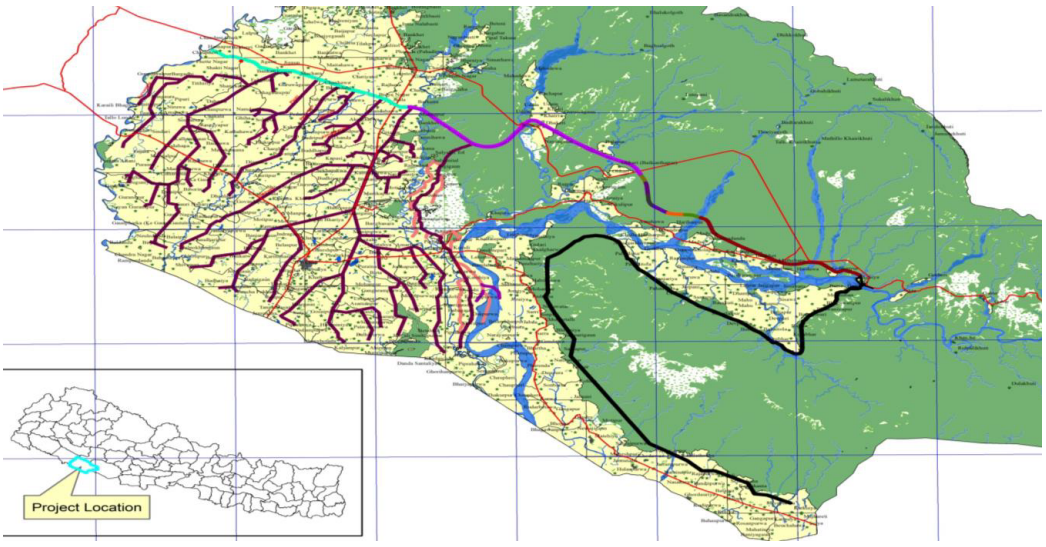

Figure 1: Sikta Irrigation Project Details (Department of Irrigation, 2019).

173.5 m average from sea level. The barrage has 18 nos of gates. Among them 13 gates have the length of 17 m each. 3 gates with right side under sluice part of the barrage have the length of 10 m each. Similarly, 2 gates with left side under sluice part of the barrage have the length of 10 m each.

Intake Structure: Maximum diversion requirement is 65 Cumecs. Right side bank feeder Sikta Irrigation Project (SIP) canal is 50 Cumecs, desilting basin flushing 12.5 Cumecs and Raj Kulo 2.5 Cumecs. And left side canal is 12.5 Cumecs.

Canal system: The length of right side main canal is 45.25 km with trapezoidal section having the tail escape at the end. And the length of left side main canal is 53.5 km. There are 7 nos of secondary canal in right side. S1 (Sidhaniya branch), Dunduwa, S2, S3 (Akalyherwa), S4 (Persenpur), S5 (Pidali), S6 (Garuwa Gaun) are the secondary canals. There are 11 nos of secondary canal in left side. Among them Rajkulo contains S1, S2, S3, S4. and Phattepur contains S5, S6, S7, S8, S9, S10, S11. The length of right side secondary and tertiary canal is 233 km. The length of left side secondary and tertiary canal is 145 km. The length of ideal canal is 30 km. The bed slope of the canal is 1/7000. The main canal crosses the highway in three places. And having right side minor structures are 136 numbers and left side minor structure are 144 numbers.

Poverty, illiteracy etc. are seen in Banke district, where Sikta Irrigation Project is under construction. The source of cash income of the local people in this area is mainly the sale of grain [54]. And lack of irrigation system is observed. The largest surface in the project area is depending on the Dunduwa Irrigation System. The system is constructed with the Dunduwa River as the source covering the command area around the Nepalgunj Municipality. The system is not in operation due to lack of water in the river. This system is incorporated in the secondary canal network of the Sikta Irrigation Project. The overall goal of the Sikta Irrigation Project is to contribute to the development of Banke district and finally to the national development objectives of the government and improve the living standard of people. The root causes of the irregularities in the project are the political interference and technical problem.

Due to the construction of Sikta Irrigation Project, deforestation near the river is a serious problem [54]. It has caused loss of biodiversity. Similarly, downstream of the river has badly affected the aquatic plants as well as animals.

The failure of canal at the time of trail testing is an example of technical problem. The dispersive soil is observed where the canal and other structure are under construction. According to the export, cutting of existing soil and filling by sweet soil is necessary before the construction of the canal and other structures as per requirement of the site condition of the project. But large volume of soil replacement is observed which is problem for soil disposal. And large volume of sweet soil arrangement is also difficult. Thus, treatment of dispersive soil is an option. In Sikta Irrigation Project, as per expert's suggestion, the treatment of dispersive soil is going on.

On the other hand, the reconstruction of that failure canal in Sikta Irrigation Project may create the financial problem as per planned cost of the project. And due to the project of national pride, the budget is in time from our government with fixed annual amount [54].

Conclusion

There are environmental, socio-political, technical and financial problems in the Sikta Irrigation Project. But the most important thing is the appearance of dispersive soil during construction of the canal. The environmental problems such as deforestation, over-deposition of sand and gravel, air pollution, sound pollution are also associated with the Sikta Irrigation Project. There was no financial problem because of the project being of national pride. However, the budget sealing is limited to certain fixed amount allocated by the government annually. Due to the construction of Sikta Irrigation Project, deforestation near the river is a serious problem. It has caused loss of biodiversity. Similarly, downstream of the river has badly affected the aquatic plants as well as animals. The failure of canal at the time of trail testing is an example of technical problem. People are asking for adequate compensation against acquisition of their land and building and this has led to delay in the completion of the project. The study would like to recommend that the irrigation facilities where the local people are asking for irrigation should be managed by the Sikta Irrigation Project to reduce the existing problem. Furthermore, the structure such as Village Passing Bridge (VPB), culvert, siphon and aqueduct should be constructed properly as per requirement of the society. Plantation of trees should be arranged as per requirements or rules of the government to reduce the deforestation for the protection of environment. Soil test should be conducted as per the expert's advice before construction of the canal or other structures. Monitoring and control system from the concerned agency should be properly conducted for the construction of Sikta Irrigation Project smoothly in the days to come.

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