JETIR.ORG

ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue



JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

A study on Salma Dam impacts on Afghanistan Development Special reference to Herat Province

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Abstract: Afghanistan is a country rich in natural resources, of which water is one of those natural resources of Afghanistan, and at the same time, it depends on agriculture, which means that it is an agriculture country right now which a total of 75% of the people—lives depend on agriculture and from this way they thus make a living. In order to be able to develop a country into an ideal country and have a strong economy, water management is needed, and one of the solutions to manage the water is to build dams that are used both for agriculture, for power supply, industrial development, clean environment, job creation, etc. The title of this study is the effect of the Salma Dam or the Afghan-India Friendship Dam on urban Development by looking at the economic dimension. This research in terms purpose is an applied research and in terms of data collection this research is a quantitative research and sampling is according to disproportionate stratified method. The goal of this study is to investigate the effect of Salma dam (Afghan-India friendship dam) on Afghanistan development. The main question of the research is whether the construction of Salma Dam effects on Afghanistan development. And the main hypothesis of the research is that the construction of Salma Dam has a direct impact on Afghanistan development. The statistical population of this study includes university professors, members of provincial council of Herat, members of foundation of civil society, members of specialist's council and students of different faculties. The size of the community is 194 people. Our sampling method is a Disproportionate and after putting this sample size on Kokran formula it becomes 129 individuals and the same numbers of people (129) were distributed questionnaires and were analyzed. The data were tested by software Excel and IBM SPSS statistics after collection.

Index Terms - Dam, Economic Development, Agriculture, Employment, Power Supply and Industrialization, Political Relationship.

I. INTRODUCTION

Afghanistan has a wealth of water resources that will require the development of a national economy with a water management system and the creation of large water reservoirs that will provide both the country with self-sufficiency in agricultural production and the energy it needs.

Water dams are one of the most important infrastructures of a country that have a direct impact on economic growth and on the overall state of society and lead to the growth of urban development, rural development and development of a country.

The Salma Dam (Afghan-India Friendship dam) opened in 2016 by Afghan President Mohammed Ashraf Ghani and Indian Prime Minister Narendra Modi in a magnificent gathering in Herat province. Salma dam is the largest economic and infrastructure projects that completed.

The Salma Dam (Afghan-India Friendship dam), one of the largest infrastructure programs in Afghan history, was planned under the rule of Sardar Mohammad Dawood Khan, the first former president of Afghanistan. The dam construction started in 1976 and completed by 25 percent, but Bloody wars caused that construction of the dam stopped in 1979. After the fall of the Taliban regime, the Afghan government declared the construction of Salma Dam its first major construction program and resumed operation in 2005.

The Salma Dam (Afghan-India Friendship dam), built on the Harirud (river) in Chesht Sharif district of Herat province, was funded by a \$ 300 million grant from India. The Salma dam with 20 kilometers long and 3 kilometers wide has a storage capacity of over 640 million cubic meters, with a height of 107.5 meters and a length of 551 meters. This section has three turbines capable of producing 42 MW.

The Salma Dam (Afghan-India Friendship Section) that Completed after 40 years has had a significant impact on the development of Afghanistan, especially in Herat province, which has impacted on various areas such as electricity generation, agricultural development, green space, clean environment, employment, planting, gardening, industrialization and indirect impacts on a region and its citizens. The effects of the Salma dam have been stated to be on different dimensions of society, but all of these dimensions require a great deal of time and research to study. We focused only on the effects of this clause on agricultural development and electricity production in this study.

The economic importance of this dam for Afghanistan, if used optimally, can address much of the country's agricultural demand, especially in the west of the country. Because by planting about 80,000 hectares of land and water to help produce and plant agricultural and horticultural crops in the short and long term, the surplus on consumption can be exported. This will create thousands of direct jobs and hundreds of indirect jobs for the citizens of the country, especially the western zone.

Government support for domestic production, especially in the agricultural sector, which is one of the basic needs of the country, can lead to economic growth and lead the country from a consumer economy to a self-sufficient economy, especially in agricultural production. Because, according to economic experts, the expansion and development of the agricultural sector can lead to the optimal economic growth and development in the country.

In addition to the direct role of water in agricultural development, water resources are one of the healthiest and most powerful sources of energy production in the world. Afghanistan imports millions of dollars' worth of electricity annually from neighboring countries, while by nature the Afghan seas have the best potential for power generation.

Electricity plays an important role in the industrial development of countries today. The widespread use of electric appliances in urban and rural life has raised the need for electricity in a larger scale. With increasing population and expanding economic activity, increasing installations, production and distribution of electricity is of paramount importance. Thus, providing cheap and sustainable energy from domestic sources, especially the Salma dam, is essential to Afghanistan's economic growth.

In addition, to lighting the homes of citizens in the West and Herat, the Salma Dam will also be used to supply power to manufacturing plants, especially the Herat Industrial Park, thereby boosting domestic growth and supplying energy to the Herat Industrial City. It will develop the national economy of the country.

By completing this study, which examines the impact of hydropower dams, especially the Salma dam, on Afghanistan development, we will find that hydropower dams have a significant impact on the development of a country and a region and contribute to the economic growth of a community.

II. SALMA DAM

Afghan-India Friendship Dam (AIFD), formerly Salma Dam, is a hydroelectric and irrigation dam project located on the Hari River in Chesht Sharif District of Herat Province in western Afghanistan. Since this project is funded and constructed by the Government of India as a part of the Indian aid project, the Afghan cabinet renamed the Salma Dam to the AIFD in a gesture of gratitude to strengthen relations between the two countries.

The hydroelectric plant produces 42 MW of power in addition to providing irrigation for 80,000 hectares of farmland (stabilizing the existing irrigation of 40,000 hectares and development of irrigation facilities to an additional 40,000 hectares of land) It is designed to make Afghanistan—which currently imports nearly 80 percent of its electricity from neighboring countries—self-sufficient.

Amendment of agreement was executed on 09.06.2015 by which date, substantial part of the works (around 97 per cent) of the "Dam and Spillway" had been completed. The water filling in dam commenced on 26.07.2015 by closing diversion tunnel gate.

It is also not disputed that the project was inaugurated by the Prime Minister of India and the President of Afghanistan on 04.06.2016.

III. OBJECTIVES

- 1. Analyzing the effects of Salma dam on economic growth in Afghanistan.
- 2. Analyzing and understanding the overall agriculture development condition on rural areas which are irrigated from Salma dam.
- 3. To analyze how much Salma dam can improve employment and reduce poverty.
- 4. To focus on providing power supply from Salma dam and its major contribution to industrialization.
- Understanding the political relationship with neighbor countries after construction of Salma dam.

IV. PROBLEM STATEMENT

Afghanistan is a landlocked dry country, but with plenty of fresh water that flows freely into neighboring countries through the rivers every year. To achieve economic development, Afghanistan needs to manage its water in order to expand agriculture, which is one of the most important pillars of Afghan society. Agriculture is approximately the world's largest provider of jobs. In Afghanistan, agriculture also is still a major source of income for people, especially for rural people, and about 80 percent of people depend on agricultural activities for their livelihood. Although we are rich in water, Afghanistan's lack of water management has made it a fourth poorest country in the world and its water needs to be managed for economic development and growth. Salma Dam is one of the dams that was planned to be built during the presidency of Sardar Mohammad Daud Khan in 1976, but the civil war had halted a vital project that finally resumed in 2006. The construction of this Salma dam was considered vital for the country's economic development, because the lands around the dam needed to be irrigated so that people could provide their livelihood needs through agriculture. The construction of Salma Dam will irrigate the lands of eight districts in Herat province which are around the Harirud River and dam, illuminate people's homes with electricity, develop the horticulture, create jobs and as a whole develop the country's economic growth. The main problem for the people in the absence of Salma Dam was water, whose agricultural lands were dehydrated every year. Salma Dam is constructed on the River of Harirud, and this River does not always witness the flow of water, but has a specific time, winter and spring, that this River has water and people used its water to irrigate their lands. But in the other two seasons of the year, arable land was left devoid of dry water. The construction of the Salma Dam, which was inaugurated in 2016 by President Ghani and Indian Prime Minister Narendra Modi, solves this problem by storing 640 million cubic meters water in the bowl of the dam, and this water Provides water in four seasons for farmers to irrigate their lands. And this is a great help for farmers whose only source of income is agriculture.

V. LITERATURE REVIEW

o They have argued that building the Salma dam in Afghanistan may have dramatic impacts on the downstream states, Iran and Turkmenistan. Such an impact would not be limited to environmental damage, but may also lead to large-scale displacement of local communities, who need drinking water, and to the destruction of their livelihood. They also have argued that this may result in environmental damage and economic loss, as well as a disregard for human rights to adequate food, water, and shelter. Such damage could be limited through an equitable and reasonable utilization of the shared watercourse in question. In that case, all watercourse states, including upstream and downstream states, will have the right to utilize the shared watercourse. Nevertheless, such utilization must comply with international law.

In the particular case of the Salma Dam, Afghanistan as state of origin has failed to comply with its international obligations regarding the adequate assessment of the impacts of the project and the exchange of information concerning the development of the dam. Furthermore, our analysis has shown that operating the Salma Dam at full capacity will cause significant transboundary damage to downstream states. Therefore, we conclude that in building the Salma Dam on the Harirud River, the state of origin failed to comply with its international obligations. We used the broader notion of legitimacy to assess the construction of the dam, arguing that

obligations other than those resulting from international water law (such as environmental law and human rights), as well as equity considerations, would also have to be incorporated in the assessment. However, applying those considerations in practice dose not lead to clear-cut results. (Mohsen Nagheeby.et.al. (2019).

o Fatemeh Aman has an article about (Water Dispute Escalating between Iran and Afghanistan), in this article she discussed about water and water dams that created and have been creating in Afghanistan include Salma Dam, she said water is a regional issue with international implications as it directly relates to regional security. While the problem is fundamentally of a technical nature, the unfortunate politicization of the problem has complicated the situation. The focus should be on combining efforts toward a balanced and practical solution. Regional cooperation with international support is needed to help Iran and Afghanistan deal with this existential problem. Investment in infrastructure and implementation of a science-based management system for water resources is of utmost

It is important that both sides express their expectations openly and communicate effectively to this end, it is essential to expand communications channels at the deputy ministerial level. Progress cannot be made without properly managed joint projects between Iran and Afghanistan, as well as investment in improving the water management system of both countries. Rehabilitation programs to retrieve wetlands also require international financial assistance. Partnerships with institutions such as United Nations Development Program and the Global Environment Facility can bring critical scientific expertise to these projects. (Fatemeh Aman. 2016).

Abbreviations and Acronyms

MW = Mega Watt

AIFD = Afghanistan –India Friendship Dam

I. RESEARCH METHODOLOGY

The methodology to be adopted shall be doctrinal and non- doctrinal. The researcher has gone through a considerable number of National laws and Regulations which are applicable in Afghanistan as well as the International Conventions and treaties that Afghanistan has ratified specifically in this regard. In addition, I use the strategies and policies of depend ministries in Afghanistan which are done in the field of my research. Moreover, various National and International Books, Journals, Reports, Articles, interviews and Websites have been referred for this research study. In this research my universe are university professors, members of provincial council of Herat, members of foundation of civil society, members of specialist's council and students of different faculties. I have used Disproportionate stratified type of sampling in my research. IMB SPSS Statistics and MS Excel are used for the purpose of analyzing the data.

3.1Population and Sample

The members of provincial council of Herat were 19, members of specialist's council were 44, members of foundation of civil society were 31, professors of university were 40, and students of different faculties were 60. There were 194 individuals and I put it on Kokran formula and Krebsi formula after analyzing our sample size is 129 individuals.

3.2 Data and Sources of Data

The researcher has gone through a considerable number of National laws and Regulations which are applicable in Afghanistan as well as the International Conventions and treaties that Afghanistan has ratified specifically in this regard. In addition, I use the strategies and policies of depend ministries in Afghanistan which are done in the field of my research. Moreover, various National and International Books, Journals, Reports, Articles, interviews and Websites have been referred for this research study.

3.3 Theoretical framework

The present study aims to assess the effects of Salma Dam on Afghanistan's development, especially in Herat province. We assessed the impacts of Salma Dam on Afghanistan development by asking questions from university professors, provincial councils, Herat provincial councils, Herat civil society foundation and students of different universities. Therefore, if we first pay attention to the importance of each of them, we can say that Salma dam is one of the most important dams in the western zone, which has a great impact on the social life of the people, especially in the villages. Salma Dam has a 40-year history, one of the most important plans of the Dawood Khan era for the development of Herat province, especially in the fields of agriculture, power supply & industrialization, employment & poverty reduction, political relationship with neighbor countries and finally economic growth. Therefore, the independent variable in this study is Salma Dam and the dependent variable is Afghanistan development. The study focuses on 5 specific goals (economic development, agricultural development, employment and poverty reduction, electricity and industrial production, and political relations) which are the components of dependent variable. In this research we examine the effects of Salma Dam on each of these components. According to each of the above components, a sub-hypothesis has been developed and for the sub-hypotheses of Salma Dam and economic development, Salma Dam and agricultural development, Salma Dam and employment and poverty reduction, Salma Dam and power supply & industrialization, and Salma Dam And political relationship with the neighbors, for each of these subhypotheses we put four or five questions inside the questionnaire to make the questions clear and transparent, and to find out the extent of the effects of the independent variable on the dependent variable, Afghanistan development. After analyzing the sub-hypotheses we achieved the main hypothesis which is Salma Dam as impacts on Afghanistan Development.

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Table 4.1: General comparison of research components

General comparison of component						
Hypothesis	Correlation coefficient	Significant level	Error considered	Sample size		
Economic Growth	0.346**	0.080	0.01	129		
Agriculture	0.350**	0.573	0.01	129		
Employment &	0.307**	0.311	0.01	129		
Poverty						
Power supply &	0.270**	0.397	0.01	129		
industrialization						
Political	We cannot h	129				
Relationship	because					

As you can see in above table, the correlation coefficient of independent variable with four hypotheses which are the impact of Salma Dam on economic growth, the impact of Salma Dam on Agriculture, the impact of Salma Dam on employment and poverty, and the impact of Salma Dam on power supply and industrialization is clear. Furthermore, my fifth hypothesis is different than others because I asked YES/NO questions in this hypothesis from my sample size, and we cannot have the correlation coefficient of this hypothesis. By distributing 129 questionnaires to university professors, members of provincial council of Herat, members of foundation of civil society, members of specialist's council and students of different faculties, was analyzed and according to these questionnaires the correlation coefficient of each hypothesis determined. The validity and rejection of each hypothesis has been determined and none of which has been ruled out. The correlation coefficient of first hypothesis (between Salma Dam and economic growth) is r =0.346**, the correlation coefficient of second hypothesis (between Salma Dam and Agriculture) is r= 0.350**, the correlation coefficient of third hypothesis (between Salma Dam and employment and poverty) is 0.307**, and the correlation coefficient of fourth hypothesis (between Salma Dam and power supply and industrialization) is r=0.270**. Considering that the significance level of all of them is between (-+1.00), so we can say the Zero statistical assumption (H0: P=0) is rejected and all research hypotheses were confirmed.

Figures and Tables

Table 4.2: Analyzing the effects of Salma dam on economic growth in Afghanistan

Correlations						
ECG=Economic growth		ECG.Q1	ECG.Q2	ECG.Q3	ECG.Q4	
Economic Growth.Q1	Pearson Correlation	1	.149	.182*	.099	
	Sig. (2-tailed)		.091	.039	.264	
	N	129	129	129	129	
Economic Growth.Q2	Pearson Correlation	.149	1	.187*	.114	
	Sig. (2-tailed)	.091		.034	.200	
	N	129	129	129	129	
Economic Growth.Q3	Pearson Correlation	.182 [*]	.187*	1	.148	
	Sig. (2-tailed)	.039	.034		.095	
	N	129	129	129	129	
Economic Growth.Q4	Pearson Correlation	.099	.114	.148	1	
	Sig. (2-tailed)	.264	.200	.095		
	N	129	129	129	129	
*. Correlation is significant at the 0.05 level (2-tailed).						

For this hypothesis or objective we asked 4 questions in our questionnaire, and as you know after using of kokran formula it becomes 129 individuals which filled the questionnaire and after analyzing in IBM SPSS Statistics software you can see the result of our first hypothesis or objective. After analyzing in SPSS you can see that there is about 87.37 % according to the questionnaire answers, Salma dam has a significant impact on Economic growth of Afghanistan, especially in Herat province. Furthermore, I have found the correlation coefficient between these four questions and it is very clear in above table that I have analyzed by IBM SPSS Statistics software. According to the correlation of this hypothesis, it is clear that Salma Dam has direct impact on economic growth in Afghanistan, and especially on economic growth of Herat province which provide 30 % of national GDP of Afghanistan, thus the Zero statistical assumption (H0:P=0) is rejected. Herat province according to data analyzing directly benefited from This Megaproject (Salma Dam).

Table 4.3: Salma Dam and Agriculture

	Correlations						
AG=Agriculture		AG.Q1	AG.Q2	AG.Q3	AG.Q4	AG.Q5	AG.Q6
AG.Q1	Pearson Correlation	1	121	.066	.029	.137	001
	Sig. (2-tailed)		.174	.455	.745	.123	.994
	N	129	129	129	129	129	129
AG.Q2	Pearson Correlation	121	1	.033	023	013	136
	Sig. (2-tailed)	.174		.712	.792	.886	.126
	N	129	129	129	129	129	129
AG.Q3	Pearson Correlation	.066	.033	1	011	049	008
	Sig. (2-tailed)	.455	.712		.902	.582	.932
	N	129	129	129	129	129	129
AG.Q4	Pearson Correlation	.029	023	011	1	.158	.051
	Sig. (2-tailed)	.745	.792	.902		.075	.564
	N	129	129	129	129	129	129
AG.Q5	Pearson Correlation	.137	013	049	.158	1	055
	Sig. (2-tailed)	.123	.886	.582	.075		.534
	N	129	129	129	129	129	129
AG.Q6	Pearson Correlation	001	136	008	.051	055	1
	Sig. (2-tailed)	.994	.126	.932	.564	.534	
	N	129	129	129	129	129	129

For this hypothesis or objective we asked 6 questions in our questionnaire, and as you know after using of kokran formula it becomes 129 individuals which filled the questionnaire and after analyzing in IBM SPSS Statistics software you can see the result of our first hypothesis or objective. After analyzing in SPSS you can see that there is about 93.55 % according to the questionnaire answers, Salma dam has a significant impact on Agriculture development in Afghanistan, especially in Herat province. Agriculture was the most important hypothesis or objective of my research, because the most impact of Salma Dam is in this sector. Thus, I asked more question from my sample size in this field. According to data analyzing, and correlation coefficient of this hypothesis we can say that there is a tremendous relation between constructions of Salma Dam and Agriculture growth in Herat province, and we can see the major impact of Salma Dam on Agriculture sector according to our data analyzing. Thus, the Zero statistical assumption (H0: P=0) is rejected.

Table 4.4: Salma Dam and employment & Poverty reduction

Correlations						
E.P= employment & poverty		E.P.Q1	E.P.Q2	E.P.Q3	E.P.Q4	
Employment &	Pearson Correlation	1	006	.140	.175*	
Poverty.Q1	Sig. (2-tailed)		.945	.114	.048	
	N	129	129	129	129	
Employment &	Pearson Correlation	006	1	.093	.149	
Poverty.Q2	Sig. (2-tailed)	.945		.295	.092	
	N	129	129	129	129	
Employment &	Pearson Correlation	.140	.093	1	079	
Poverty.Q3	Sig. (2-tailed)	.114	.295		.375	
	N	129	129	129	129	
Employment &	Pearson Correlation	.175*	.149	079	1	
Poverty.Q4	Sig. (2-tailed)	.048	.092	.375		
	N	129	129	129	129	
*. Correlation is significant at the 0.05 level (2-tailed).						

For this hypothesis or objective we asked 4 questions in our questionnaire, and as you know after using of kokran formula it becomes 129 individuals which filled the questionnaire and after analyzing in IBM SPSS Statistics software you can see the result of our first hypothesis or objective. After analyzing in SPSS you can see that there is about 94 % according to the questionnaire answers, Salma dam has a significant impact to improve employment and reduce in Afghanistan, especially in Herat province. The third hypothesis was to analyze the effects of Salma Dam on improvement of employment and reduction of poverty which after analyzing the questions, and founding the

correlation coefficient of this hypothesis we can say that Salma dam has direct impact on improvement of employment and reduction of poverty in Herat province. Consequently, the Zero statistical assumption (H0: P=0) is rejected.

Table 4.5: Salma Dam and power supply & industrialization

Correlations						
E.IND= Ele	ectricity & Industrialization	E.INDS.Q1	E.INDS.Q2	E.INDS.Q3		
E.INDS.Q1	Pearson Correlation	1	.032	.163		
	Sig. (2-tailed)		.719	.065		
	N	129	129	129		
E.INDS.Q2	Pearson Correlation	.032	1	075		
	Sig. (2-tailed)	.719		.397		
	N	129	129	129		
E.INDS.Q3	Pearson Correlation	.163	075	1		
	Sig. (2-tailed)	.065	.397			
	N	129	129	129		

For this hypothesis or objective we asked 3 questions in our questionnaire, and as you know after using of kokran formula it becomes 129 individuals which filled the questionnaire and after analyzing in IBM SPSS Statistics software you can see the result of our first hypothesis or objective. After analyzing in SPSS you can see that there is about 78.2 % according to the questionnaire answers, Salma dam has a significant impact to provide power supply and improved industrialization in Afghanistan, especially in Herat province. The fourth hypothesis or objective is to analyze the impact of Salma Dam on power supply and industrialization. According to data analyzing and founding the correlation coefficient of this hypothesis, we can say that the Zero statistical assumption (H0:P=0) is rejected and Salma Dam has direct impact on providing power supply and improvement of industrialization in Afghanistan especially in Herat province.

VI. ACKNOWLEDGMENT

Foremost, I would like to thank the supreme power the almighty Allah who is obviously the one has always guided me to work on the right path of life. Without his grace this dissertation could not become a reality. Next to him are my parents, whom I am really great full for the love and encouragement that they had to me till this stage.

I have great pleasure in giving my gratitude to my reverenced and beloved supervisor Ms. Shruti singh for her untiring and excellent guidance, constant encouragement and valuable criticism culminated to this thesis. Her guidance helped me in all the time of research and writing of the dissertation. I could not have imagined having a better guider and mentor for my master's degree study.

I would like to give special thanks to Dr. Faridi my teacher for his sagacious guidance and healthy criticism. I shall always be remembering him, in my carrier while facing any difficulty.

I express my sincere thanks once again to Dr. Shruti singh my guide and coordinator of MA in Public Administration, for their immense support during this two years, without which the work would not have been completed.

Thanks are due to all faculty members, including the teaching and non-teaching staffs of Department of Public Administration for their kind cooperation.

Last but not the least, I thank to my friends who gave me motivation and such an inspire guys or giving me moral support, I needed during completion of the thesis.

VII. CONCLUSION

Liquid water is the life of human beings and we use it in different fields such as it can be has direct impact in electricity generation, agricultural development, horticultural development, irrigation, mining, job creation, poverty reduction, and economic and social development in general and can be caused to the transformation of a society. The construction of dams on the rivers are used for such purposes, and the Salma Dam is one of the dams in Afghanistan which does not have direct effects on urban areas in southwestern of Afghanistan but at least it has direct effects on rural areas and brought changes in their life. And that in itself is a positive step for development. The subject of our research was the impact of the Salma Dam on Afghanistan's development. As you know, the construction of dams is one of the most important infrastructures in the field of development of a society because it has various effects on the environment which we live. In this study, we focus on the five main goals of the Salma Dam, including the impact of the Salma Dam on economic development, agricultural development, employment growth and poverty reduction, power supply and industrialization, and the study of political relations with neighboring countries. As it turns out, the research is aimed at examining the impact of the Salma Dam on Afghanistan's development, especially in Herat province. Initially, the study began by stating the problem, the importance and necessity of the research, the goals, questions and hypotheses that the researcher was trying to achieve, and then the theoretical foundations and perspectives presented in this regard were discussed. In the theoretical foundations of the research, using the valuable opinions of some experts and effective views on the effectiveness of Salma Dam on Afghanistan's development, it was determined that Salma Dam can play an important role in the development of Herat province and can be very useful in creating a developed society. And considering the information obtained through the distribution of questionnaires to university professors, members of the Provincial Council, members of the Council of specialists, members of the Herat Civil Society Foundation and students from different faculties, if we use our water and build a dam on it, Like Salma Dam, we can see economic development, agricultural development and poverty reduction and job creation in our society. In order to gather the necessary information and to reach reliable answers to determine the impact of Salma Dam on Afghanistan's development, 129 questionnaires to 129 university professors, members of the Provincial Council, Council of specialists, members of the Civil Society Foundation and students of different faculties Distributed, which is a disproportionate stratified sampling. And according to opinions, the final conclusion was made, and after analyzing the data through the SPSS program, we came to the conclusion that the construction of the Salma Dam has a direct impact on the development of Afghanistan, especially in Herat province.

I have clearly written about my five objectives or hypotheses in the previous chapter, and again I will write them briefly here.

The first hypothesis is the impacts of Salma Dam on economic growth, and after analyzing the questionnaire in SPSS we found that Salma dam has directly impact on economic growth of Afghanistan, especially in Herat province. Respectively, all the hypotheses were analyzed by IBM SPSS Statistic program and we have found that construction of Salma Dam has directly impacts on economic growth, agriculture sector, employment growth and poverty reduction, power supply and industrialization, and political relationship with neighbor countries.

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