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Analysis on Barriers to Development of the
Public-Private Partnership (PPP) in Health
Sector of Pakistan: Analytic Hierarchy Process
Approach

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**ANALYSIS ON BARRIERS TO DEVELOPMENT OF THE
PUBLIC-PRIVATE PARTNERSHIP (PPP) IN HEALTH
SECTOR OF PAKISTAN: ANALYTIC HIERARCHY
PROCESS APPROACH**

Directed by Professor: Sang Gyu Lee

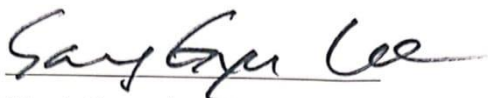
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DEDICATION

I respectfully dedicate this effort to my dear parents, siblings, and friends who have always been a source of prayers, inspiration, and remarkable assistance, during all stages of my life. I am grateful to my colleagues and family members, who have always been excellent support to boost my morale and confidence through their emotional, spiritual, and intellectual words and prayers to pursue my educational achievement. I can never disremember the compassionate role of my younger brothers and sisters in taking care of family in my absence.

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LIST OF ABBREVIATIONS

AHP:	Analytic Hierarchy Process
BHU:	Basic Health Unit
BBO:	Buy-Build-Operate
BLT:	Build-Lease-Transfer
BOO:	Build-Own-Operate
BOOM:	Build-Own-Operate-Maintain
BOT:	Build-Operate-Transfer
BOOT:	Build-Own-Operate-Transfer
BT:	Build-Transfer
BTO:	Build-Transfer-Operate
CR:	Consistency Ratio
DBFO:	Design-Build-Finance-Operate
DBOM:	Design-Build-Operate-Maintain
DHQ:	District Head Quarter Hospital
DOT:	Develop Operate-Transfer
GDP:	Gross Domestic Product
LDO:	Lease-Develop-Operate
MOU:	Memorandum of Understanding
NCDs:	Non-Communicable Diseases
NGO:	Non-Governmental Organization
NIPS:	National Institute of Population Studies
NPO:	Non-Profit Organization
PDF:	Project Development Facility
PFI:	Private Finance Initiative
PHC:	Primary Health Care
PPP:	Public-Private Partnership

PRSP:	Punjab Rural Support Program
RHC:	Rural Health Centre
RI:	Random Index
ROO:	Rehabilitate-Own-Operate
ROT:	Rehabilitate-Operate-Transfer
SDGs:	Sustainable Development Goals
THQ:	Tehsil Head Quarter Hospital
TOT:	Transfer-Own-Transfer
UHC:	Universal Health Coverage
WHO:	World Health Organization

ABSTRACT

ANALYSIS ON BARRIERS TO DEVELOPMENT OF THE PUBLIC-PRIVATE PARTNERSHIP (PPP) IN HEALTH SECTOR OF PAKISTAN: ANALYTIC HIERARCHY PROCESS APPROACH

Introduction: In the recent years, public-private partnership (PPP) has become one of the most commonly used mechanisms with regards to providing healthcare services in various countries, and the ventures have gone successful. Despite of many accomplishments, still there are many challenges to development of PPP projects in the health care sector of Pakistan.

Purpose: Current research was conducted to identify the most critical barriers in public-private partnerships in health sector of Pakistan using the Analytic hierarchy process technique.

Methods: Based on the literature review and responses of interviewees, AHP model was developed. The model was developed with five main criteria barriers and twenty-one sub-criteria barriers. All the barriers were analyzed through pairwise comparisons to calculate relative weights and rankings as per experts' evaluations.

Results: A total of fourteen participants' responses were analyzed and their relative weights were calculated. The criteria ranking was evaluated from the most influential to the least influential as follows: governance and regulatory barriers ($w=0.4633$), financial barriers ($w=0.2465$), socio-cultural barriers ($w=0.1534$), political barriers ($w=0.0898$), and technical and legal barriers ($w=0.0471$).

Conclusion: Based on the results, it is concluded that decision-makers/policy-makers may consider the most influential barriers and their ranking while formulating the policies to develop PPPs in the healthcare sector Pakistan. After, eliminating the critical barriers, the policies and strategies may become more effective and efficient.

Key words: Healthcare, PPPs, AHP model, barriers, public and private parties, Pakistan.

I. Introduction

1. Background of the Study

Traditionally, public-private partnership projects were set up in hard-core infrastructure areas like transport, water supply, or energy etc. However, today, the trend has been changed with the advancement in technology and expansion of different business areas. Therefore, the public-private partnerships are being established in physical infrastructure, including social sectors, especially health and education.

There are many definitions to cover PPPs' concept, but no specific definition can be associated with this concept. However, the most commonly used definition of PPP is “working arrangements based on a mutual commitment (over and above that implied in any contract) between a public sector organization with any organization outside of the public sector” (Bovaird, 2004). PPPs are long-term arrangements signed by a government or a public agency on behalf of the public sector and a private partner commercial enterprise, consortia, non-governmental organizations, religious groups, who will be responsible for managing part of or the whole infrastructure, like a hospital. (Woodson, 2016)

Recently, PPPs have become a prevalent technique to develop infrastructure and strengthen the relationships among public authorities and private parties and investors to deliver public services. PPPs are successful in various countries where policies, relevant laws, rules and regulations, political will, suitable environment, and cooperation between public and private partners are implemented and practiced correctly. Similarly, a study explained that most of the health PPPs are run under the supervision of experts from the relevant industry, academia, and NPOs who guide the decision-makers to pick research portfolios consistent with the organizational goals. The role of these scientific boards is prominent for considering the cost and feasibility of projects for acceptance or rejection. (Muñoz et al., 2015)

Successful development of PPPs has established various main benefits like building infrastructure through private investments, reduction in government expenditure, overall improvement in quality and enhanced efficiency, better utilization of available resources, and better management of projects between a public agency and private partners through proper risk-sharing and defined roles and responsibilities. On the other hand, the literature reveals that the countries with poor laws, lack of financial resources, unstable governments, socio-cultural resistance, bad governance, and lack of transparency and accountability could not make the PPP ventures as successful projects.

The PPP approach is a valuable tool to meet up the infrastructure development gap through private investments. To bridge the financial gap, governments make different strategies to offer various opportunities to private investors to establish and flourish business ventures and partnerships in PPP mode. In this way, the government can make some fiscal space to allocate the available scarce resources to some more desirable sectors and needs. Another crucial aim of PPP projects is to make it beneficial for the public and private partners through increased efficiency and quality after the involvement of technical experts and their experience-sharing gains. Nevertheless, a sustainable and successful partnership between a government agency and private investments is possible when the government provides a robust, smooth, comprehensive environment and transparent framework and encourages confidence in investors. Therefore, a good framework should be based on strong political commitment, government support, technical, legal, financial assistance, supportive PPP policy, administrative procedures, and ultimately a favorable environment with the proper risk-sharing mechanism.

It can be seen that PPPs in the health care sector have been extensively developed globally, but the most prominently can be observed in America and European countries. Health care partnerships under PPP mode are established with different arrangements starting from simple franchising to constructing or operating a full-fledged hospital through

the private sector. In some instances, primary health care services are contracted out, while in some cases, all levels of health care facilities are outsourced to privately manage, operate, and provide complete services at all levels of health care. In all such agreements, contracts are signed between the public and the private party regarding clinical services to the communities. Various European countries including Germany, France, Italy, and Great Britain, have implemented private finance initiatives to set up public-private partnerships. (Barlow and Köberle-Gaiser, 2008)

In their study, R. Lewis, and George, (2014) highlighted that public-private partnerships are arranged according to the scope and scale of PPP projects, and their ranking is based on the risk-sharing levels ranging from low to high. Different terminologies and modalities have been defined in this regard, including design and build, outsourcing, contracting out, BOT, BOO, BOOT, and similarly leasing, operating, and maintaining through franchising, etc. (Roehrich, Lewis and George, 2014)

Currently, the world has been experiencing a worse-natured pandemic of Covid-19 for almost two years, and it has exposed the strengths and weaknesses of health systems. To strengthen the health care systems, PPPs can be very helpful through innovation, knowledge and experience sharing, capacity building, increased efficiency, and improved quality of health care at various levels.

Pakistan's public health domain has been increased many folds due to new health challenges and emerging social issues associated to economic, financial, and political conditions in the country. Pakistan is experiencing a shortage of funds and budgets, scarce resources, a complex hierarchy of authorities/institutions to take corrective and prompt actions, and the implementation of policies and laws. In addition, Pakistan has gone through the devolution of health subjects from national to the provinces due to the 18th amendment in the constitution in 2011. This devolution has created many challenges as well as opportunities for the provinces.

Public-Private-Partnerships are very important to develop the infrastructure in the country, in different fields/sectors, for the welfare of the citizens because the provision of all the services may not be possible for the government alone. Infrastructure development target can also be attained through contribution of investments by private parties and resource mobilization in different areas like, education, health, housing, transportation, sanitation, availability of utilities and provision of clean drinking water, etc. However, it has always been very challenging, and no success stories have been seen so far concerning successful ventures of health care services on PPP mode in Punjab province, Pakistan. Pakistan is spending far less on health care which is not according to the benchmark set by WHO, as per data reflected in the Economic Survey of Pakistan 2021. Table 1

- i. Pakistan spent only 1.2% of its GDP on health in 2019-20.
- ii. Developing countries should spend 5% of their GDP on health as advised by WHO.
- iii. Pakistan is spending almost US\$ 43 per capita on health instead of reaching the defined benchmark of US\$ 86 (as per WHO) for low-income countries.

In 2018, per capita, health expenditure of Pakistan was 43 USD which increased from 16 USD in 2004 at an average growth annual rate of 7.94%.

Table 1. Total Health Expenditure by Government of Pakistan

Federal and Provincial Governments Health Expenditure				
Fiscal Years	Public Sector Expenditure (PKR in million)			Health Expenditure as % of GDP
	Current Expenditure	Development Expenditure	Total Health Expenditures	
2011-12	104,284	29,898	134,182	0.7
2012-13	129,421	31,781	161,202	0.6
2013-14	146,082	55,904	201,986	0.7
2014-15	165,959	65,213	231,172	0.7
2015-16	192,704	75,249	267,953	0.9
2016-17	229,957	99,005	328,962	1.0

2017-18	329,033	87,434	416,467	1.2
2018-19	363,154	58,624	421,778	1.1
2019-20 (P)	406,011	76,254	482,265	1.2
*P=Provisional. Source: PRSP Budget Expenditure, Finance Division , Islamabad				

2. Objectives of the Study

The main objective of the present research was to identify the most critical barriers in setting up PPPs in the health sector of Pakistan. Specific objectives of the study are explained as follows.

- i. To identify the barriers affecting the development of PPP projects in the health sector of Pakistan.
- ii. Prioritizing and ranking the barriers to providing relevant knowledge to the decision-making authorities to solve the obstacles regarding development of PPP projects in the health sector of Pakistan.
- iii. To provide some impactful recommendations which would be helpful to formulate the policy for accelerating the development of public-private partnership projects in the health sector of Pakistan.

3. Organization of the Study

The current dissertation has been designed and organized into six chapters. Chapter one is about the introduction, background, purpose and objectives of the study. In the very next chapter, literature review has been discussed in detail along with empirical studies related to developing PPP projects in the health sector. Then, the research population, sampling technique, conceptual framework, data collection, data screening, data analysis process, limitations, and overall research methodology has been discussed in chapter three. Chapter four discusses the findings, results of the analysis and interpretation of the data, tables and figures. Chapter five covers the discussion part and study recommendations. Finally, the last chapter six, presents the conclusion and future research areas.

II. Literature Review

1. Pakistan

a) Country Overview

Islamic Republic of Pakistan (PAK) is a South Asian country and total population of the country was 207.774 million (Census 2017), but in the year 2020, National Institute of Population Studies has estimated that population of country has reached to almost 215.25 million. Pakistan is ranked at fifth position worldwide due to this more prominent population. Pakistan is a developing country, and its economy is mainly semi-industrial and agricultural. The country's economy is struggling and facing many challenges Table 2, but fortunately, there was a positive growth of 3.94% in FY2021 compared to the 0.47% negative growth of last year. Meanwhile, Pakistan has been ranked under the 'Medium' category based on 0.557 HDI value in 2019 by Human Development Report 2020 (UNDP).

Table 2. Indicators of Economy of Pakistan

Indicator	Year 2020
GDP (Annual) Total (US\$) Billion	263.70
GDP (Annual) per capita (US\$)	1,194
Consumer Price Index	200.1
Consumer Price Index Inflation Rate %	8.8
Debt of Government (% of GDP)	87.2
Total Unemployment Rate % (2017-18)	5.8
Poverty Index (Multi-dimensional) %	38.3
Real GNI Per Capita US\$	1143
GDP (on PPP) per capita (US\$)	4,877
Sources: https://knoema.com/atlas/Pakistan/topics/Economy , www.statista.com/pakistan and Pakistan Economic Survey 2020-21.	

b) Overview of Health System

Like many other developing countries, Pakistan faces various issues and problems related to “Public Health.” National health security is becoming a significant threat to Pakistan due to various risk factors like; pollution and environmental hazards, poor and inadequate infrastructure, lack of skilled workforce/health professionals, rapid urbanization, high population growth rate, and the prevalence of unhealthy lifestyles.

Pakistan is a developing country with a low-income economy; therefore, it is struggling with the standardized or up to mark performance in core components of health system, especially in the financing component as the total health expenditure was just 1.2% of GDP. The other weak area is the low availability of health care staff. According to the OECD Health Statistics 2020, in Pakistan ratio of nurses to doctors was just 0.5 while the OECD average is 2.5 and the nurses per 1000 population ratio was also just 0.5 while Japan was at the top with 12.2 and the OECD average was 8.6. Similarly, Pakistan’s doctors per 1000 population ratio are only 1.0, while the OECD average was 3.4. Other health indicators are also lagging in achieving set targets. Moreover, Pakistan is also struggling with specific health indicators that have been improved very much in the region’s other countries. However, the government has shown seriousness after setting a target to raise the critical workforce rate of 4.45 per 1000 persons as advised in the WHO guidelines.

The global pandemic of COVID-19 makes the public health situation more critical and challenging because several people have insufficient healthcare facilities. Moreover, the downsized economy, increasing inflation, and high living costs affect ordinary people’s lives. Resultantly, the out-of-pocket expenditure will also rise due to the extraordinary pressure on the public health facilities. In the constitution of Pakistan, the 18th amendment was made in the year 2011, and the federal health ministry (MoH) was devolved while its remaining health-related functions and activities were assigned to other federal ministries. Then after two years, the Cabinet decided in May 2013 to re-establish the federal health ministry, which was named “Ministry of National Health Services, Regulations and

Coordination” (M/o NHR&C), to run the health sector affairs. This ministry is now taking care of the functions of health and population sectors at the federal level with a coordinating role among all the other four provinces of the country. One of the best things this ministry did was the development of the National Health Vision 2016-25, after detailed deliberations and consultation with relevant stakeholders. So, this devolved policy created many challenges and opportunities for provinces to show their performance in the health sector.

c) Health Sector Resources

- i. According to the Economic Survey of Pakistan (2020-21), details of the national level health infrastructure by the year 2020, are as follows Table 3.

Table 3. Public Sector Health Infrastructure of Pakistan

S.No.	Description of the Health Facility	Total Numbers
1.	Hospitals	1,282
2.	Basic Health Units	5,472
3.	Rural Health Centres	670
4.	Healthcare Dispensaries	5,743
5.	Mother and Child Health Centres	752
6.	Tuberculosis Centres	412
7.	Total Number of Hospital Beds	133,707

- ii. According to the Economic Survey of Pakistan (2020-21), details of the national level registered human resource by the year 2020, are as follows Table 4.

Table 4. Public Sector Human Resource of Health

S.No.	Description of the Human Resource	Total Numbers
1.	Medical Doctors	245,987
2.	Dentists	27,360
3.	Nurses	116,659

- iii. According to the Economic Survey of Pakistan (2020-21), details of the health indicators are as follows Table 5.

Table 5. Health Indicators of Pakistan

S.No.	Description of the Indicators	Total Numbers
1.	MMR	189 / 100,000 births
2.	NMR	41.2 / 1,000 live births
3.	IMR	55.7 / 1,000 live births
4.	MR under 5 years of age	67.2 / 1,000
5.	TB incidence	263 / 100,000 people
6.	HIV incidence	0.12 / 1,000 uninfected population
7.	Life Expectancy	67.3 (years)
8.	Skilled birth attendants	68%
9.	Contraceptive prevalence rate	34%
Source: World Bank's indicators of development (WDI)		

d) Governance of Health Sector

After the devolution, both the provincial governments and the federal government's MoNHSRC performed bifurcated duties and responsibilities as per the legislative list designed and implemented by the federal government of Pakistan. However, there was a need to have a national-level vision with some oversight on the interventions being taken by the provincial governments. Therefore, this national health vision was developed to improve the overall health care system of Pakistan. Much more focus was given mainly to the women and children through better means of access and affordability. The ultimate goals also include the achievement of worldwide commitments like UHC and SDG-3 through resilient, responsive, and improved versions of the health care system. Similarly, one of the vital roles of the federal government is to oversee the provincial policies and strategies and then to guide them through pointing out the quality health care

services and priority actions engagements. In addition, all the provinces are provided an equitable share of money from the central government.

According to the analysis of key stakeholders, it can be seen that it is responsibility of the ministry of health to implement the health projects. However, success and sustainability of those projects or initiatives also depend upon the coordinated role of other ministries. The significant roles of the most relevant stakeholders have been explained here.

i. Ministry of National Health Services, Regulation and Coordination

This ministry is one of the main actors for implementing the health projects and keeping them aligned with the National Health vision 2016-25. They have the responsibility to formulate the strategies and action plans for implementing health initiatives, infrastructure development, and capacity building of health professionals. After devolution, the provinces are managing their health subject through provincial health ministries. It is now the responsibility of provincial health departments to start health projects.

ii. Ministry of Planning, Development and Special Initiatives

At federal level planning division is responsible for formulating the annual development budget for all the ministries. Similarly, this role of budgeting is given to Planning & Development Boards at provincial levels. For every national and international project, approval of the P&D Board is mandatory. Moreover, this ministry is also responsible for the formulation of national-level policies at the federal and their P&D Boards at the provincial level.

iii. Ministry of Finance

This ministry is also one of the key players in implementing any project because all the funding is provided through this ministry. Even if foreign grants/aids are available for a project, they have also required confirmation from this ministry. The implementation

of a project and its sustainability depends upon the provision of funds by the finance division. All the budgets are finally published through the ministry of finance.

iv. Ministry of Information Technology & Telecom

To implement the eHealth or HIMs projects, the role of the IT ministry is also essential. Because they have provincial set-ups with their IT boards to implement and operate different IT projects for various ministries with the help of their trained staff, the success and sustainability of the HIMs project are also linked with the capacity building and operation & maintenance IT Boards.

v. Ministry of Law and Justice

Pakistan is a developing and low-income country with a low literacy rate as well. There is still a considerable gap in using the latest technologies to improve service quality and ensure good governance. Cyber laws are mandatory in many sectors and fields, which need to be formulated without wasting time. Specific laws are required for the health sector, especially the eHealth and data management security, integrity, and validity. So, the ministry of law and justice can help technological advancement by introducing cyber laws.

vi. NGOs, Trusts, Private Healthcare Organizations

Other than the public sector institutions and organizations, many private-sector health care facilities are working in Pakistan. Moreover, various trusts and NGOs are also providing their services in health sector. The role of these institutions is also considerable towards achieving the SDG 3 goals and targets as well as UHC.

e) Problems and Challenges of Health Sector of Pakistan

After extensive review of literature, national and international publications, research articles, and reports, various critical challenges of the health sector of Pakistan have been identified like, absence of central health policy, lack of accountability, transparency, sufficient budgets, real-time monitoring, improper implementation of

strategies/policies and rules & regulations are the main challenges. Similarly, the public systems are malfunctioning, resulting in the shape of bad governance and lack of public awareness, low literacy rate, and poverty may be ranked among the bigger challenges of health sector.

There are various other issues and challenges which need immediate attention of the concerned authorities to improve the overall health system. Among these glaring issues, malnutrition and stunting are also affecting child health and becoming a big reason for the loss of GDP. According to the Global Nutrition report 2018 about Pakistan, it is reported that 37.6% of under-five children are stunted, while the average stunting percentage of Asia countries is 21.8%. Moreover, 7.1% of under-five children are affected by wasting and meanwhile country could not achieve the set targets of diet-related NCDs. Likewise, diabetes has affected almost 12% of adult men and women and anemia is drastically high in adolescent girls because almost 57% of girls are anemic.

Some other major issues include the lack of coordination in relevant ministries and government departments/institutions and lack of public-private partnership projects and improper health insurance system, etc. One of main issues is financial issue but corruption and mishandling of public funds are also significant issues. Moreover, after the decentralization of the health sector, the supply of funds at the provincial level is still inadequate and resulting in improper functioning of various health programs. In addition to this, water and air pollution due to sewage and industrial wastes, road accidents, violence, malnutrition, and unhygienic foodstuffs are also causing severe health problems. Some of the unhealthy life styles and bad habits of use of tobacco and other narcotics/drugs are causing serious health problems including depression and mental sickness.

There are various kinds of health challenges throughout the world but especially to the lower-income countries, including the issues of communicable diseases, NCDs, increasing old age population, lack of infrastructure, and required funds to upgrade the

health systems and shortage of capacity. A very little or small healthcare infrastructure is available in lower, middle-income countries as compared to developed countries. In this situation, the drastic effects of a global pandemic of COVID-19 have increased the worries of governments to tackle the health care issues and provide quality services at accessible points and affordable prices. To cope with the health care issues and development of health infrastructure, there is a significant need to develop more and more public-private partnerships through private investors. This will be possible after carefully addressing and resolving the related issues and barriers to developing health care PPPs.

2. Public Private Partnerships (PPPs)

a) Concept and History

Different types of PPPs are now established, keeping in view the level of risk-taking and risk-sharing parts. There is a wide range of types of PPP modalities, and they are showing that with time, the private sector is becoming more and more apparent. Now, the PPPs are not typical or traditionally managed public projects where the private sector's role was to set up the facilities but not financing, operation, or maintenance. Many different types of PPPs were established as per the requirement and nature of the projects. The most commonly used PPPs in the health sector include BOOT, BOO, BOT, DBFM, and management contracts. It is believed that efficiency has been improved, the private capital fund is available for sustainable management of PPP projects in different areas like, energy, supply of water, transportation, and health care services. (Babatunde et al., 2015).

Following are the most commonly used modalities adopted worldwide for the operation and management of PPPs.

- Build-and-Transfer (BT)
- Build-Lease-and-Transfer (BLT)
- Build-Operate-and-Transfer (BOT)
- Build-Own-and-Operate (BOO)

- Build-Own-Operate-Transfer (BOOT)
- Build-Transfer-and-Operate (BTO)
- Contract-Add-and-Operate (CAO)
- Develop-Operate-and-Transfer (DOT)
- Joint Venture (JV)
- Management Contract (MC)
- Rehabilitate-Operate-and-Transfer (ROT)
- Rehabilitate-Own-and-Operate (ROO)
- Service Contract (SC)

Table 6 shows the most common classification and modalities of PPPs in Pakistan.

Table 6. PPP Classification and Modalities

Modality	Ownership	Investment	O&M	Commercial Risk	Duration (years)
Service Contracts	Public	Public	Public/private	Public	1-3
Management Contracts	Public	Public	Private	Public	2-5
Lease Contracts	Public	Public/private	Private	Public/private	10-15
Concessions	Public/private	Private	Private	Private	25-30
BOT Contracts	Public/private	Private	Private	Private	20-30
Source: Public-Private Partnership Handbook, Asian Development Bank, Manila, 2008.					

b) PPPs in the Healthcare Sector

Public-private partnerships are considered valuable because they provide an opportunity to public and private parties to work together for strengthening and improving quality, innovation, and overall efficiency in the processes. It was the early 1990s when Public-private partnership projects were started under the health care sector to redefine the level of support and coordination among both sectors. (Kosycarz, Nowakowska and Mikołajczyk, 2019)

In early 1990s, the United Kingdom was one of the earliest countries that took advantage of initiating the public-private partnership projects in health care by recognizing an opportunity to utilize the potential of private investors to increase financial resources for the establishment of various health projects. (Allard and Trabant, 2008). Health care PPPs carry many benefits in the shape of better access, improved efficiency, reduction in cost, risk sharing, increasing effectiveness, use of advanced techniques and technology, skills and experience sharing by the management, arrangement of private capital to fulfill the budgeting needs. (Barlow, Roehrich and Wright, 2013)

Longo said in the paper that hospitals and health care facilities were only few, and the way out to tackle this issue is to involve the private sector partners in the requisite health care services to the community. (Longo, 2015). In another study, it was explained that PPPs are not just partnerships or simple collaborations. Instead, they are much more exclusive ventures. The main point of attraction in PPP contracts is innovation, where both parties can find different solutions to work together to achieve common goals. (Hodge and Greve, 2011)

c) PPPs in the Health Sector of Pakistan

Pakistan is a large country concerning its a total population of over 210 million; therefore, a mixed health system exists for primary care. This system includes many government hospitals and health facilities, hospitals and clinics of the private sector, and trust and charitable health organizations. Government health facilities available in the rural areas are not well managed and properly maintained. Instead, they are providing poor-quality health services to the community. (Social, 2016)

After devolution, private sector's involvement has increased regarding provision of health services in Pakistan. Different players showed their confidence and started participating in health care PPPs including private hospitals, suppliers, charity fund institutions, and commercial businesses. Meanwhile, BHUs, RHCs, THQs, and DHQs were

also considered for contracting out and, in this way, expansion of service delivery and improvement of the quality. Moreover, the other auxiliary services avenues were also expanded, including the ambulance service, repair, maintenance, and supply chain services. Designated PPP cells and PPP authorities have been established in two provinces of Pakistan, including Punjab and Sindh. Although the PPP cells are working hard to promote and manage the PPPs in their respective provinces, there are still specific issues of capacity gaps to handle the whole process of qualification, budget arrangements, payments for the outputs, and efficient monitoring of PPP contracts. (Zaidi et al., 2019)

i. PPPs in the Health Sector of Punjab, Pakistan

During the 1980s and 1990s, Pakistan developed many government-owned and managed primary health care (PHC) facilities throughout the country, as the same practice was also observed in other developing countries. However, in the arena of health care public-private partnerships, Pakistan entered very late. Health sector PPPs are sustained by providing robust legal, political, financial, and administrative frameworks. Similarly, the components like monitoring, transparency, accountability, innovation, risk sharing, contract management, and capacity building are also considered on a priority basis to avoid any future complications or disputes between public agencies and private parties. Population wise, Punjab is the biggest province of Pakistan with almost 110 million people. Therefore, health care needs are also in high demand. To achieve the SDG3 targets and ensure sustainable betterment in health systems, the government has to face many challenges because the regional comparison of countries showed that health indicators were are still low.

PPP Cell and PPP Authority in Punjab province of Pakistan are working hard to convert all the possible opportunities into actual contracts, which will come out in improved infrastructure and better delivery systems. However, although they have successfully managed various projects and public private partnerships in different sectors, like; roads,

water management, housing, waste management, transportation, parking, etc., they still lack success stories in health and medical education.

ii. Examples of Healthcare Projects on PPP mode in Punjab, Pakistan

In the year 2003 Government of Punjab signed an MOU with a local NGO named Punjab Rural Support Program (PRSP) to improve the utilization and uplifting of communities' trust level on BHUs in the District Rahim Yar Khan. At that time, this partnership contract was awarded without observing any competitive procedures because the provincial government provided funds. A management contract of five years was signed with the NGO by authorizing them to have administrative and financial control over 104 BHUs in the district. Moreover, to run and operate these health facilities, reasonable autonomy was also given to the management of PRSP to implement timely decisions. This was a very successful experience for the Government of Punjab to manage the BHUs through NGO; otherwise, the government struggled with various issues, especially the human resource issue. Studies have explained that Pakistan and many other developing countries have outsourced primary health care services to different NGOs. (Loevinsohn et al., 2009)

The previous provincial government (2013-18) of Punjab, Pakistan, started PPP projects with a renowned private hospital "Indus Hospital" and handed over the control of government-owned hospitals to the management of Indus Hospital. Following mid-size government hospitals were given to private entities for their better operation;

1. 150-bed Multan Institute of Kidney Diseases Hospital
2. 400-bed Recep Tayyip Erdogan Hospital in Muzaffargarh
3. Regional Blood Centres at Multan and Bahawalpur
4. 61-bed Muhammad Shehbaz Sharif Hospital in Lahore
5. 100-bed THQ Hospital in Manawan
6. 60-bed THQ Hospital in Raiwind

7. 100-bed THQ Hospital in Sabzazar, Lahore
8. 100-bed THQ Hospitals in Kahna Nau, Lahore (100 beds)

Usually, a one-line grant budget is provided to the management of private partners to operate these hospitals. For example, in 2017-18 government of Punjab provided almost PKR 3.94 billion (other than Zakat and donations for the hospital) to the private partner to run these seven hospitals, and almost 1.49 million patients were provided with the best possible healthcare facilities.

The first three health facilities come under the Specialized Healthcare Medical Education Department, while the last five hospitals are owned by the Primary and Secondary Healthcare Department of the Punjab, Pakistan. To reduce the burden on the tertiary care health facilities, there is a need for the government of Punjab should continue with PPP projects for the THQ and DHQ level small size hospitals.

iii. Prominent Features of the PPP Act 2014, Punjab Pakistan

The government of Punjab, Pakistan, successfully passed the “Punjab Public-Private Partnership Act 2014” in May 2014. This law is beneficial for the government and the private partners to understand the rules and regulations of PPPs in the province. Some of the prominent features of this Act are as follows.

1. Establish a high-level Steering Committee responsible for promotion, facilitation, coordination, and oversight of the projects. Moreover, this committee is also the final authority for PPPs development in the province. One key role is to help out the local governments and other line departments regarding problem-solving, attracting PPP projects, approval or rejection, and finally, implementing projects after completing all the moral formalities.
2. Establishment of the PPP Cell under P&D Board for promotion and facilitation of the PPP projects.

3. Formation of another critical “Risk Management Unit” under the Finance Department of the Government of Punjab, acting as fiscal guardian.

iv. Projects Approval Mechanism by PPP Authority, Punjab Pakistan

PPP Authority has defined a proper system of approval or rejection of the PPP projects as per directions of Punjab Public-Private Partnership Act 2014. Mainly two types of project proposals are considered (i) Solicited Proposals, (ii) Un-solicited Proposals. A brief mechanism of approval is like this.

1. Identification of the project and proposal preparation
2. Prioritization of the project and then its approval through Steering Committee
3. Ensure the government support in all possible ways
4. Project consideration by the committee on the recommendations of PPP Cell and Risk Management Unit
5. Establishment of PPP agreement with a private investor or a private party and selection of the potential private party
6. The pre-qualification process attracts the most suitable private party through tendering, bidding, and evaluation of bids.
7. Signing off PPP agreement and negotiation of the final contract
8. Operation and implementation of the PPP project
9. Complete understanding of dispute resolution mechanism and termination of the PPP agreement through mutual consent of both parties.

These steps or guidelines are constructive under the approval mechanism and operation, management, and winding up the PPP projects.

3. Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) is a technique based on Multi-Criteria Decision Making (MCDM) analysis used to organize and examine complex decisions and

evaluate the weight and rank the importance of decision-makers' judgments with the help of psychology and math. Thomas L. Saaty developed this AHP model in the 1970s, and it has been refined many times since its development. (Saaty, 1977)

The AHP is one of the most appropriate techniques to use while making decisions for complex-natured problems and issues. AHP is very helpful to select the best alternative according to the understanding of the problem. In this technique, weightage is calculated for every vital stakeholder because different respondents respond differently to the same criteria. Moreover, the AHP technique uplifts the morale of the respondents because everyone comes with the feeling that his / her voice is heard and given consideration; everyone can understand the basis of the decision. Various practical and theoretical methods have been adopted to determine the criteria weights by using opinions and evaluations of experts. The most commonly known methods include the pair-wise comparison matrix, calculation of weight, and rankings of the criteria. (Zavadskas et al., 2008)

a) Basic Principles of AHP

AHP is a systematic process to break down the problem into hierarchical components through main and sub-criteria, which help the decision-makers to choose on the basis of pair-wise comparisons. AHP is one of the most dominant and renowned mathematical methodologies which supports to solve multifaceted decision problems by disintegrating the problem into different criteria and sub-criteria factors in a hierarchical structure. (Gudienė et al., 2014; Taherdoost, 2017). AHP works on three basic principles, including the hierarchical process which splits the problem into different parts. The following principle is to prioritize, which ranks the factors according to their impact and importance. The last basic principle is logical consistency, which ensures that all the main factors and sub-factors are assembled correctly on logic, and their ranking is also consistent. Moreover, the AHP technique has various benefits and advantages because of

its flexibility and easy-to-understand model, even for the more significant problems through priorities. By using AHP, participants can consider the ranking of elements and select the best alternative according to the main objective. While solving the different natured problems, the managers have to consider various factors like, economic, natural or modeling etc. before finalizing the decision-making process. In order to make a mathematical model doable, some of the elements are ignored. Some of the factors, especially, the economic factors and natural factors are considered uncertain based on the non-availability of related data and forecasting errors. (Molnár and Szidarovszky, 2016)

b) Application of AHP

AHP is very common and popular due to its flexibility and better application in solving various problems about real-life decisions. Therefore, it is commonly used in almost all kinds of decision-making activities. Straightforward examples of personal decisions like the selection of car, job, mobile phone, house, study program, etc., all can be handled using the AHP technique. Most companies and organizations use AHP to take decisions and select alternatives, such as finalizing budgets, selecting projects, risk-taking activities, financing, and selecting the project team. Decision-making under AHP is not limited to individuals or organizations; instead, the countries at national levels can use it for complicated issues like; economic issues, political issues, and social issues by setting up the logical priorities and ranking according to the impact of different factors. So, the usage and application of the AHP technique are extensive.

Multi-criteria feature is considered one of the main elements of decision-making techniques while solving the issues of political nature, economic issues, social problems, decisions related to military or any other domains. Multi-criteria decision-making technique provides different possible solution options. Moreover, this technique is also very useful to evaluate clearly among various criteria even though these criteria are

conflicting with each other but still the AHP method can distinctly find out the best alternatives from the available options. (Ozdemir and Sahin, 2018)

4. Empirical Studies

An empirical literature review of the selected variables has shown that most of the high-income countries have their appropriate policies for the development and implementation of PPPs. They are managing and operating them successfully, while on the other hand, middle and low-income countries are lacking in their policies and strategies. Resultantly, the middle and low-income countries have to face enormous challenges because the private sector proliferates. Among the various other issues, the most common are lack of policy, improper healthcare delivery systems, monitoring tools, and skillful and expert human resources. (Riaz et al., 2020)

Based on the intense literature review and participants' expert opinions, a comprehensive pair-wise questionnaire was developed. It is also a common phenomenon, in the past few decades, that healthcare systems of various countries have been changed speedily because of low governmental budgets in comparison to the high healthcare costs. There were five main criteria barriers while twenty-one sub-criteria barriers were identified with respect to development of PPPs in healthcare sector of Pakistan. The main criteria barriers were: (1) financial barriers, (2) political barriers, (3) socio-cultural barriers, (4) governance and regulatory barriers, and (5) technical and legal barriers regarding development of healthcare PPPs in Pakistan. A summary Table 7 of the main and sub-criteria barriers has been designed for this study which is also showing the relevant references from different previous studies.

Table 7. Summary of the Main and Sub-Criteria Barriers

Category of Main Barriers	Description of Sub-Criteria Barriers	References
Financial Barriers	High financial cost	(Al-Hanawi et al., 2020a; Bansal, Saini and Khatod, 2013; Bing et al., 2005; Khan and Martin, 2016; Medda, 2007; Mittal, Ahlgren and Shukla, 2018; Xu et al., 2010)
	Investors' lack of confidence	(Al-Hanawi et al., 2020a)
	Inappropriate risk allocation and sharing	(Al-Hanawi et al., 2020a; Bedi, Pellegrini and Tasciotti, 2015; Rupf et al., 2015)
	Difficulties in getting loan from banks	(Al-Hanawi et al., 2020a; Bing et al., 2005)
	Lack of budget to promote PPPs	(Al-Hanawi et al., 2020a)
Political Barriers	Lack of strong political commitment to PPPs	(Al-Hanawi et al., 2020a)
	Inadequate experience in PPPs	(Al-Hanawi et al., 2020a; Bing et al., 2005; Shen, Platten and Deng, 2006; Xu et al., 2010)
	Unstable government	(Bing et al., 2005; Zou, Wang and Fang, 2008)
	Strong political interference	(Al-Hanawi et al., 2020a; Bing et al., 2005; Kumaraswamy and Zhang, 2001; Medda, 2007; Ng and

		Loosemore, 2007; Shen, Platten and Deng, 2006; Xu et al., 2010)
Socio-Cultural Barriers	Potential conflicts of interests among stakeholders	(Al-Hanawi et al., 2020a)
	Corruption and bribery	(Bing et al., 2005; Kumaraswamy and Zhang, 2001; Xu et al., 2010; Zou, Wang and Fang, 2008)
	Investors' not willing to accept high risks	(Bedi, Pellegrini and Tasciotti, 2015; Rupf et al., 2015)
	Lack of trust between the public and private sector	(Al-Hanawi et al., 2020a; Bing et al., 2005; Ng and Loosemore, 2007)
Governance & Regulatory Barriers	Problems with administrative procedures and guidelines	(Al-Hanawi et al., 2020a)
	Lack of support from government	(Estache, Juan and Trujillo, 2007; Grimsey and Lewis, 2002; Thomas, Kalidindi and Ananthanarayanan, 2003; Zou, Wang and Fang, 2008)
	Lack of transparency and accountability	(Al-Hanawi et al., 2020a)
	Poor regulatory frameworks and enforcement	(Al-Hanawi et al., 2020a; Bing et al., 2005; Estache, Juan and Trujillo, 2007; Grimsey and Lewis, 2002; Kumaraswamy and Zhang, 2001; Ng and Loosemore, 2007; Shen, Platten and Deng, 2006)

Technical & Legal Barriers	Lack of clarity in PPP process	(Al-Hanawi et al., 2020a)
	Law and regulation changes	(Al-Hanawi et al., 2020a)
	Weak institutional capacity and PPP strategies	(Al-Hanawi et al., 2020a)
	Construction time delay	(Al-Hanawi et al., 2020a; Bing et al., 2005; Estache, Juan and Trujillo, 2007; Ng and Loosemore, 2007; Thomas, Kalidindi and Ananthanarayanan, 2003; Xu et al., 2010)

i. Financial Barriers

Sadeghi explained in his study that financial barriers and the issues of capital were given importance by the respondents of their study conducted in Iran about the barriers to PPPs in health care. The study stressed the significance of the financial barriers by elaborating that as per the opinion of experts, these were very critical factors to set up the PPPs in health care. They specifically noted that one of the significant issues was on the part of the government regarding lack of purchase after guarantee. They further highlighted that to keep the private investors motivated and confident; governments should ensure guaranteed returns to the investors in the shape of profits on their investments. Otherwise, the situation would not be easy for the investors to stay in the partnership and show their willingness to invest in public health care initiatives. The government guarantee and the lack of familiarity with the financial contribution through different organizations, and investors' lack of interest was also significant barriers to developing PPPs in the health sector. The study respondents thought that in the absence of an investment protective

environment or framework, the private sector would hesitate to invest in PPPs. (Sadeghi, Bastani and Barati, 2020)

Internationally it has become a practice to utilize the private investment options to build the required infrastructure for delivering services to the public through PPPs. Almost all the developing and low-income countries face budget deficits and scarcity of financial resources; therefore, public-private partnerships are desirable and feasible options to survive. (PPP). Recently, public-private partnerships have gained good popularity in the context of private investments financing to develop and set up the needed infrastructure because of various advantages to the governments and investors. This practice is common in various countries to meet their fiscal deficits, shortage of funds, and low budget allocations in response to the high unmet needs and gaps. (Chowdhury, Chen and Tiong, 2011)

Public-private partnership businesses are done with one of the objectives that would result in a sustainable financial system by reducing the burden of government. Moreover, the blend of public-private experiences in management, administration, and capacity enhancement may result in increased health care services delivery and utilization. Specific measures under the umbrella of PPP projects can ensure the protection of rights for the public, and pricing of the health care services may also be controlled by discouraging the purely private sector's policy of charging high rates. These initiatives may lead to socio-economic development and improvement in the health care infrastructure. (Ahmed and Nisar, 2010)

A similar point of view was presented in a study by clarifying that most of the projects in the public sector remain un-funded or low funded, and certain specific issues were always there like red-tape, corruption, undue favors, and absence of transparency, etc., and to cope with these issues have never been accessible by poor and middle classes.

It is because of the non-existence of the proper relationship between the two sectors. (Jdidi et al., 2017)

Ewa Agnieszka et al. 2018, has explained that in 2015 Poland spent 6.3% of GDP on healthcare. Moreover, the health system of Poland is dedicating sufficient funds for the hospitals like over one-third of their total health budget is utilized by the hospital care. Public-private partnership in the health sector is thriving in Poland because their Ministry of Development and Ministry of Finance funds and expands the public sector investment.

Another excellent example of extended private sector investment in the projects of healthcare PPPs is in Singapore. Since after the independence, Singapore has managed excellent health standards, and it is due to a very effective policy of shifting a significant portion of healthcare provision through their private sector. They have encouraged the private sector to invest sufficiently in the health sector, and consequently, the government managed to reduce its financial burden from 50% to 25% in a period of 35 years, i.e., from 1965 to 2000. (Lim, 2004) (Kosycarz, Nowakowska and Mikołajczyk, 2019)

Financial barriers are one of the key barriers that are critical to be considered in the context of the development and implementation of PPPs. Moreover, private investments can be attracted more by offering better incentives and returns even though in health care projects. Different sectors have different potentials to generate profits or returns on investments. Social sectors are not considered for attractive profits, but if the governments can provide other incentives and benefits, they can attract more potential investors, but if the governments fail to make such strategies, then investors will not participate in the public-private partnership ventures. (Sadeghi, Bastani and Barati, 2018)

ii. Political Barriers

A successful public-private partnership can be ensured with a stable and supportive political and legal environment. The strong political will can be a big game-changer in

attracting private parties to invest in the public sector projects. The governments, along with political mottos, can promote public-private partnerships among the community. The political factor is enormously influential towards the assessment of the future of PPPs. Therefore, all the players from the governmental platform can make a big difference by providing a supportive environment to the potential investors.

A study from Iran highlighted that the political barrier was chosen by many of the interviewees because it was a critical factor in establishing long-term partnerships in PPP mode in the health sector. Therefore, the investors showed their complete confidence and willingness to participate in health care PPP projects in the country. (Sadeghi, Bastani and Barati, 2020)

Danaei fard et al., in their research findings, grouped various factors under the category of main barriers to PPPs, like political barriers, legal barriers, financial barriers, technical barriers, procedural barriers, structural barriers, social-cultural barriers, human resource and capacity issues, and various other strategic barriers. (Danaie Fard, Delkhah and Kiaiee, 2017)

The initiatives were taken after the devolution of the health system in Pakistan. Leadership support played a vital role in establishing strong coordination among the provincial governments and the other public offices to strengthen their health systems through various options, including PPPs. However, the provincial governments were not technically sound in terms of capacity and capabilities to handle the complicated health management systems and administrative controls over complicated projects. Moreover, there was a strong influence of central government on the management of hospitals and policy-making institutes; therefore, it took much time to strengthen provincial governments' systems and reframe the financial and administrative systems. Meanwhile, the positive point was that provincial governments started allocating more budgets for the health sector compared to the past allocations made by the federal government. It started

happening due to intense political support and complete ownership of the projects by all the four provincial governments. At the same time, provinces took severe steps towards their capacity building in planning, budgeting, financing, and monitoring health care projects. Political solid commitments and good administrative strategies brought the provinces on track to achieve desired results.

Political pressure created a favorable environment in all four provinces to show visible health infrastructure in all the regions and at all provincial territories. Alongside, the vision and directions of the provincial health ministry made it possible to increase and expand the health budgets and infrastructure to cater to the rising demands of health services. Nevertheless, sometimes, the unusual transfers of the critical personnel of health administrations and lack of skilled and trained staff caused significant hurdles in the way of better health reforms. Moreover, the changes in health strategies due to new appointments changed the progress graph towards decline, and the overall growth momentum was lost. (Zaidi et al., 2019)

The world has experienced different pandemics and outbreaks of deadly diseases in the past, including TB, smallpox, and the plague or Black Death, but currently facing the issue of Covid-19, which is also drastically dangerous. This pandemic is not only destroying the health systems but the overall economies of the countries as well. History has shown that pandemics hit the world, but these were fatal for the low-income countries and developing economies because they lacked the infrastructure of health care facilities.

The epidemiological trends and increasing disease burden have surged the need for more and more tertiary care level hospitals, especially the general hospitals. This need is at its peak in developing countries, but they do not have the desired budgets and funds to establish more hospitals and run them smoothly. They are usually dependent on aid, grants, loans, or ODA from the developed countries and world-recognized intuitions, but this is not a proper solution to their health care issue of infrastructure shortage. Therefore,

the convenient option is to adopt the most feasible models of public-private partnerships in their countries to construct different level health facilities or contract out the services of those hospitals which are not providing good quality services. Most of the time, health projects have to face different challenges and complications when making design, plans, financing models, building the hospital, and operation and maintenance mechanisms. All these challenges can be tackled well through the strong political commitment of the governments and prioritizing the health sector needs by involving all the relevant stakeholders to improve comprehensive technologies, innovative measures, and smooth functioning of PPPs with private sectors.

Literature review about the political barriers in health sector PPPs, sum-up that partnerships with private parties will be successful in the presence of a solid and supportive political commitment and an aim to grow the health care infrastructure through all feasible options of private investments.

iii. Socio-Cultural Barriers

The public procurement process is typical in various countries where the moral laws, rules, and public-private partnerships have not been prepared and implemented. All the governments should try to give priority to the establishment of PPP projects and to get desired goals through the shared projects. Sometimes, there is a resistance from the society towards the acceptance of public projects under the control of the private sector because they consider it commercialization instead of a partnership. Therefore, the governments should promote the culture of PPPs in the communities and take a start from those projects that better general acceptance and high rate of success. (Baizakov, 2008)

Zhang, in his study, explained the five classes of factors that were very important to be considered during the implementation of the public-private projects so that they can be successful. Classification of factors was categorized as follows; feasible investment

environment, financial soundness, availability of technical skills and expertise, and problem-solving through the team of experts willing to resolve the issues. (Zhang, 2005)

Outstanding quality health care services which are accessible and affordable are always demanded from each government. The increased level of chronic diseases has also created a demand for high-quality health care standards. On the other hand, governments cannot provide a high standard and high-quality services from their public budgets, and they have to face various limitations. In the prevailing situation, there is an urgent need to introduce PPPs in the health sector to ensure service delivery and better quality of health care services. Private sector can resolve various issues of financing, better governance, technological advancement, and human resource availability with regard to health sector PPPs. Until and unless the government has insufficient resources, it should be the best option to increase the partnerships with the private sector to get rid of the limitations and other critical hurdles in the provision of quality health care services. (PRAMESTI)

A study contributed that cultural and social barrier are critical and significantly important issues towards establishing public-private partnerships. They pointed out that a negative attitude is also one of the critical social issues or cultural practices towards private sector investors. Moreover, the study respondents stressed that the general public does not accept private involvement in public infrastructure, and they also consider the government sector comparatively better than the private. Furthermore, it was also the culture in the government offices that their employees were satisfied with the prevailing customs and norms and were unwilling to accept private partners' risk. Therefore, these social and cultural factors were also significant barriers to developing hospitals in PPP mode. (Sadeghi, Bastani and Barati, 2020)

Different cultures and societies have their perceptions about the government interventions to involve the private sector in different partnerships. For example, some believe that corruption and bribe is motive, red tape, favoritism, and under-the-table hands

are involved in carrying out the public projects through private parties, etc. While on the other hand, the operation and maintenance of larger hospitals in lower-middle-income and developing countries is always a challenge due to the non-availability of requisite medical equipment and shortage of staff.

Most developing countries have the ultimate desire to develop big hospitals, state-of-the-art health care institutions, medical universities and colleges, institutes for bio-medical engineers, nurses, and paramedical staff, etc., and achieve the UHC and SDG targets throughout the country. Moreover, the government should try to remove all kinds of social and cultural barriers on a priority basis.

iv. Governance & Regulatory Barriers

Literature review points out that a feeble national policy is a significant threat and hindrance to organizations and businesses in public procurement. It also emphasizes a proper legal procedure that promotes transparency in the public procurement act. A friendly regulatory framework promotes healthcare provision. Regulations are aimed at protecting individuals and enabling them to access services, and reduction of costs. The primary objective of regulations is to initiate standard practice as a measure of quality.

Zadek and Radovich explained that good governance should be the priority of the organizations and institutions and must be supported with relevant laws, rules, regulations, customs, and cultures to strengthen their process of decision making and to achieve the goal of transparent and accountable systems. Governance is a valuable tool to enhance and improve the level of transparency and accountability. It is also the responsibility of the management of the organizations to stay focused on the defined goals and improve the culture of teamwork, better controls, encourage participatory culture, and promote integrity, under the supportive leadership role. (Zadek and Radovich, 2006)

According to Minjire and Waiganjo, the responsibility of the administrative control over the activities involved in public-private partnership projects, related functions, and arrangements to take necessary steps and actions is given to the project management team. (Minjire, 2015)

Several governance issues arise on the basis of involvement of multi-stakeholders in complex and risky projects on PPP mode. To overcome these issues and get successful results of partnerships between public and private parties, many factors are considered more critical: well-equipped establishments, solid legal frameworks, straightforward and easy procedures, competency, accountability, and transparency in both the private well public sectors. Literature reveals that even after different research studies with theoretical and practical findings and observations, there is still a gap to find the most effective mechanism of good governance and better management. The mode of PPP collaborations was started in the 1990s and early 2000s to get the benefit of private capital, innovative skills, risk-sharing mechanism, and particularly reduction on the public exchequer. The concept is becoming popular and multiplying due to the solid frameworks and increased confidence of private investors. It is always considered more closely that neither the absolute control and command should be with the public sector, nor the commercialization of the service delivery projects to private parties. (Torchia and Calabrò, 2018)

Developing countries with weak policies, poor governance, unstable governmental and political systems and malpractices of bribery or corruption cannot convince the private parties to invest in public projects. They cannot also invite or attract foreign investments in PPPs. While a clear legal framework, social regulations, transparent procedures of procurement and collaborations, and provision of firm guarantees from governments can attract various potential investors locally and internationally. The primary goal of achieving quality health services can be accomplished by adopting suitable modes of financing or partnerships with the private sector in any reasonable model of PPPs.

In previous studies it was explained that health care projects on PPP mode are mainly done to increase and expand the network of health facilities and health infrastructure in the form of hospital construction, better accommodation facilities for health personnel, outsourcing of particular services like: security, utilities, IT, management and monitoring of the projects, etc. (Akintoye and Chinyio, 2005) and (Blanken and Dewulf, 2010).

Relational governance' role has been complex and complicated concerning the relationship between trust/commitment and relational norms. By implementing the PPP, we cannot say that all the governance issues of infrastructure projects may be sorted out like the agency problems, uncertain commitments, and precisely the problems associated with projects of asset-specific nature. (Maosa and Muturi)

v. Technical & Legal Barriers

It is the responsibility of the governments to ensure that the private sector has been adequately involved in the PPPs development, and then much more focus should be given on the implementation of the PPP projects without inordinate delays so that maximum benefits may be achieved from these ventures. Furthermore, confidence must be given to the stakeholders that government would ensure the stability of legal and regulatory frameworks, and there would be no rapid changes to avoid confusion. On the other hand, to boost the confidence level of the investors and all the stakeholders, it is also necessary to establish an environment of transparency and accountability.(Al-Hanawi et al., 2020b)

While elaborating the critical factors and barriers to the PPPs in the health sector, a study has narrated that legal and political barriers are also one of the most effective barriers to the implementation of the projects in the PPP model. The respondents of the study argued that such kind of solid legal framework was missing in their country. Meanwhile, another significant hindrance was the lack of coordination and cooperation at various governmental agencies and offices, strengthening the legal and political barriers. In the absence of proper coordination and supportive behavior of governmental authorities,

partnerships with the private sector cannot be successful and long-lasting. In addition, other malpractices like favoritism, red tape, and inordinate delays in approval processes are also counted as barriers to developing PPPs. Moreover, the adopted procedures and formalities were composite and complicated, causing a low attraction for the private investors to invest in hospitals. The other experts were that existing laws and regulations were contradictory; therefore, investors were not willing to participate in various PPP projects. Therefore, the study concluded the ranking of technical, structural, or procedural barriers at third place among all other barriers to developing PPPs. (Sadeghi, Bastani and Barati, 2020)

Technical barriers are considered when delays are seen in the construction work, lack of capacity and ability of the staff handling the projects, lack of supportive frameworks, and non-availability of technologies required to run projects smoothly. Developing countries do not possess sufficient technical human resources and the latest technologies and equipment that can help the partners to run the PPP projects successfully. Studies from the many African countries revealed that they had a low capacity to utilize and benefit from ST&I (Science, Technology, and Innovation Strategy), resulting in their economies. Some of the authors argued that many underdeveloped countries lack proper institutions that can work on STI and produce knowledge, skill and other technological advancements for their socio-economic growth". (Banji, Bertha and Shruti, 2018)

The efficiency and effectiveness of PPP projects can be ensured with the help of sound policies, strategies, rules, and regulations and a feel of free work without any kind of snooping by the political leadership or any other irrelevant parties. It is necessary to strengthen the national policy to enhance and maximize the benefits of PPP undertakings by the government and the participating private business organizations. Governments must have a clear legal framework and other regulatory procedures to stimulate and enrich the transparency in all the transactions. Once a friendly regulatory framework has been deployed, it may protect the rights of individuals and encourage them to access the requisite

services at reduced costs. One of the critical objectives of regulations is to provide standardization and better quality. (Maosa and Muturi)

Ismail & Ajija (2013) conducted a study that highlighted the success of crucial parameters on PPPs practices in Malaysia. The study found out that the best practices of these variables are adherence to the principles of good governance, supportive legal framework, sustainable economic policy, technical knowledge, open supply chain management, and socio-economic environment. (Ismail, 2013)

III. Research Method

1. Study Framework

Research procedure and methodology has been explained in Figure 1.

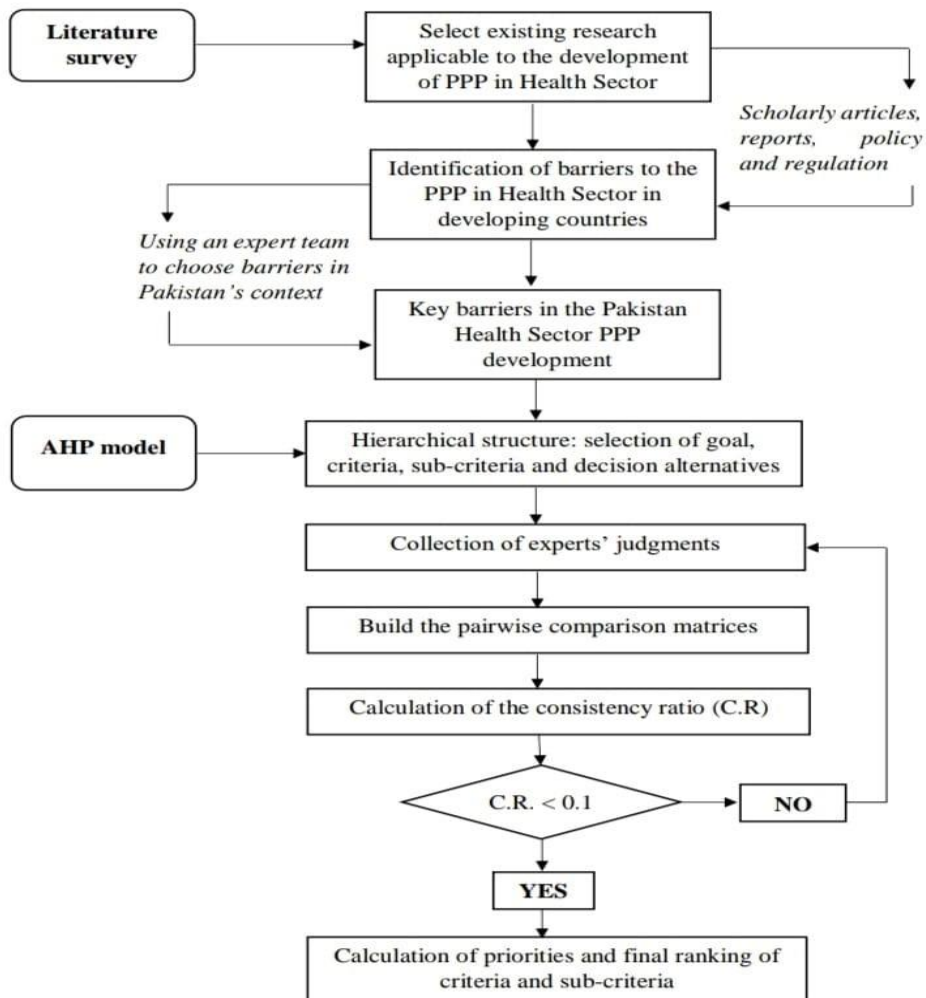


Figure 1. Conceptual Framework of the Study

Both the quantitative and qualitative methods was applied in the present study to identify the essential barriers affecting development of PPP projects in the health sector of Pakistan and then prioritize and rank them. An extensive review of the literature provided different barriers to PPPs in the health sector of developing countries. To find out the most impactful barriers to developing PPP projects in the health sector, some scholarly articles, papers, health, and PPP reports were consulted.

2. Questionnaire Formulation

i. Electronic Mail Interviews

In the first phase, a comprehensive list of barriers to the development of PPP projects in the health sector of Pakistan was obtained through the qualitative process using electronic mail interviews (Appendix-A). The list of barriers was formulated on the basis of literature review and opinion of experts; then thematic analysis was performed to convert the list into a pair-wise questionnaire for the subject study.

ii. Pair-wise Questionnaire

In the second phase, a pair-wise questionnaire was formulated and distributed among the experts to provide their responses to be utilized in AHP analysis and to prioritizing and ranking the identified barriers (Appendix-B). In this way, by using AHP, the priority and importance of the identified barriers were determined. Data was collected through a pair-wise questionnaire. The qualitative analysis was completed with the help of electronic mail interviews, and then thematic analysis was performed to get the final list of prominent and sub-criteria. Finally, all 11 participants were requested to answer the two critical questions regarding the barriers to the development of public-private partnership (PPP) in the health sector of Pakistan, regardless of their rank of importance. As a result of data collection in the first phase, the main barriers were categorized under five heads, which were titled “Main Criteria Barriers.” In contrast, a total 21 number of essential barriers were

finalized based upon the literature review and opinion of experts, and these were reflected as “Sub-criteria Barriers”. Inductive perspective was followed, which is known for observing the resemblances, similar patterns, and regularities inexperience and concluding. Moreover, coding was done manually. After the analysis, the main themes / main factors of the AHP model were created.

After setting up the hierarchical structure, there was a need to weight the priorities of the criteria so that pairwise comparisons can be performed. When the weights of priorities are not identified, the criteria factors are assessed on subjective basis using the scale of preference or relative importance. Therefore, using the scale of relative importance from 1 to 9 (where 9 is extremely important and 1 is equally important), a pair-wise questionnaire was designed to indicate the relative importance of options A to options B. In case of various theoretical comparisons between other scales and applications, the scale of relative importance has been proved effective. Table 8

Table 8. The Scale of Relative Importance

Preferences' Explanation	Numeric Values
If option A and option B are Equally Important	1
If option A is Moderately more Important than option B	3
If option A is Strongly more Important than option B	5
If option A is Very Strongly more Important than option B	7
If option A is Extremely more Important than option B	9
Intermediate values between adjacent scale values	2,4,6,8
*Same pattern of ranking may be followed for option B vs option A.	

When numbers are presented after arranging into rows and columns, these are called matrixes. The units of the matrix are called its elements. There are various applications of matrixes like they can be used to solve linear equations and represent graphs. For example, the pair-wise comparison is used to determine the preference or more

important element compared to the other elements in a pair form. The decision-makers can easily give a numerical value to the preferred element in the pair-wise comparison. The constructed pair wise matrixes were formulated through the aggregate weights of each criteria and sub-criteria and they are obtained through geometric mean of all the ranks selected by experts in the pair-wise questionnaire. In a pair-wise matrix Table 9, two criteria are compared by placing one in the row and the other in the column. Therefore, the square matrixes have an equal number of rows and columns. Moreover, these square matrixes possess the reciprocal property. Therefore, whenever the criteria n is compared to criteria n at that time, the numerical value 1 will be obtained due to equal importance, and it will create the main diagonal line as 1 always. In the next step, criteria are compared with each other. At the same time, the comparison of weights is always an activity appearing in the column on the left against an activity appearing in the row on top.

Table 9. Sample of Pair-wise Comparison Table

Objective	Criteria 1	Criteria 2	Criteria 3	...	Criteria n
Criteria 1	-	-	-		-
Criteria 2	-	-	-		-
Criteria 3	-	-	-		-
...					
Criteria n	-	-	-		-
Total Σ					

After completing the pair-wise matrix comparison, consistency is checked through the weight approximation by the decision-makers. If the values are inconsistent, these are based on maximum eigenvalue λ_{max} , which must be solved from the priority matrix. Similarly, to find out the consistency, the consistency index was calculated with the help of an equation $CI = (\lambda_{max} - n) / (n - 1)$. If the estimates are perfectly consistent, the result will be $CI=0$, but the small inconsistent values are also acceptable. The deviation inconsistency can be calculated using the formula of consistency index.

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

$$n-1$$

When the matrix entries are random, a random index (RI) Table 10 is used as a consistency index. The random index scale is fixed and standardized based on several criteria to be evaluated. The value to RI will increase with an increase in matrix size. The matrix size is represented with the letter n, while RI describes corresponding values of the random index. The table has been taken from the research study (Saaty, 1977).

Table 10. Random Index Table

n	1	2	3	4	5	6	7	8	9
Random Index (RI)	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45

The last phase calculates the consistency ratio (Consistency Ratio = CI / RI) using the consistency index and random index. The consistency ratio is beneficial in deciding whether the responses are consistent or not. As the rate of consistency is high as 100% in the preferences, then the rate of deviation will be low, like 0. If the consistency ratio is less than or equal to 0.1 or 10%, it is under the acceptable range. Whenever CR is not in the acceptable range, then there is a need to re-evaluate the matrixes. Overall rankings were calculated on the basis of weights of the criteria and then they were presented in sequential order using a built-in formula of RANK in the Microsoft Excel software.

iii. List of Main Criteria Barriers

According to results, five main themes or main criteria regarding barriers to the development of public-private partnerships in the health sector of Pakistan were identified.

1. Financial Barriers
2. Political Barriers
3. Socio-Cultural Barriers
4. Governance & Regulatory Barriers
5. Technical & Legal Barriers

iv. The Most Influential Sub-Criteria Barriers

According to results, 21 sub-themes or sub-criteria regarding barriers to the development of public-private partnerships in the health sector of Pakistan were identified.

Table 11

Table 11. List of Barriers to Health Sector PPP in Pakistan

Category	Code	Description of Barriers
Financial Barriers	F1	High financial cost
	F2	Investors' lack of confidence
	F3	Inappropriate risk allocation and sharing
	F4	Difficulties in getting loan from banks
	F5	Lack of budget to promote PPPs
Political Barriers	P1	Lack of strong political commitment to PPPs
	P2	Inadequate experience in PPPs
	P3	Unstable government
	P4	Strong political interference
Socio-Cultural Barriers	SC1	Potential conflicts of interests among stakeholders
	SC2	Corruption and bribery
	SC3	Investors' not willing to accept high risks
	SC4	Lack of trust between the public and private sector
Governance & Regulatory Barriers	GR1	Problems with administrative procedures and guidelines
	GR2	Lack of support from government
	GR3	Lack of transparency and accountability
	GR4	Poor regulatory frameworks and enforcement
Technical & Legal Barriers	TL1	Lack of clarity in PPP process
	TL2	Law and regulation changes
	TL3	Weak institutional capacity and PPP strategies

TL4 Construction time delay

v. List of Codes used in Analysis

Table 12 is showing the details of codes, assigned to main and sub-criteria barriers, which for used in the analysis process.

Table 12. List of Codes assigned to Barriers

Sr. No.	Main Criteria Barriers	Codes
1	(F) Financial Barriers	Financial
2	(P) Political Barriers	Political
3	(SC) Socio-Cultural Barriers	Socio-Cul.
4	(GR) Governance & Regulatory Barriers	Gov. Reg.
5	(TL) Technical & Legal Barriers	Tech. Legal
Sub-Criteria Barriers		
Financial Barriers (F)		Codes
1	(F1) High financial cost	F1 HFC
2	(F2) Investors' lack of confidence	F2 ILC
3	(F3) Inappropriate risk allocation and sharing	F3 IRAS
4	(F4) Difficulties in getting loan from banks	F4 DBL
5	(F5) Lack of budget to promote PPPs	F5 LBPP
Political Barriers (P)		Codes
6	(P1) Lack of strong political commitment to PPPs	P1 LSPC
7	(P2) Inadequate experience in PPPs	P2 IPEP
8	(P3) Unstable government	P3 USG
9	(P4) Strong political interference	P4 SPI
Socio-Cultural Barriers (CL)		Codes
10	(SC1) Potential conflicts of interests among stakeholders	SC1 PCIS

11	(SC2) Corruption and bribery	SC2 CAB
12	(SC3) Investors' not willing to accept high risks	SC3 IWHR
13	(SC4) Lack of trust between the public and private sector	SC4 LTPP
Governance & Regulatory Barriers (GR)		Codes
	(GR1) Problems with administrative procedures and guidelines	
14		GR1 PAPG
15	(GR2) Lack of support from government	GR2 LSG
16	(GR3) Lack of transparency and accountability	GR3 LTA
17	(GR4) Poor regulatory frameworks and enforcement	GR4 PRFE
Technical & Legal Barriers (TL)		Codes
18	(TL1) Lack of clarity in PPP process	TL1 LCP
19	(TL2) Law and regulation changes	TL2 LRC
20	(TL3) Weak institutional capacity and PPP strategies	TL3 WICS
21	(TL4) Construction time delay	TL4 CTD

3. Data Collection

i. Research Population

The research population includes the government / public sector officers and executives / senior managers of the partnering organizations (private sector health institutions and financial institutions/ banks) and academia experts associated with public-private partnership developments. The primary purpose of including both the scholars and industry professional/ sector experts is to achieve accurate results for this study.

ii. Research Sampling Process

A suitable and appropriate sample was selected, keeping in view the objectives of the study. Experts/professionals from Public-Private Partnership Authority, Planning &

Development Board, Health Departments, Bankers are on duty. Also, Hospital directors/managers are in charge of developing PPP projects in the health sector, Punjab, Pakistan. Moreover, to find a valid representative sample, attempts were made to include experts from both private and public organizations.

iii. Sampling Type and Reason for Selection

Purposive sampling (a non-probability) approach was adopted to select the current study samples because this technique keeps focusing on the researcher's judgment for choosing subjects under investigation. In this study, individuals from both the public and private institutions were selected to focus on the relevant knowledge and understanding of the issue under investigation. Moreover, the institutions were also selected purposively, considering their potential linkage with health sector PPP projects.

iv. Sampling Size

Sample size was finalized using the standard method of "Information saturation level," which was like other qualitative studies. For the first phase, 15 experts were approached to participate in this research as interviewees, out of which 11 responded to the interview questions. For example, in a study, M.E. Qureshi (2003) selected a sample size of 13 farmers to get the responses to riparian revegetation policy options using the AHP model. (Qureshi and Harrison, 2003). In another study, Doğançan (2020), using the AHP model, obtained and utilized the response of 6 participants to rank and prioritize the barriers to medical tourism in Turkey. (Cavmak and Cavmak, 2020). Similarly, for the second phase, 23 experts were approached to respond to the study's questionnaire, out of which 17 experts responded, and data of only 14 questionnaires was used in the analysis. Three questionnaires were incomplete and inconsistent; therefore, these were excluded. Criteria for selection of evaluators was at least 5 years of working experience in academia, health industry, or public-private partnership projects, which is a good baseline for understanding the healthcare projects on PPP mode and their current working designation at the

managerial level. The unit of analysis in this study is “Individuals.” While conducting this research, ethical considerations were given due weightage to ensure the anonymity and confidentiality of respondents and their provided information and willingness of the interviewees and all other respondents of the questionnaires.

Certain limitations may be considered while understanding the finding of present research. According to need of research model, purposive sampling technique was applied due to which the sample size was relatively small. In future, the researchers may include a larger sample size for the similar study. At present, only a few projects of healthcare PPPs were found successful in Punjab, Pakistan, therefore, the point of participants of the study might be limited with regards to their specific experience. But after inclusion of some more participants from different regions and different projects, a detailed examination will be warranted.

v. Defining Goals and Objectives:

The most critical and challenging step is setting goals or objectives, which is starting point of all the methodologies. The objective should be set so that it can bring measurable outcomes by considering the importance of all the required factors. The overall objectives or goals should be defined so that they can imitate the causes of the issue and not only the manifestation. Current study’s main objective is “Most influential barriers to the development of PPP in the health sector of Pakistan”.

vi. Setting up Hierarchical Structure

The second and crucial step is to break down the problem into a hierarchical structure Figure 2. Very first level is about framing the main goal/objective to solve the problem using the hierarchy process. Then, the main criteria and sub-criteria are set to go deep into problem-solving, and the alternatives are placed at the last level.

vii. Hierarchical structure of the barriers to the development of PPPs in the Health Sector of Pakistan

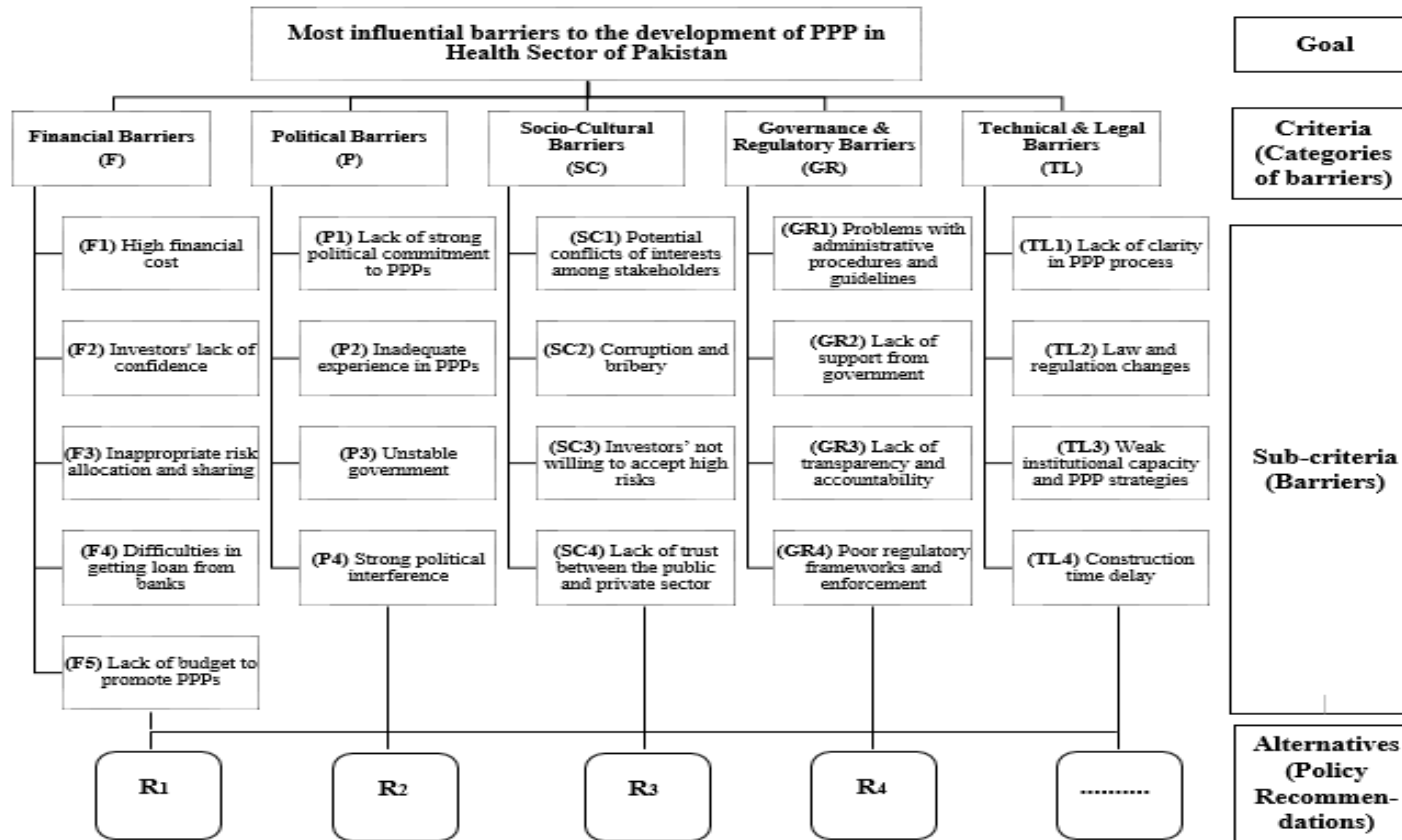


Figure 2. Research Model

4. Analysis Process

The analysis processes/computation section was completed using Microsoft Excel 2016 program through different steps, which are as follows.

- Step 1:** To find out which criteria and sub-criteria are more and how much more critical, AHP was applied. The fundamental scale of AHP was used by assigning a number ranging from 1 (equal importance) to 9 (extreme importance), and pairwise matrix was formulated.
- Step 2:** In a pair-wise matrix, two criteria are compared by placing one in the row and the other in the column. The constructed pair wise matrixes were formulated through the aggregate weights of each criteria and sub-criteria and they were calculated with the help of geometric mean of all the ranks selected by experts in the pair-wise questionnaire.
- Step 3:** Eigen value (λ_{Max}) and Eigen vectors were calculated along with the relative weights of the criteria and sub-criteria barriers.
- Step 4:** Overall global rankings and relative weights were calculated to find out the ranking importance of the barriers. The global priorities were calculated as a result of multiplication of each relative weight of the barriers within the category with relative weight of category.
- Step 5:** The Consistency Ratio (CR) was computed to check the validity of the ranking in the matrix. The benchmark for acceptance of consistency was set as if the CR is less than 10%. If the CR is not coming into a defined range, re-examining the pair-wise comparisons in the matrix was carried out.

IV. Results

Quantitative analysis was completed using AHP to determine the importance and priority ranking of the identified barriers to the development of public-private partnerships in the health sector of Pakistan. Final list of a total of twenty-one barriers, after thematic analysis, was converted into a pair-wise questionnaire for the subject study. Out of 23, only 17 experts responded the pair-wise questionnaire, but only 14 responses were used to calculate the results because the responses from the other 3 experts were incomplete and inconsistent. Therefore, those were not included in the analysis.

i. Summary Table of Pairwise Comparison Matrix for Main Criteria Barriers

There are five main criteria regarding barriers to the development of public-private partnerships in the health sector of Pakistan, including Financial Barriers, Political Barriers, Socio-Cultural Barriers, Governance & Regulatory Barriers, and Technical & Legal Barriers. Analysis was performed on the pair-wise matrixes to get the comparison results and consistency ratios as well. After calculating individual weights, the ranking of the categories was also calculated.

Table 13 shows the priority ranking of all five main categories of barriers. The experts, ranked these categories from highest to lowest by indicating that Governance & Regulatory Barriers ($w=0.4633$) are the most highly influential on development of public-private partnerships in health sector of Pakistan, followed by Financial Barriers ($w=0.2465$), Socio-Cultural Barriers ($w=0.1534$), Political Barriers ($w=0.0898$) and Technical & Legal Barriers ($w=0.0471$).

Every country and its provinces have different political situation, financial condition, governance and regulations models, and technical and legal frameworks that can provide different results and opinions about PPPs in health sector.

Table 13. Pair wise assessment matrix for main category barriers to the development of PPPs in healthcare sector of Pakistan

Barriers	Financial	Political	Socio-Cul	Gov. Reg	Tech. Legal	Relative Weight	Rank
Financial	1	3	3	0.333	5	0.2465	2
Political	0.333	1	0.333	0.2	3	0.0898	4
Socio-Cul	0.333	3	1	0.25	4	0.1534	3
Gov. Reg	3	5	4	1	6	0.4633	1
Tech. Legal	0.2	0.3333	0.25	0.167	1	0.0471	5

$\lambda_{\text{Max}} = 5.30837, CI = 0.077094, CR = 0.0688$

ii. Summary Table of Pair-wise Comparison Matrix for Sub-Criteria Barriers

In this study, there are a total of twenty-one sub-criteria barriers to the development of PPPs in the health sector of Pakistan. Analysis was performed on the pair-wise matrixes to get the comparison results and consistency ratios as well. While analyzing the study results, sub-criteria barriers in each category of main criteria were also analyzed. The aggregated responses of experts were converted in to final pair-wise comparison matrixes to analyze, and their relative weights were calculated. After the calculation of weights, the final rankings within the categories was also calculated to show the priority level of barriers. CR calculations, showed that values were less than 0.10.

Table 14. Pair wise assessment matrix for “Financial barriers” to the development of PPPs in healthcare sector of Pakistan

Barriers	F1 HFC	F2 ILC	F3 IRAS	F4 DBL	F5 LBPP	Relative Weight	Rank
F1 HFC	1	0.2	0.2	2	0.333	0.0753	4
F2 ILC	5	1	2	6	3	0.4149	1
F3 IRAS	5	0.5	1	3	0.333	0.1940	3
F4 DBL	0.5	0.167	0.333	1	0.2	0.0522	5
F5 LBPP	3	0.333	3	5	1	0.2634	2

$\lambda_{\text{Max}} = 5.36371, CI = 0.090929, CR = 0.0811$

Table 15. Pair wise assessment matrix for “Political barriers” to the development of PPPs in healthcare sector of Pakistan

Barriers	P1 LSPC	P2 IPEP	P3 USG	P4 SPI	Relative Weight	Rank
P1 LSPC	1	5	1	0.333	0.2300	3
P2 IPEP	0.2	1	0.143	0.2	0.0546	4
P3 USG	1	7	1	1	0.3235	2
P4 SPI	3	5	1	1	0.3919	1
λ Max = 4.16811, CI = 0.05603, CR= 0.0622						

Table 16. Pair wise assessment matrix for “Socio-Cultural barriers” to the development of PPPs in healthcare sector of Pakistan

Barriers	SC1 PCIS	SC2 CAB	SC3 IWHR	SC4 LTPP	Relative Weight	Rank
SC1 PCIS	1	0.2	2	0.25	0.1036	3
SC2 CAB	5	1	4	2	0.4660	1
SC3 IWHR	0.5	0.25	1	0.143	0.0723	4
SC4 LTPP	4	0.5	7	1	0.3580	2
λ Max = 4.17134, CI = 0.05711, CR= 0.0634						

Table 17. Pair wise assessment matrix for “Governance & Regulatory barriers” to the development of PPPs in healthcare sector of Pakistan

Barriers	GR1 PAPG	GR2 LSG	GR3 LTA	GR4 PRFE	Relative Weight	Rank
GR1 PAPG	1	0.333	0.143	0.333	0.0651	4
GR2 LSG	3	1	0.333	3	0.2248	2
GR3 LTA	7	3	1	7	0.5945	1
GR4 PRFE	3	0.333	0.143	1	0.1155	3
λ Max = 4.16871, CI = 0.05623, CR= 0.0624						

Table 18. Pair wise assessment matrix for “Technical & Legal barriers” to the development of PPPs in healthcare sector of Pakistan

Barriers	TL1 LCP	TL2 LRC	TL3 WICS	TL4 CTD	Relative Weight	Rank
TL1 LCP	1	3	0.25	3	0.2249	2

TL2 LRC	0.333	1	0.2	3	0.1343	3
TL3 WICS	4	5	1	5	0.5661	1
TL4 CTD	0.333	0.333	0.2	1	0.0748	4
λ Max = 4.26023, CI = 0.08674, CR= 0.0963						

Table 14 explained that under the category of Financial Barriers, the most significant barrier is Investors' lack of confidence ($w=0.4149$), followed by Lack of budget to promote PPPs ($w=0.2634$), Inappropriate risk allocation and sharing ($w=0.1940$), High financial cost ($w=0.0753$) and Difficulties in getting loan from banks ($w=0.0522$).

Table 15 represented that under the category of Political Barriers, the strongest barrier was Strong political interference ($w=0.3919$), followed by Unstable government ($w=0.3235$), Lack of strong political commitment to PPPs ($w=0.2300$), and Inadequate experience in PPPs ($w=0.0546$).

Table 16 highlighted that under the category of Socio-Cultural Barriers **Error! Reference source not found.**, the significant impact barrier is Corruption and bribery ($w=0.4660$), followed by Lack of trust between the public and private sector ($w=0.3580$), Potential conflicts of interests among stakeholders ($w=0.1036$), and Investors' not willing to accept high risks ($w=0.0723$).

Table 17 indicated that under the category of Governance & Regulatory Barriers, the biggest barrier is Lack of transparency and accountability ($w=0.5945$), followed by Lack of support from government ($w=0.2248$), Poor regulatory frameworks and enforcement ($w=0.1155$) and Problems with administrative procedures and guidelines ($w=0.0651$).

Table 18 showed that under the category of Technical & Legal Barriers, the most impactful barrier is Weak institutional capacity and PPP strategies ($w=0.5661$), followed by Lack of clarity in PPP process ($w=0.2249$), Law and regulation changes ($w=0.1343$), and Construction time delay ($w=0.0748$).

iii. Summary Table of Global ranking of barriers to the development of PPPs in Health Sector of Pakistan

Table 19. Global ranking of barriers to the development of PPPs in Health Sector of Pakistan

Categories of Barriers	Relative Weight	Specific Barrier		Relative Weights	Relative Rank	Global Weights	Global Rank	
Financial	0.2465	F1 HFC	High financial cost	0.0753254	4	0.0185652	14	
		F2 ILC	Investors' lack of confidence	0.4149750	1	0.1022777	3	
		F3 IRAS	Inappropriate risk allocation and sharing	0.1940251	3	0.0478208	8	
		F4 DBL	Difficulties in getting loan from banks	0.0522360	5	0.0128745	16	
		F5 LBPP	Lack of budget to promote PPPs	0.2634385	2	0.0649289	5	
Political	0.0898	P1 LSPC	Lack of strong political commitment to PPPs	0.2299616	3	0.0206445	13	
		P2 IPEP	Inadequate experience in PPPs	0.0546048	4	0.0049021	20	
		P3 USG	Unstable government	0.3235288	2	0.0290443	11	
		P4 SPI	Strong political interference	0.3919049	1	0.0351827	9	
Socio-Cultural	0.1534	SC1 PCIS	Potential conflicts of interests among stakeholders	0.1035859	3	0.0158895	15	
		SC2 CAB	Corruption and bribery	0.4660497	1	0.0714895	4	
		SC3		0.0723395	4	0.0110965	17	
		IWHR	Investors' not willing to accept high risks					
Governance & Regulatory	0.4633	SC4 LTPP	Lack of trust between the public and private sector	0.3580249	2	0.0549191	6	
		GR1	Problems with administrative procedures and guidelines	0.0651261	4	0.0301725	10	
		PAPG						
		GR2 LSG	Lack of support from government	0.2247899	2	0.1041440	2	
		GR3 LTA	Lack of transparency and accountability	0.5945378	1	0.2754462	1	

Technical & Legal	0.0471	GR4 PRFE	Poor regulatory frameworks and enforcement	0.1155462	3	0.0535319	7
		TL1 LCP	Lack of clarity in PPP process	0.2248536	2	0.0105839	18
		TL2 LRC	Law and regulation changes	0.1342946	3	0.0063213	19
		TL3 WICS	Weak institutional capacity and PPP strategies	0.5660810	1	0.0266455	12
		TL4 CTD	Construction time delay	0.0747708	4	0.0035195	21

The overall global rankings were presented in Table 19 which showed that (GR3 LTA)-Lack of transparency and accountability is the most significant barrier as per the opinion of experts because this factor obtained (0.2754462) preference among all the other factors and was ranked in the first place. Similarly, (GR2 LSG)-Lack of support from government was ranked at second place with (0.1041440), followed by (F2ILC)-Investors' lack of confidence at third place with (0.1022777), (SC2CAB)-Corruption and bribery at fourth rank with (0.0714895) and (F5LBPP)-Lack of budget to promote PPPs at fifth ranking with (0.0649289) and so on for the rest of barriers until the last twenty-first place i.e. (TL4 CTD)- Construction time delay with just (0.0035195).

V. Discussion

1. Discussion for Research Methods

This research study was conducted with a purpose to add a little contribution to understand PPPs in health sector of Pakistan by focusing and determination of the barriers and their priority ranking. The findings of the qualitative and quantitative analysis have been collaborated. AHP technique was applied to achieve the objectives of the study. Pair wise comparison matrix were constructed with the aggregated weights using geometric mean of all individual rankings by the experts' pairwise judgments.

2. Discussion for Results

The study's findings concluded that the main barrier to the development of PPPs in the healthcare sector of Pakistan were the governance and regulatory barriers, followed by the financial barriers. They were due to the contribution of various sub-factors like; Lack of transparency and accountability, poor regulatory frameworks and enforcement, lack of support from the government, problems with administrative procedures and guidelines, Investors' Lack of confidence, Inappropriate risk allocation and sharing, Difficulties in getting a loan from banks, High financial cost and Lack of budget to promote PPPs. Similarly, the experts ranked the political barriers and socio-cultural barriers at third and fourth place, respectively. The major contributing factors of political and socio-cultural barriers were like; Lack of strong political commitment to PPPs, terrible experience in PPPs, unstable government, substantial political interference, potential conflicts of interests among stakeholders, corruption, and bribery, investors' not being willing to accept high risks, lack of trust between the public and private sector. According to the ranking of main criteria, experts ranked the technical and legal barriers at fifth place among other factors, but still, there were most vital contributing factors like; Lack of clarity in the PPP process, law and regulation changes, weak institutional capacity, and PPP strategies and construction time delay.

Most of the experts believed that lack of transparency and accountability, corruption and bribery, and the investor's lack of confidence to invest were the biggest hurdles in the development of PPPs in the healthcare sector of Pakistan. Many of the experts pointed out that Pakistan has the substantial potential to develop PPPs even in the healthcare sector, but the promotion policies and strategies could not attract more and more private investors. Contributors of the study also stressed the better coordination among all the stakeholders and cultural change through governmental solid support and ownership of the projects under government guarantee. In addition, to attract more private investments in healthcare PPPs, the trust level between government and private parties needs to be enhanced.

The current study results were also consistent with the findings of some already researched topics in Pakistan using different methodologies other than the AHP approach. Recently a study was conducted on the healthcare system of Pakistan in 2020, where some of the results matched with the current study. In their study, the researchers concluded that lack of transparent communication among stakeholders and financial barriers in the shape of non-availability of sufficient capital and high cost were considered and identified as significant hurdles and ranked them as the most crucial barriers. (Ahmad et al., 2020). Similarly, another study conducted by Khan and Puthussery, 2019, supported the current study's findings of sub-criteria factors, i.e., corruption, lack of coordination, and HR capacity. In their study, it was revealed that multi-layered corruption, bribery in the healthcare system, along with another barrier of lack of coordination among the stakeholders and the capacity of human resources and their fear of losing jobs, were the biggest challenges in the way of development of PPPs in the healthcare sector of Pakistan. (Khan and Puthussery, 2019)

As a result of the overall global rankings of the barriers, prioritized by the experts based on their judgments, the most influential and essential top-ranked five barriers that

affect the development of PPPs in the healthcare sector of Pakistan were lack of transparency and accountability (overall ranking of $w=0.2754462$), followed by lack of support from government ($w=0.1041440$), investors' lack of confidence with ($w=0.1022777$), corruption and bribery with ($w=0.0714895$) and lack of budget to promote PPPs with ($w=0.0649289$).

3. Policy Recommendations

The present study has proposed specific recommendations based on results and findings that policy-makers can consider improving their existing policy and strategy towards developing public-private partnerships in the health sector. In addition, the study provides a detailed and in-depth understanding of critical and the most significant barriers to the development of public-private partnerships in the health sector of Pakistan. To improve the overall development of PPPs in the healthcare system of Pakistan and to get rid of various barriers and hindrances, the following recommendations or alternatives are proposed.

First of all, it is recommended that all the processes and mechanisms involved in establishing PPPs should be transparent and impeccable to ensure a level of trust between the public and private parties. In addition, there should be a more outstanding check and balance mechanism and institutional framework with a top-down approach to find all the system loopholes and their timely correction. Only transparent and accountable systems can attract private investors to participate in PPPs in the healthcare sector. Good governance and social regulations can be beneficial to attract private party investors. Secondly, it is recommended that governments should ensure their utmost support and political willingness to develop more and more PPPs in the healthcare sector under a supportive mechanism for the private parties. There may be better incentives to attract investors with easy regulations and friendly procedures for all the stakeholders. Improvement in the overall governance and better implementation of rules, regulations,

and legal frameworks can guarantee a promising future for PPPs in the healthcare sector of Pakistan.

In almost all the developing countries, financial and economic challenges are considered among the topmost challenges. Pakistan, being a developing country, is also facing a lot of financial burdens, especially the governments have no sufficient funds to cater to all the needs of social sectors like health and education. Thirdly, it is recommended that the PPP Authority and other vital institutions adopt innovative and flexible financial models regarding PPP development. Most of the time, investors have an acute shortage of funds. Therefore, best policies should be designed for bank loans at low-interest rates and relaxed repayment periods for the investors in healthcare PPPs. In financial models, risk-sharing ratios must be revisited to attain the confidence of private investors in this sector. The government may allocate certain funds under different schemes for the promotion of healthcare PPPs through private investors. Most of the study participants pointed out corruption and bribery as one of the topmost barriers in the development of PPPs in the healthcare sector. Therefore, fifthly it is recommended that the PPP Authority and all other supporting organizations ensure that all the process of PPPs is unbiased and free from malpractices or financial embezzlements. Furthermore, a strong culture of trust, accountability, and transparency should be promoted to attain a sustainable future of PPPs in the healthcare sector of Pakistan.

Sixthly, it is recommended that healthcare PPPs need to be promoted with a strong marketing strategy. Furthermore, an effective strategy should be adopted to attract the investors of PPPs in the healthcare sector as well. Different kinds of seminars, expo, or institutional fairs can be planned and designed at the national level to increase awareness of investment opportunities in healthcare PPPs. Seventhly, it is also recommended that the national ministries of health, finance, and planning devise some mechanism to attract international investors in the healthcare PPPs in Pakistan. Facilitators must work on the

significant importance of marketing campaigns and attractive investment policies to invite international players in this sector.

The quality of human resources needs to be improved through professional knowledge, skills, and overall capacity building. Therefore, last but not the least, it is recommended that public institutions working to establish PPPs and, as private organizations interested in investments, may provide professional qualification and better training facilities to their employees, especially in healthcare project management.

VI. Conclusion

There is a substantial potential for the development of PPPs in the healthcare sector of Pakistan, but still, the success stories are fewer in this regard in comparison to other sectors like roads, water and sanitation projects, education, and transportation, etc. This research has found some key barriers which may also be valid in other developing countries, and it may assist in understanding the PPPs in the healthcare sector. Summary represents that the current study was carried out to analyze the barriers hindering the development of public-private partnerships in the healthcare sector of Pakistan. As a result, a very thin or little contribution has been made to the literature regarding barriers to developing PPPs in the healthcare sector in developing countries. In this research, Analytic Hierarchy Process was applied in a combined form of qualitative and quantitative analysis to determine the priority and ranking of the barriers affecting the development of public-private partnerships in the healthcare sector of Pakistan.

The empirical and theoretical studies have indicated that PPPs facilitate the provision of services to the citizens by establishing good governance, sound legal framework, sustainable economic policy, prudent financial management, and a favorable socio-economic environment. In addition, other studies have come up with models for efficient management of PPPs and project governance, focusing on project completion. However, there has been little work done so far in this area, but it still needs to conduct a conclusive to find why PPPs have not been effectively influenced the performance of healthcare provision in Pakistan and specifically in Punjab province. Therefore, this research sought to lessen the gap by assessing some of the most critical barriers that influence the development of public-private partnerships in Pakistan's healthcare provision.

The study results showed that 21 key barriers need to be handled critically through a holistic approach to ensure that PPPs in the healthcare sector of Pakistan has a sustainable

future. The findings revealed that governance and regulatory barriers have been ranked as the most impactful barriers, followed by the financial barriers and socio-cultural barriers. Meanwhile, the results showed that political and technical barriers had been ranked fourth and fifth, respectively. Furthermore, the experiential finding results pointed out that the most influential top-ranked five barriers that affect the development of PPPs in the healthcare sector of Pakistan were lack of transparency and accountability, followed by lack of support from government, investors' lack of confidence, corruption and bribery and lack of budget to promote PPPs.

Some policy recommendations were suggested to eliminate the most effective barriers and for a sustainable future of PPPs in the healthcare sector of Pakistan. There is a need to review the existing strategies and to take practical steps to promote the culture of PPPs in the healthcare sector of Pakistan through transparent systems, better financial models, a corruption-free environment, better coordination among stakeholders, strong marketing, improved regulations, and good governance with strong support from government and last but not the least the capacity building of human resource.

This research has tried to lessen the gap in comparative literature and help those responsible for making decisions regarding the development of PPPs in the healthcare sector of Pakistan. The suggested policy recommendations can assist the decision-makers in finding better solutions by suitably tackling the key barriers. Moreover, the data collection was ensured from the private and public organizations; therefore, the results and recommendations are rightly applicable to both the public and private sector institutions operating in Pakistan. In a nutshell, these results may open new horizons of knowledge for the researchers to explore further factors of success and failure to develop PPP projects in the health sector.

The thematic consideration of doing this research was to investigate the reasons for the non-development of PPP projects in the health sector of Pakistan due to numerous

barriers and then find out the most influential ones after their ranking through experts. Therefore, the results and recommendations of this study might be beneficial for those authorities and the policymakers who would be working on the development of PPP projects in the health sector after getting a good understanding of the most significant barriers and their ranking. The future researchers may do some in-depth study using any other model or frame work to find out the most influential barriers to the development of PPPs in the health sector of Pakistan and the most suitable alternatives. Moreover, the focus of the study was on the Punjab province of Pakistan while the further research may be conducted in other provinces or regions of the country to prove or disapprove the results of current study.

References

- Ahmad N, Zhu Y, Hongli L, Karamat J, Waqas M, Mumtaz SMT. Mapping the obstacles to brownfield redevelopment adoption in developing economies: Pakistani Perspective. *Land Use Policy* 2020;91:104374.
- Ahmed F, Nisar N. Public-private partnership scenario in the health care system of Pakistan. *East Mediterr Health J* 2010;16(8):910-2.
- Akintoye A, Chinyio E. Private Finance Initiative in the healthcare sector: trends and risk assessment. *Engineering, Construction and Architectural Management* 2005.
- Al-Hanawi MK, Almubark S, Qattan AM, Cenker A, Kosycarz EA. Barriers to the implementation of public-private partnerships in the healthcare sector in the Kingdom of Saudi Arabia. *Plos one* 2020a;15(6):e0233802.
- Al-Hanawi MK, Almubark S, Qattan AMN, Cenker A, Kosycarz EA. Barriers to the implementation of public-private partnerships in the healthcare sector in the Kingdom of Saudi Arabia. *PLoS One* 2020b;15(6):e0233802.
- Allard G, Trabant A. Public-private partnerships in Spain: lessons and opportunities. *International Business & Economics Research Journal (IBER)* 2008;7(2).
- Babatunde SO, Perera S, Zhou L, Udejaja C. Barriers to public private partnership projects in developing countries: A case of Nigeria. *Engineering, Construction and Architectural Management* 2015.
- Baizakov S. Guidebook on promoting good governance in public-private partnership. 2008.
- Banji O-O, Bertha V, Shruti V. Towards effective public-private partnerships in research and innovation: A perspective for African Science Granting Councils. African Technology Policy Studies Network, 2018.
- Bansal M, Saini R, Khatod D. Development of cooking sector in rural areas in India—A review. *Renewable and Sustainable Energy Reviews* 2013;17:44-53.

- Barlow J, Köberle-Gaiser M. The private finance initiative, project form and design innovation: The UK's hospitals programme. *Research Policy* 2008;37(8):1392-402.
- Barlow J, Roehrich J, Wright S. Europe sees mixed results from public-private partnerships for building and managing health care facilities and services. *Health Affairs* 2013;32(1):146-54.
- Bedi AS, Pellegrini L, Tasciotti L. The effects of Rwanda's biogas program on energy expenditure and fuel use. *World development* 2015;67:461-74.
- Bing L, Akintoye A, Edwards PJ, Hardcastle C. The allocation of risk in PPP/PFI construction projects in the UK. *International Journal of project management* 2005;23(1):25-35.
- Blanken A, Dewulf G. PPPs in health: static or dynamic? *Australian journal of public administration* 2010;69:S35-S47.
- Bovaird T. Public-private partnerships: from contested concepts to prevalent practice. *International review of administrative sciences* 2004;70(2):199-215.
- Cavmak D, Cavmak S. Using AHP to prioritize barriers in developing medical tourism: case of Turkey. *Int J Travel Med Glob Health* 2020;8(2):73-9.
- Chowdhury AN, Chen PH, Tiong RL. Analysing the structure of public-private partnership projects using network theory. *Construction management and economics* 2011;29(3):247-60.
- Danaie Fard H, Delkhah J, Kiaiee P. Identifying and prioritizing obstacles ahead of public-private sector partnership development. *Scientific-Research Journal of Business Management* 2017;29:33-49.
- Estache A, Juan E, Trujillo L. The World Bank Sustainable Development Vice-Presidency. *Public-Private Partnerships in Transport. Policy Research Working Paper* 2007.
- Grimsey D, Lewis MK. Evaluating the risks of public private partnerships for infrastructure projects. *International journal of project management* 2002;20(2):107-18.

- Gudienė N, Banaitis A, Podvezko V, Banaitienė N. Identification and evaluation of the critical success factors for construction projects in Lithuania: AHP approach. *Journal of Civil Engineering and Management* 2014;20(3):350-9.
- Hodge G, Greve C. Theorizing Public-Private Partnership success: A market-based alternative to government Paper for the Public Management Research Conference at Syracuse University, 2011
- Ismail S. Critical success factors of public private partnership (PPP) implementation in Malaysia. *Asia-Pacific Journal of Business Administration* 2013.
- Jdidi J, Mejdoub Y, Yaich S, Ben Ayed H, Kassis M, Fki H, Ayadi I, Damak J. Private public partnership: a solution for the development of health system in Tunisia. *Tunis Med* 2017;95(3):160-7.
- Khan EU, Martin AR. Review of biogas digester technology in rural Bangladesh. *Renewable and Sustainable Energy Reviews* 2016;62:247-59.
- Khan NN, Puthussery S. Stakeholder perspectives on public-private partnership in health service delivery in Sindh province of Pakistan: a qualitative study. *Public health* 2019;170:1-9.
- Kosycarz EA, Nowakowska BA, Mikołajczyk MM. Evaluating opportunities for successful public-private partnership in the healthcare sector in Poland. *Journal of Public Health* 2019;27(1):1-9.
- Kumaraswamy M, Zhang XQ. Governmental role in BOT-led infrastructure development. *International journal of project management* 2001;19(4):195-205.
- Lim M-K. Shifting the burden of health care finance: a case study of public-private partnership in Singapore. *Health Policy* 2004;69(1):83-92.
- Loevinsohn B, Ul Haq I, Couffinhal A, Pande A. Contracting-in management to strengthen publicly financed primary health services—the experience of Punjab, Pakistan. *Health policy* 2009;91(1):17-23.
- Longo MC. Good Practices in Health Care “Management Experimentation Models”: Insights from an International Public-Private Partnership on Transplantation and

- Advanced Specialized Therapies. International Best Practices in Health Care Management. Emerald Group Publishing Limited, 2015.
- Maosa RO, Muturi WM. FACTORS INFLUENCING PERFORMANCE OF PUBLIC-PRIVATE PARTNERSHIPS IN HEALTHCARE PROVISION IN KENYA; THE CASE OF NYAMIRA COUNTY.
- Medda F. A game theory approach for the allocation of risks in transport public private partnerships. *International journal of project management* 2007;25(3):213-8.
- Minjire EK. Factors affecting the performance of public-private partnerships in healthcare projects in Kenya: A case study of the ministry of health, Nairobi. Jomo Kenyatta University of Agriculture and Technology 2015.
- Mittal S, Ahlgren EO, Shukla P. Barriers to biogas dissemination in India: A review. *Energy Policy* 2018;112:361-70.
- Molnár S, Szidarovszky F. An alternative method in optimizing random outcomes. *Acta Polytechnica Hungarica* 2016;13(4):77-86.
- Muñoz V, Visentin F, Foray D, Gaulé P. Can medical products be developed on a non-profit basis? Exploring product development partnerships for neglected diseases. *Science and Public Policy* 2015;42(3):315-38.
- Ng A, Loosemore M. Risk allocation in the private provision of public infrastructure. *International journal of project management* 2007;25(1):66-76.
- Ozdemir S, Sahin G. Multi-criteria decision-making in the location selection for a solar PV power plant using AHP. *Measurement* 2018;129:218-26.
- PRAMESTI MW. THE URGENCY OF PUBLIC PRIVATE PARTNERSHIP (PPP) IN PUBLIC HEALTHCARE SERVICES (Study of PPP between BPJS Kesehatan and Private Healthcare Providers Semarang City, Central Java, Indonesia). *STATE AND DIGITAL SOCIETY*:121.
- Qureshi ME, Harrison SR. Application of the analytic hierarchy process to riparian revegetation policy options. *Small-scale forest economics, management and policy* 2003;2(3):441-58.

- Riaz BK, Ali L, Ahmad SA, Islam MZ, Ahmed KR, Hossain S. Community clinics in Bangladesh: A unique example of public-private partnership. *Heliyon* 2020;6(5):e03950.
- Roehrich JK, Lewis MA, George G. Are public–private partnerships a healthy option? A systematic literature review. *Social science & medicine* 2014;113:110-9.
- Rupf GV, Bahri PA, de Boer K, McHenry MP. Barriers and opportunities of biogas dissemination in Sub-Saharan Africa and lessons learned from Rwanda, Tanzania, China, India, and Nepal. *Renewable and Sustainable Energy Reviews* 2015;52:468-76.
- Saaty TL. A scaling method for priorities in hierarchical structures. *Journal of mathematical psychology* 1977;15(3):234-81.
- Sadeghi A, Bastani P, Barati O. Public-Private partnership in the development of Iranian hospital services: lessons learned from experience. *Journal of Military Medicine* 2018;20(4):371-81.
- Sadeghi A, Bastani P, Barati O. Identifying Barriers to Development of the Public-Private Partnership in Providing of Hospital Services in Iran: A Qualitative Study. *Evidence Based Health Policy, Management and Economics* 2020;4(3):162-71.
- Shen L-Y, Platten A, Deng X. Role of public private partnerships to manage risks in public sector projects in Hong Kong. *International journal of Project management* 2006;24(7):587-94.
- Social P. Living Standards Measurement Survey.(2012-13). Pakistan Bureau of Statistics. Government of Pakistan, Islamabad 2016.
- Taherdoost H. Decision making using the analytic hierarchy process (AHP); A step by step approach. *International Journal of Economics and Management Systems* 2017;2.
- Thomas A, Kalidindi SN, Ananthanarayanan K. Risk perception analysis of BOT road project participants in India. *Construction management and economics* 2003;21(4):393-407.

- Torchia M, Calabrò A. Increasing the governance standards of public-private partnerships in healthcare. Evidence from Italy. *Public organization review* 2018;18(1):93-110.
- Woodson TS. Public private partnerships and emerging technologies: A look at nanomedicine for diseases of poverty. *Research Policy* 2016;45(7):1410-8.
- Xu Y, Yeung JF, Chan AP, Chan DW, Wang SQ, Ke Y. Developing a risk assessment model for PPP projects in China—A fuzzy synthetic evaluation approach. *Automation in Construction* 2010;19(7):929-43.
- Zadek S, Radovich S. Governing collaborative governance. *Enhancing Development Outcomes by Improving Partnership Governance and Accountability* 2006.
- Zaidi SA, Bigdeli M, Langlois EV, Riaz A, Orr DW, Idrees N, Bump JB. Health systems changes after decentralisation: progress, challenges and dynamics in Pakistan. *BMJ global health* 2019;4(1):e001013.
- Zavadskas EK, Turskis Z, Tamošaitienė J, Marina V. Multicriteria selection of project managers by applying grey criteria. *Technological and economic development of economy* 2008;14(4):462-77.
- Zhang X. Critical success factors for public-private partnerships in infrastructure development. *Journal of construction engineering and management* 2005;131(1):3-14.
- Zou PX, Wang S, Fang D. A life-cycle risk management framework for PPP infrastructure projects. *Journal of financial management of property and construction* 2008.

Appendix-A Electronic Mail Interview

ANALYSIS ON BARRIERS TO DEVELOPMENT OF THE PUBLIC-PRIVATE PARTNERSHIP (PPP) IN HEALTH SECTOR OF PAKISTAN: ANALYTIC HIERARCHY PROCESS APPROACH

This research (mix of qualitative and quantitative approaches) is designed to explore the perception of managers regarding barriers in development of PPP in healthcare sectors. Mr. Saadat Ali is a master degree student at Yonsei University, Seoul, South Korea, and principal investigator of this research for completion of his final dissertation.

Demographics of the Participants / Interviewees:

Designation _____ Organization (Public or Private) _____

Department / Sector _____ Age (years) _____ Gender: _____

Qualification: (Graduation /Masters/ M.Phil./ PhD)					
Total Work Experience (in number of years)					
Number of PPP projects involved in	None	1 - 2	3-5	6-9	10 or above

You are requested to kindly answer the following two questions regarding the barriers to the development of public-private partnership (PPP) in the health sector of Pakistan, regardless of their rank of importance.

Q. No.1: What kinds of barriers to the development of public-private partnership (PPP) in the health sector of Pakistan can you see?

Q. No.2: Please list the barriers you name, regardless of their importance, and add additional comments separately if you find it necessary?

The main purpose of this electronic mail interview is to obtain a list of relevant barriers from a variety of professional areas in order to shape a hierarchical model. Your professional judgement based upon your in-depth knowledge and industry experience in the shape of a solid response to the above cited questions will enable me to develop a comprehensive list of barriers to the development of public-private partnership (PPP) in the health sector of Pakistan.

Appendix-B Pairwise Questionnaire

QUESTIONNAIRE ABOUT THE ANALYSIS ON BARRIERS TO DEVELOPMENT OF THE PUBLIC-PRIVATE PARTNERSHIP (PPP) IN HEALTH SECTOR OF PAKISTAN: ANALYTIC HIERARCHY PROCESS APPROACH

This research is designed to explore the perception of experts / managers regarding barriers in development of PPP in healthcare sector of Pakistan. Mr. Saadat Ali is a master degree student at Yonsei University, Seoul, South Korea, and principal investigator of this research for completion of his final dissertation.

Demographics of the Participants:

Designation _____ Organization (Public or Private) _____

Department / Sector _____ Age (years) _____ Gender: _____

Academic Qualification: (Graduation /Masters/ M.Phil./ PhD)					
Total Work Experience (in number of years)					
Number of PPP projects involved in	None	1 - 2	3-5	6-9	10 or above

According to the literature review and opinion of the experts and scholars, the list of barriers after thematic analysis, has been converted into a pair-wise questionnaire for the subject study. Using the preference scale from 1 to 9 (where **9** is

extremely important and **1 is equally important**), please indicate the relative importance of options A (left column) to options B (right column). Kindly encircle / rate your agreement level as below:

Preferences' Explanation	Numeric Values
If Option A and Option B are Equally Important	1
If Option A is Moderately more Important than Option B	3
If Option A is Strongly more Important than Option B	5
If Option A is Very Strongly more Important than Option B	7
If Option A is Extremely more Important than Option B	9
Intermediate values between adjacent scale values	2,4,6,8
*Same pattern of ranking may be followed for Option B vs Option A .	

Pairwise Comparison of Main Factors

Option A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Option B
Financial Barriers (F)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Political Barriers (P)
Financial Barriers (F)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Socio-Cultural Barriers (SC)
Financial Barriers (F)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Governance & Regulatory (GR)
Financial Barriers (F)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Technical & Legal (TL)
Political Barriers (P)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Socio-Cultural Barriers (SC)
Political Barriers (P)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Governance & Regulatory (GR)
Political Barriers (P)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Technical & Legal (TL)
Socio-Cultural Barriers (SC)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Governance & Regulatory (GR)

Socio-Cultural Barriers (SC)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Technical & Legal (TL)
Governance & Regulatory (GR)	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Technical & Legal (TL)

Pairwise Comparison of Sub-Factors

Financial Barriers (F)

Option A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Option B
(F1) High financial cost	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F2) Investors' lack of confidence
(F1) High financial cost	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F3) Inappropriate risk allocation and sharing
(F1) High financial cost	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F4) Difficulties in getting loan from banks
(F1) High financial cost	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F5) Lack of budget to promote PPPs
(F2) Investors' lack of confidence	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F3) Inappropriate risk allocation and sharing
(F2) Investors' lack of confidence	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F4) Difficulties in getting loan from banks
(F2) Investors' lack of confidence	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F5) Lack of budget to promote PPPs
(F3) Inappropriate risk allocation and sharing	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F4) Difficulties in getting loan from banks
(F3) Inappropriate risk allocation and sharing	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F5) Lack of budget to promote PPPs
(F4) Difficulties in getting loan from banks	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(F5) Lack of budget to promote PPPs

Political Barriers (P)

Option A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Option B
(P1) Lack of strong political commitment to PPPs	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(P2) Inadequate experience in PPPs
(P1) Lack of strong political commitment to PPPs	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(P3) Unstable government
(P1) Lack of strong political commitment to PPPs	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(P4) Strong political interference
(P2) Inadequate experience in PPPs	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(P3) Unstable government
(P2) Inadequate experience in PPPs	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(P4) Strong political interference
(P3) Unstable government	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(P4) Strong political interference

Socio-Cultural Barriers (CL)

Option A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Option B
(SC1) Potential conflicts of interests among stakeholders	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(SC2) Corruption and bribery
(SC1) Potential conflicts of interests among stakeholders	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(SC3) Investors' not willing to accept high risks
(SC1) Potential conflicts of interests among stakeholders	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(SC4) Lack of trust between the public and private sector
(SC2) Corruption and bribery	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(SC3) Investors' not willing to accept high risks
(SC2) Corruption and bribery	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(SC4) Lack of trust between the public and private sector
(SC3) Investors' not willing to accept high risks	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(SC4) Lack of trust between the public and private sector

Governance & Regulatory Barriers (GR)

Option A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Option B
(GR1) Problems with administrative procedures and guidelines	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(GR2) Lack of support from government
(GR1) Problems with administrative procedures and guidelines	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(GR3) Lack of transparency and accountability
(GR1) Problems with administrative procedures and guidelines	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(GR4) Poor regulatory frameworks and enforcement
(GR2) Lack of support from government	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(GR3) Lack of transparency and accountability
(GR2) Lack of support from government	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(GR4) Poor regulatory frameworks and enforcement
(GR3) Lack of transparency and accountability	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(GR4) Poor regulatory frameworks and enforcement

Technical & Legal Barriers (TL)

Option A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Option B
(TL1) Lack of clarity in PPP process	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(TL2) Law and regulation changes
(TL1) Lack of clarity in PPP process	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(TL3) Weak institutional capacity and PPP strategies
(TL1) Lack of clarity in PPP process	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(TL4) Construction time delay
(TL2) Law and regulation changes	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(TL3) Weak institutional capacity and PPP strategies
(TL2) Law and regulation changes	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(TL4) Construction time delay
(TL3) Weak institutional capacity and PPP strategies	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	(TL4) Construction time delay

Appendix-C List of Participants of Electronic Mail Interview / Survey

During the 1st phase, data was collected through “**Electronic Mail Interview / Survey**”. Total 15 experts were approached to participate in this research as interviewees and they accepted the request. Interview questions were shared via email and received their responses. Out of 15, only 11 experts responded to the interview questions but only 10 responses were used to formulate a pair-wise questionnaire because the response from Scholar 3 was incomplete, therefore, it was not included.

Sr. No.	Respondent	Designation	Industry	Sector	Education Level	Gender	Experience (Years)	No. of PPP Projects
1.	Expert 1	Assistant Professor	Academia	Public	PhD	Male	9	1-2
2.	Expert 2	Assistant Professor	Academia	Public	PhD	Male	6	None
3.	Expert 3	Director Planning	Academia	Public	PhD	Male	16	None
4.	Expert 4	Deputy Director Projects	PPP Authority	Public	MS	Male	8	10 or above
5.	Expert 5	Deputy Director Projects	PPP Authority	Public	Master	Female	12	6-9
6.	Expert 6	Financial Expert-Projects	PPP Authority	Public	Master	Female	7	10 or above
7.	Expert 7	Asstt. Manager Projects	IDAP	Public	BSc Engineering	Male	10	6-9
8.	Expert 8	Project Manager	Healthcare	Private	Bio Medical Engineering, PMP	Male	6.5	3-5
9.	Expert 9	Credit Manager	Bank	Private	Master	Male	11	3-5
10.	Expert 10	Hospital Director	Healthcare	Public	MBBS, MPH	Male	15	10 or above
11.	Expert 11	Hospital Director	Healthcare	Private	MBBS	Female	10	3-5

Appendix-D List of Respondents of Pair-wise Questionnaire

During the 2nd phase, data was collected through “Pairwise Questionnaire”. Total 23 experts were approached to participate in this research as respondents and they accepted the request. Questionnaires were shared via email and hard copies through representative there, and received the responses back via email. Out of 23, only 17 experts responded but only 14 responses were used to calculate the results because the responses from other 3 experts were incomplete and inconsistent, therefore, those were not included in analysis.

Sr. No.	Respondent	Designation	Industry	Sector	Education Level	Gender	Experience (Years)	No. of PPP Projects
1.	Expert 1	Hospital Director	Healthcare	Public	MBBS, MPH	Male	17	3-5
2.	Expert 2	Assistant Chief Health	Healthcare	Public	Master	Male	14	3-5
3.	Expert 3	Deputy Director Projects	PPP Authority	Public	Master	Female	12	6-9
4.	Expert 4	Asstt. Manager Projects	PPP Authority	Public	Master - MS	Male	12	6-9
5.	Expert 5	Director Projects	PPP Authority	Public	PhD	Male	16	10 or above
6.	Expert 6	Chief Planning Officer	Healthcare	Public	Master	Male	24	6-9
7.	Expert 7	Hospital Director	Healthcare	Private	MBBS, MPH	Female	14	1-2
8.	Expert 8	Project Manager	Healthcare	Private	B.Sc. Engineering	Male	15	3-5
9.	Expert 9	Assistant Professor	Academia	Private	PhD	Male	11	1-2
10.	Expert 10	Chief Infrastructure	P&D Board	Public	Master	Male	19	1-2
11.	Expert 11	Assistant Professor	Academia	Public	PhD	Male	12	1-2
12.	Expert 12	Manager Credits	Bank	Private	Master	Female	12	3-5
13.	Expert 13	Vice President	Bank	Private	Master	Male	25	10 or above
14.	Expert 14	Chief Health	P&D Board	Public	Master - MS	Male	16	10 or above