

Research Article

Reasons for the Potential Implementation of Public-Private Partnerships in Ethiopian Road Infrastructure Provision

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Received 12 January 2022; Revised 23 April 2022; Accepted 11 May 2022; Published 31 May 2022

Academic Editor: Gabriella Mazzulla

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Constructing and operating infrastructure facilities have traditionally been the responsibility of the public sector. Governments in several countries have been gradually enlisting the private sector in the provision of infrastructure through a public-private partnership. The purpose of this study is to investigate the reasons behind the potential implementation of public-private partnerships in Ethiopian road sector, which provide scientific support and rationales. There were both qualitative and quantitative research approaches used. A questionnaire survey was conducted, as well as an interview with industry professionals. To analyze the collected data, qualitative and quantitative data analyses were applied. The quantitative data were analyzed using version 26 of the Statistical Package for the Social Sciences software. The findings revealed scarcity in government funding, the inability of the public sector to assume all project risks, social strain on people due to poor road facilities, the demand for the skills and experience of the private sector, and the requirement for improvements in the levels of services as leading reasons for the potential implementation. The findings of the study provide scientific data and support for the adoption of public-private partnerships as they give solutions to the problems associated with road infrastructure delivery.

1. Introduction

The public sector has traditionally been in charge of constructing and operating infrastructure facilities. On the other hand, many governments have struggled to fulfill the rising demand for road infrastructure [1]. As a result, governments in a number of nations have been gradually enlisting the private sector in infrastructure development and basic service delivery through Public-Private Partnerships (PPP) [2]. PPP is a concept that is not widely accepted. It is a term used by some nations, particularly Italy, to describe any public-private collaboration. Other nations, following Eurostat guidelines, define PPP as agreements by which the public administration is the primary payer of services [3].

Governments around the world have made innovation a central element in their rhetoric and practice as they seek to

build highly efficient services [4]. World Bank Institute [5] describes PPP as “Public-Private Partnership is a long-term contract between a private party and a government agency, for providing a public asset or service, in which the private party bears significant risk and management responsibility.” Apparently, as it is based on best practices, PPP provides mutual gains for both the public and private sectors in the delivery of public infrastructure and services [6]. The main benefits for the government are the pace, dependability, and effectiveness associated with private sector practices to public service delivery in order to ensure value for money [7]. In a conventional PPP framework, the government, project sponsor, project operator, financiers, suppliers, contractors, third parties, and clients are all engaged. The establishment of a separate corporate entity known as a Special Purpose/Project Vehicle (SPV) is a key aspect of

PPPs. The SPV is a legal corporation that assumes responsibility for a project and negotiates contracts with third parties, such as the government [4].

Since the turn of the seventeenth and eighteenth century, many infrastructure projects (water channels, highways, and railways) in Europe, and later in America, China, and Japan, have been privately financed under concession contracts [8]. Project financing has a long history in the industrial sector (for example, mining, pipelines, and oil reserves), but it has only gradually been expanded to infrastructure projects including toll roads, communication networks, prisons, institutions, electric utilities, and hospitals [9]. PPPs of various types have been implemented in the European Union (EU), Australia, Central America, North America, South East Asia, and Africa for more than 30 years [10]. Nowadays, most governments around the world are adopting PPP to address infrastructure backlogs, despite the fact that PPP ideas were originally developed and executed in the UK with the adoption of the Private Finance Initiative (PFI) [11]. Regardless of the fact that many governments are interested in the PPP agenda due to several reasons, only a few nations have dominated PPP marketplaces in different regions [12]. According to Lockwood, Verma [1], while a number of significant PPP road projects have been completed and are now operational, there are substantially more in various phases of construction around the world.

Recognizing the importance of road transportation in promoting social and economic growth, as well as its function as a catalyst for poverty reduction, the Government of Ethiopia (GOE) has implemented several development programs [13]. To overcome road sector constraints, the GOE created the Road Sector Development Program (RSDP). The RSDP was executed in five phases over two decades, from 1997 to 2020. The fifth RSDP, which was in effect until 2020, was presented in light of the country's goal of becoming a middle-income country by 2025 [14]. Many of the projects planned under the RSDPs, on the other hand, were not completed on time and on budget and did not fulfill quality standards [15].

To encourage quick economic growth and better road infrastructure, the GOE planned to employ public-private partnerships as an alternate means of financing infrastructures in Ethiopia [16]. The Ministry of Finance (MOF) in Ethiopia has taken the initiative to design the public-private partnership program framework by preparing a PPP policy followed by a PPP proclamation that helps the implementation of the program transparently [17]. The framework also includes PPP directions, guidelines, manuals, and regular bid documents [18]. According to Yong [19], a PPP outline includes policy, laws, regulations, and procedures that define what tasks the public and private sectors must perform and how these tasks are intertwined throughout the life cycle of a PPP project. In addition, a PPP framework determines how PPP projects are defined, prioritized, budgeted for, procured, tracked, and accounted for, as well as who will carry out each of these tasks, which are often done on a programmatic basis [20].

The Ethiopian Roads Authority (ERA) is responsible government institution for the development, operations,

and maintenance of the roads network in the country, which was reestablished as a regulatory federal government institution in July 8, 2011, under regulation 247/2011 [14]. It is tasked with managing the country's roads including responsibilities for developing and administering highways, certifying the standard of road construction and creating proper conditions on which the road network is promoted [13]. In addition, ERA is the contracting authority, which enters into a PPP Agreement with the private sector for execution of road projects. The current status of ERA in terms of PPP road projects indicates that it has not delivered any road project through PPPs. However, three expressway projects are proposed for PPP implementation [21].

The implementation of PPP for the delivery of road infrastructures in Ethiopia has a clear gap because Ethiopia's road sector is totally dominated by public spending [15]. Since there are not many studies on the context of PPP in Ethiopia, it becomes significant to perform research that can give objective and scientific support to the potential implementation of PPP. Additionally, this research is essential in addressing one of the most difficult problems faced by the GOE: delivering high-quality road infrastructure assets and services. The importance of undertaking research and presenting scientific evidence with regard to the compelling reasons for adopting PPP and reinforcing its potential implementation is interrelated with contributing to the management of the road infrastructure backlog. Therefore, the research is conducted with the aim of identifying the driving reasons leading to the potential implementation of PPP in the road sector of Ethiopia. The study has taken particular questions to address the research's aim, as what are the reasons that led to adoption of PPP for road infrastructure in Ethiopia? What role do the leading factors have in the potential implementation of PPP?

The study is structured as follows. The first section provides an outline of the global and Ethiopian contexts for public-private partnerships in the road infrastructure development. Section two describes Ethiopian road investment projects and potential PPP projects as well as existing literature on the factors that lead to PPP implementation. In part three, the research methods and analysis techniques used to conduct this study are briefly discussed. The fourth section contains the findings of the study with a detailed explanation of the primary factors as well as the interpretation of the research findings. With a concise conclusion and implications, section five brought the study to a close.

2. Literature Review

2.1. Ethiopian Road Investment Projects and Potential Public-Private Partnerships Projects. In developing countries, a well-developed road transport sector is expected to boost economic growth through a number of ways [22]. Ethiopia has intensified the focus on enhancing the quality and size of road infrastructures [23]. The government is putting the RSDP into action in several phases and divisions, including

the rural and urban road programs [24]. Paved and unpaved roads have been built as part of the RSDP program, and more are being constructed in the fifth phase. The overall budget for RSDP V is estimated to be 334.5 billion Ethiopian Birr (ETB), of which federal roads account for ETB 264.7 billion. During the three years of RSDP V, approximately ETB 117 billion was disbursed, with ETB 87 billion expended on federal roads [14]. The road projects under the RSDP program are focused on upgrading existing roads from gravel to asphalt, rehabilitation of main roadways, construction of new roads, and regular network maintenance [25].

In order to provide relatively better accessibility, the government needs to develop 200,000 km of optimal national road network [23]. Road development and upkeep, on the other hand, are not a simple investment. Raising this significant sum of money solely from domestic sources is unaffordable for the GOE; it needs loans and aid from other countries and organizations [25]. Furthermore, Ethiopia's government is working constantly to achieve the target road network by proposing and constructing road projects in several regions of the country [13]. According to Ethiopian Roads Authority [26], one major impediment in this aspect is the lack of sufficient financing to build an adequate road network. The amount of money available to create and maintain roads is minimal. A feasible solution would be to seek for alternative and long-term financing [23].

Taking into account the opportunities of PPP development in Ethiopia, the GOE is considering four sectors, which are energy, housing, health, and transport sectors, to initialize PPP projects [21]. The opportunities include political will of the government, huge infrastructure needs, and regional integration, as evidenced by the signing and ratification of many protocols and agreements of Common Market for Eastern and Southern Africa (COMESA) and Intergovernmental Authority on Development (IGAD), all of which provide significant opportunities for PPP transactions [27]. Moreover, Ethiopia's government has set a goal in its Second Growth and Transformation Plan (GTP II) to minimize the average time it takes to reach the nearest all-weather road [13]. The GOE intends to execute three road projects within the PPP pipeline to attain this goal [21].

The expressway projects planned to be executed through PPPs are part of the expansion of Addis Ababa–Adama expressway project, which is a continuation of the government's efforts to improve the standard of its import-export corridors. The road projects are Adama–Awash, Awash–Mieso, and Mieso–Dire-dawa (a total of 357 km) expressways [21]. The expressway projects are within the corridor of the existing Addis Ababa–Adama–Awash–Djibouti trunk road, which has the highest traffic volume and load in the country as it is the main corridor to the port of Djibouti [28]. The road project from Adama–Awash Expressway Lot I, Adama–Melkajilo (60 km), which was one of the PPP projects planned to be constructed over a five-year period, is currently omitted from the PPP pipeline. The government of Ethiopia and the African Development Bank (ADB) Group have signed USD 98 million grant agreement to help finance the project [21].

2.2. Reasons for Potential Implementation of Public-Private Partnerships. Governments worldwide seek to use public-private partnerships to provide road infrastructures because of several reasons [1]. In terms of what drives governments to implement PPP, there are variations [10]. In developing nations, PPP is implemented for a variety of reasons including finance requirements and poverty alleviation [29]. PPP should be explored since there is a significant infrastructure gap as well as other issues that arise as a result of it, such as inadequate economic development and reduced living standards [30]. According to Donato and Balzarini [31], project financing provides value, enhances management of risks, lowers funding costs through resolving issues, and minimizes information asymmetries costs, which is directly related to improvement of infrastructure delivery and services.

Prior studies on driving factors for adopting PPP discussed the reasons or motivations. Cheung et al. [32] employed a questionnaire survey to investigate the reasons for implementing PPP in Hong Kong, Australia, and the UK. The study discovered the top two reasons for implementing PPP in Hong Kong as “demanding contribution to economic development” and “high quality of services required.” In Australia, the three key reasons are “high quality of services required,” “demanding contribution to economic development,” and “inefficiency because of public monopoly and lack of competition.” The main drivers for implementing PPP in the UK as indicated in the study are “shortage of government funding,” “demanding contribution to economic development,” and “avoiding public investment restriction.”

Ismail (2014) used a questionnaire survey to investigate the factors forcing the implementation of public-private partnerships (PPP). The results of the study show that the driving forces for PPP implementation in Malaysia are “demanding contribution to economic development,” “the whole of life cost savings required,” “the social strain on people due to poor road facilities,” “the requirement for improvements in the levels of services,” and “shortage of government funding.” Different countries have different priorities for each of the driving forces as shown in the study. The findings indicate that the distinctive nature of PPP is represented in each country's motivations for implementing PPP.

Cherkos and Jha [33] conducted a study through documents from five toll roads and bridge projects in Senegal, Ghana, Nigeria, Mozambique, and Cote d'Ivoire and interviews with the key stakeholders of toll road projects in Ethiopia to identify drivers of PPP implementation in new and inexperienced markets. The study results demonstrate that “fostering economic development with the help of the private sector to raise project financing” and “constructing roads that can ease traffic congestion” are the main potential drivers of PPP implementation in inexperienced PPP markets.

A research was carried out to investigate the key reasons for adopting PPP for construction projects in Ghana by Robert et al. [34]. An empirical questionnaire survey was used to collect the primary data necessary for the research.

The survey respondents were asked to rate the factors. The findings of the study highlighted several key reasons, including “allowing for shared risk,” “reducing the problem of public sector budget limitation,” and “private sector has better mobility.” Using factor analysis, the study was also able to group the factors.

A comparative study was conducted between China and Hong Kong regarding the key drivers for adopting PPP. The 15 drivers were classified into five groups: cost savings and value for money, reduced public funding, a catalyst for the economy, enhanced asset quality and service levels, and equitable risk sharing. The findings indicated that respondents from China rated economy-related drivers higher, whereas Hong Kong respondents tended to rate efficiency-related drivers higher. The study discovered differences in the reasons for implementing PPP between the two economies, whereby in Hong Kong the main reason is related to the quality of services and efficiency, whilst in China, the key reason is related to the economic factor [35].

Gebremeskel et al. [36] used a questionnaire survey and semistructured interviews to identify driving factors for the implementation of PPP projects in the Ethiopian context. The findings revealed 22 driving factors, which were grouped into 6: “benefit for public and private sectors,” “social development,” “cost reduction,” “attention of private sector,” “management ability of public sector,” and “ability of private sector.” Most driving factors for adopting PPP projects were related to financial problems as indicated in the study.

A questionnaire survey and an in-depth interview were used to elicit the perceptions of the state-owned agencies and private sector on the underlying reasons for implementing PPP in road construction in Ghana. The general results show that “shortage of government funding,” “economic development pressure of demanding more facilities,” “accelerated project development,” “allowing for shared risk,” and “ability to raise funds for a project by the private sector” are the most important reasons for implementing PPP in road construction in Ghana [37].

Liu and Wilkinson [38] employed semistructured interviews and focus group discussions to determine the drivers for implementing PPP in New Zealand. The study revealed seven categories of driving factors for PPP implementation: “acceleration of infrastructure demand,” “better risk allocation,” “the whole of life cost savings,” “improved quality of services,” “likely to access additional revenue sources,” “benefits for local economic and social development,” and “improved project scrutiny.”

In prior studies, the attractive factors and critical success factors for PPP implementation were explored by providing empirical evidence in the Ethiopian road sector [15, 39]. Furthermore, studies have also been conducted on the concept of PPP in Ethiopia, its advantages for the economy if successfully implemented, the current trends of PPPs in Ethiopia, a driving index for PPP in emerging economy, and country experiences [2, 16, 36, 40]. However, this study fills the gap in the literature by exploring the reasons and their importance for potential PPP

implementation by providing empirical evidence considering the road sector of Ethiopia in particular. The summary of the reasons and their sources is shown in Table 1. It comprises 11 factors.

3. Research Methodology

The study conducts a systematic review of the literature to determine the reasons for potential PPP implementation. Secondary data is gathered from previously completed studies, books, reports, and articles in peer-reviewed publications. The research used a questionnaire survey, and an in-depth interviewing with professionals to collect primary data. The results were then analyzed followed by drawing conclusions.

3.1. Papers Assortment in the Literature Review. The literature selection procedure for the empirical study was first subjected to a preliminary assessment, with removal of studies addressing PPP in other areas such as health. The literature review was carried out by conducting a systematic review and content analysis of the literature in order to classify the studies that were related to the research’s aim. The studies were chosen using qualitative content analysis, which screened keywords in a text for reliability. Scholarly articles, those published in English, those having a publication date from 2009 onwards (recent research), and those with an empirical nature are among the criteria for inclusion. Furthermore, the factors were scrutinized from previous studies with a focus on empirical investigations in developing countries and inexperienced markets, as the study context is Ethiopia, a developing country with an inexperienced market. The findings of the literature analysis were used to create a questionnaire that obtained participants’ ideas on the leading reasons and their importance in the provision of Ethiopian road infrastructure through PPPs.

3.2. Target Population. The target population of this survey is the public and private sectors including practitioners (contractors and consultants) working in the Ethiopian road sector.

3.3. Study Participants. In this research, all industrial professionals from the public and private sectors were included in the target survey respondents to the questionnaire and interview. Those were purposively chosen from the target population as the PPP notion continues to evolve despite its existence and to obtain more accurate data from experts that are more familiar with the subject matter.

Professionals that work in the field of government policies and regulations on infrastructure development in Ethiopia, experts that have familiarity or close participation in the procurement of infrastructure projects, and those who have worked in their respective field of expertise as senior experts or managers were chosen and took part in the

TABLE 1: Summary of reasons for PPP implementation.

	[37]	[30]	[35]	[33]	[32]	[36]	[41]	[38]	[34]
Infrastructure demand that is increasing at a faster rate	✓							✓	
Local economic development required		✓	✓	✓	✓		✓		
Requirement for improved project scrutiny								✓	
Requirement for improvements in the levels of services					✓		✓	✓	
Scarcity in government funding	✓		✓		✓		✓	✓	✓
The demand for the skills and experience of the private sector						✓			✓
The inability of the public sector to assume all project risks	✓							✓	✓
The need for value for money			✓						
The social strain on people due to poor road facilities						✓	✓		
Traffic congestion reduction				✓					
Whole of life cost savings required							✓	✓	

questionnaire intending to ensure that this sample represented the public and private sectors including practitioners.

An interview was also designed and conducted by purposively selecting professionals in both public and private sectors including practitioners (contractors and consultants) to get reliable information. The interviews were administered mainly with experienced top and mid-level management of both public and private sectors including practitioners. Respondents, who took part in the interview, are those who work in the field of government policies and regulations on infrastructure development in Ethiopia as well as senior specialists or managers in their particular fields of expertise.

3.4. Data Analysis. In this research, the data collected from the questionnaire survey were analyzed using the Statistical Package for the Social Sciences (SPSS) software version 26. To investigate the distributions of the information provided by the respondents, the descriptive data analysis approaches including the measurement of central tendency (mean value) were used.

A ranking was created to represent the relevance of each factor in the given sample by using the following equation:

$$MS = \frac{\sum(fxs)}{N}, \quad (1 < MS < 5), \quad (1)$$

where s is the score set to each factor by the respondents (ranging from 1 to 5), f is the frequency of each rating for each factor, and N is the total number of responses concerning that factor.

Relative Importance Index approach was also employed by using the following equation:

$$RII = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{AxN}, \quad (2)$$

where n_5 is the number of respondents for strongly agree, n_4 is the number of respondents for agree, n_3 is the number of respondents for neutral, n_2 is the number of respondents for disagree, and n_1 is the number of respondents for strongly disagree. A is the highest score (i.e., 5 in this case), and N is the the number of respondents assigning the same scoring for the factor/issue.

In order to quantify the significance of the reasons for PPP in the road sector, a one-sample t -test was performed by

having “the detected factors are not important or less important” as the null hypothesis (H_0). When performing the t -test, it was more acceptable to highlight the significance of the component statistically over 3.5 rather than mean values above the average on the 5-point scale.

$$t(df) = \frac{(\bar{x} - \mu)}{SM D}, \quad (3)$$

where \bar{x} is the mean of the sample, μ is the hypothesized mean of the population, and SMD is the standard error.

Scale reliability was examined using Cronbach’s alpha coefficient that evaluate every possible means of splitting the test into its component pieces. Cronbach’s alpha is the most common test score reliability coefficient. Cronbach’s alpha rises in tandem with the average interitem correlation (holding the number of items constant). In general, in questionnaire design, a score of higher than 0.7 is regarded acceptable [42].

4. Results and Discussion

4.1. Reliability. To check the internal consistency of the measurement used in the questionnaire, Cronbach’s coefficient alpha was computed. The outcome from Cronbach’s coefficient alpha was 0.832. It demonstrates that all of the reasons have good internal consistency and reliability since α is between 0.9 and 0.8.

4.2. Demographic Information. A total of 140 questionnaires were distributed to selected Ethiopian road sector participants in various fields of assignment. A cover letter and a copy of the questionnaire were sent to each potential respondent. The study was able to collect data from 121 respondents out of a total target group of 140 professionals. A total of 121 questionnaires indicates an 86% response rate.

The questionnaire respondents were asked to rate their degree of agreement according to the five-point Likert scale (1–least and 5–most) against each determining reason. The respondents were professionals and experts in different institutions.

- (i) Public-Private Partnership Directorate General-Ministry of Finance
- (ii) Ethiopian Roads Authority (ERA)

- (iii) Addis Ababa City Roads Authority (AACRA) (Engineering procurement directorate and road construction administration directorate)
- (iv) Federal Integrated Infrastructure Development and Coordinating Agency
- (v) National Planning Commission of Ethiopia
- (vi) Local Contractors and Consultants working with ERA in the road sector
- (vii) International Contractors and Consultants working in Ethiopia in the road sector
- (viii) Civil societies (Construction Contractors Association of Ethiopia (CCA), and Ethiopian Association of Civil Engineers (EACE))

Table 2 reveals the demographic characteristics of the respondents. Out of 121 respondents for the questionnaire survey, 52 (43%) are currently working in the public sector, and 69 (57%) are engaged in the private sector. The majority of the respondents are engaged in the private sector that includes practitioners (consultants and contractors). It is an expected outcome since so many professionals work in the private sector in Ethiopia's road sector, where the research study was focused.

Table 3 shows the level of education of the questionnaire respondents. 71 (58.7%) of respondents have a Bachelor of Science (BSc); 47 (38.8%) respondents have Master of Science (MSc); and 3 (2.5%) respondents have Ph.D. degrees. This demonstrates that the respondents are mature and trained enough to give their opinions in the questionnaire survey. Respondents' sector experience indicates that 39 (32.2%) respondents were involved in the public sector only, 45 (37.2%) respondents were involved only in the private sector, and 37 (30.6%) respondents have experience in both sectors. This shows that participants have sufficient knowledge and experience of the sectors to provide credible information.

The years of experience indicates that 33 (27.3%) of the respondents have <5 years of experience, 40 (33.1%) respondents have 5 to 10 years of experience, 28 (23.1) respondents have 11 to 20 years of experience, and 20 respondents have over 20 years of experience. This demonstrates that the respondents have sufficient experience to provide reliable information.

The questionnaire respondents have a wide range of specializations, which might help collect relevant perspectives to answer the study questions. This shows that the respondents have vast knowledge and experience in road infrastructure projects. Though the other experts have experience in other methods of infrastructure procurement, only 7.4% of the respondents were PPP experts. This result demonstrates the lack of PPP experts in Ethiopia.

The interview was carried out among selected target professionals. Out of the total 16 interview participants, 44% were from the public sector, and 56% were from the private sector comprising practitioners (contractors and consultants). Out of the ten participants of the interview, 63% of them held MSc degrees, and only 37% were holding

BSc degrees. The years of experience of interview respondents shows that the majority of respondents (31%) have experience of more than 20 years in their area of expertise.

4.3. Rankings of the Reasons to Implement Public-Private Partnership. Table 4 presents the results, which list the reasons as ranked by all respondents. Results are significant at 95% level ($P < 0.05$); degree of freedom (df) = $N - 1$, that is, 120.

One reason with t -value negative (indicating the mean value is less than the test value) was ranked least (11th) and was not deemed statistically significant ($P > 0.05$), namely, requirement for improved project scrutiny (mean = 3.421).

"Scarcity in government funding" is ranked as the most important reason as perceived by overall respondents from the public and private sectors of Ethiopia. This factor has a mean value of 3.907, T -value positive, and $P < 0.05$, which shows statistical significance rejecting the null hypothesis of the study. The findings by Ismail [41] also indicated that the factor is among the top drivers for implementing PPP in Malaysia. A study by Cheung et al. [32] also identified the factor as one of the top drivers for implementing PPP in Hong Kong and Australia. The finding is relevant to Ethiopia as the Government of Ethiopia is encountering financial constraints in funding road projects. Insufficient public resources, according to Ethiopian Roads Authority [26], lead to inadequate funding of road infrastructure. The difficulty is intensified when the road network expansion is in rural regions [43]. Furthermore, as the Ethiopia's financial sector remains shallow, the RSDP for Ethiopia is having difficulty assisting the government in improving and expanding its road network [23]. Due to lack of governmental funds, PPP initiatives entail the private sector coordinating and providing finance [44]. This relieves the government from covering funding demands with its own revenue (taxes or borrowing) [41]. Due to funding restrictions to develop high-quality road infrastructure, the Ethiopian government is considering the private sector via PPPs to solve the funding gap [21]. As a result, the absence of public sector financing has been identified as one of the primary reasons for the potential implementation of PPP, which allows the private sector to fund projects.

"The inability of the public sector to assume all project risks" is a reason for PPP road projects potential implementation in Ethiopia, which is ranked second by the respondents with a mean value of 3.866, T -value positive, and $P < 0.05$. The result leads to the rejection of the null hypothesis (H_0), that is, "the detected factors are not important or less important." An earlier study by Liu and Wilkinson [38] also reported similar findings, whereby the factor was perceived as the most important factor for adopting PPP in New Zealand. Risks in road projects result in inefficiency [45]. Annual risk assessments provide an objective perspective into ERA's ability to handle risks such as project risks, technical risks, cost-related risks, schedule risks, strategic risks, and soon. These risks impact the performance

TABLE 2: Questionnaire respondents' distribution.

By sector	Target responses	Actual responses	Percentage of actual responses (%)
Public sector	63	52	43
Private sector	77	69	57
Total	140	121	100

TABLE 3: Questionnaire respondents' level of education and sector experience.

Level of education	Number of respondents (in (%))	Sector experience	Number of respondents (in (%))
BSc	58.7	Public sector	32.2
MSc	38.8	Private sector	37.2
Ph.D.	2.5	Both	30.6

of road projects and result delays [46]. Previous annual risk analyses have determined that ERA's projects have high risk exposure, and managing the risks is difficult. The risk management process at ERA is based on a continuous, systematic, and forward-thinking approach to risk identification, analysis, and response. ERA, on the other hand, is said to have major inherent risks [47]. The inclusion of the private party will enable the public sector to transfer risks and enhance efficiency through private sector management [48]. Since PPPs implementation allows allocating project risks to the party that is best able to manage them, it makes it a preferable option to be used [49]. This indicates that the lack of capacity of the responsible contracting authority in undertaking road infrastructure project risks is a reason for introducing PPP.

The third reason ranked by overall respondents is "the social strain on people due to poor road facilities" with a mean value of 3.838, T -value positive, and $P < 0.05$ that shows statistical significance of the factor, which allows to reject the null hypothesis. The finding is consistent with the findings of Ismail [41] who identified the factor as one of the top reasons for implementing PPP in Malaysia. Even though Ethiopia's road network has improved since 1994, the country's road density remains low when compared to other developing countries [24]. Due to poor road accessibility and poverty, people are unable to exploit the economic and social opportunities resulting in societal pressure. In Ethiopia, poor road infrastructure and accessibility make it difficult to spread new technologies. This leads to high transaction and operating costs and restricts access to health, education, and other social services [43]. Poor road infrastructure in the country has a significant impact on the prevalence and depth of poverty [43]. As a result, better roads are required to benefit society and reduce social stress [50]. Well-constructed roads and quality services are needed to be attained by involving the private sector via partnership. Such services solve the problems resulting from weak public infrastructure, which has an influence on the living standards and economic condition of the general public [51]. Thus, the social strain on people is considered as one of the leading reasons to implement PPP for delivering better quality road infrastructures.

Another reason is "the demand for the skills and experience of the private sector" as ranked fourth by overall

respondents with a mean value of 3.787, T -value positive, and $P < 0.05$. The alternative hypothesis is accepted as the result shows statistical significance. A similar finding was reported as a reason for potential PPP implementation by Gebremeskel et al. [36] in an emerging economy. ERA has its own in-house and on-the-job training programs for its personnel at all levels [13]. The existing training institutions in Alemgena and Ginchi can train personnel in a range of aspects, including new approaches that are appropriate for the country's road needs [24]. Professionals have received foreign training in addition to short-term trainings since the start of the RSDP. Advanced training courses in foreign institutions with sponsorship are also offered to increase institutional competence. To complement ERA's in-house training efforts, technical assistance has also been provided under donor financing [14]. Aside from this, both public and private sectors' talents and resources are combined through PPPs with risk and responsibility sharing. This allows the responsible public agency to take advantage of the expertise of the private party by assigning daily operations [52]. Although ERA is doing so much to improve the required skills and experience, the need for private sector capabilities, expertise, and innovation is still there, which urges PPP implementation [8].

The fifth-ranked reason with mean value 3.75, T -value positive, and $P < 0.05$ is "Requirement for improvements in the levels of services." The results indicate that the null hypothesis is an invalid assumption as $P < 0.05$. Previous studies by Liu and Wilkinson [38], Cheunget al. [32], and Ismail [41] also revealed this factor as one of the top five reasons for the implementation of PPP. Public services being provided by the private sector enhance the efficiency and service quality [53]. As mentioned in the above sections, ERA has proposed a PPP road project From Adama-Diredawa. The existing Addis-Adama-Djibouti asphalt road could accommodate increasing traffic flow rates, axle loads, long haul from export-import, and local transportation demands. As the road is primary corridor to Djibouti's port, it has the largest traffic volume and load in the country. Trucks transporting import and export commodities account for a large portion of the traffic [28]. Thus, the low level of road infrastructure services can result in disruption in the economic development of the country, which may

TABLE 4: Ranking of reasons for PPP implementation in the Ethiopian road sector.

Reasons	N	Mean	RII	Standard deviation	Variance	Rank	T (test value = 3.5)	Sig. (2-tailed)
Infrastructure demand that is increasing at a faster rate	121	3.634	0.7732	0.682	0.465	8	2.159	0.033
Local economic development required	121	3.727	0.7268	0.916	0.839	6	2.725	0.007
Requirement for improved project scrutiny	121	3.421	0.7454	0.655	0.429	11	-1.326	0.187
Requirement for improvements in the levels of services	121	3.750	0.6842	0.905	0.819	5	3.037	0.002
Scarcity in government funding	121	3.907	0.75	1.025	1.050	1	4.368	0.000
The demand for the skills and experience of the private sector	121	3.787	0.7814	0.966	0.933	4	3.267	0.001
The inability of the public sector to assume all project risks	121	3.866	0.7676	1.269	1.612	2	3.171	0.002
The need for value for money	121	3.594	0.7574	0.492	0.242	9	2.101	0.037
The social strain on people due to poor road facilities	121	3.838	0.7188	0.826	0.682	3	4.499	0.000
Traffic congestion reduction	121	3.566	0.7132	0.356	0.126	10	2.038	0.043
Whole of life cost savings required	121	3.662	0.7324	0.702	0.493	7	2.535	0.012

impulse the use of PPPs in infrastructure service improvement [54]. One of the major advantages of having the private sector supply public services is that it can do its best, especially in terms of improving efficiency and service quality [32]. As a result, one of the primary reasons for establishing PPP schemes for roads is the necessity for improved service levels.

Among the set of 11 reasons, “Requirement for improved project scrutiny” is ranked least with a mean of 3.421, T -value negative, and $P > 0.05$, which indicates statistical insignificance. This result fails to reject the null hypothesis. The factor may not be considered statistically significant by the respondents of the survey. Nevertheless, this does not suggest that the reason is irrelevant for the implementation of PPP. On the contrary, a prior study by Liu and Wilkinson [38] points out the higher importance of the factor as a driver for considering PPP implementation. Higher requirement for scrutiny (critical examination) with due diligence makes assessment processes reliable and helps in gaining efficiency [55].

Discussion about the reasons for the potential implementation of PPP in the road sector of Ethiopia during an interview is summarized in the following paragraphs. The indicated points strengthen the findings of the questionnaire.

- (i) Public-private partnerships, according to all participants, are a means to pay attention to public services and their provision in a variety of sectors across the country, including the road sector. Roads, according to the interviewees, have the potential to be a great asset to our country. PPP inroads are appropriate and can improve project quality. Factors that make the infrastructure necessary in the first place drive PPPs in the road sector.
- (ii) Interview respondents also indicated that the need for advancements in the level of services in terms of accessibility and connectivity is a reason for considering PPPs since they enable the private sector to provide public services with greater efficiency. In

addition to this, the need for road infrastructure is rising more rapidly.

- (iii) The public sector cannot take on all project risks as per the perception of the majority of the interview participants. Design, building, and operating risks, for example, are better suited to the private sector, whereas political and legal risks (law changes) are more suited to the public sector.
- (iv) As all of the interviewees highlighted, projects are not being completed on time. Several problems in terms of cost, quality, and inappropriate risk allocations influence the traditional system of road contracting in Ethiopia.
- (v) In summary, the majority of the respondents emphasized the general goals of the road transportation sector stem from the country’s pressing need for socioeconomic development.

5. Conclusions and Future Research Directions

This paper has presented the reasons to potential PPP implementation in the road sector of Ethiopia based on an empirical questionnaire survey and an interview on purposively sampled professionals. The study’s findings reveal that the undertaken mean score analysis identifies the level of importance of the reasons for implementing PPP in the Ethiopian road sector. The results show that 10 of the 11 factors are significant because their mean values are greater than 3.5. The top five important reasons include scarcity in government funding, the inability of the public sector to assume all project risks, the social strain on people due to poor road facilities, the demand for the skills and experience of the private sector, and requirement for improvements in the levels of services. On the contrary, the requirement for improved project scrutiny is ranked least, suggesting that the factor is not a strong reason for potential implementation of PPP in Ethiopian road infrastructure provision.

In this study, the authors have sought to address the research questions related to the reasons for potential implementation of PPP in road sector of Ethiopia. An important implication of the study is derived from the findings. The findings point to a specific set of reasons for the potential implementation of PPP to provide quality road infrastructure in the country. The findings of the study give empirical evidence for the leading reasons of PPP adoption, which lowers public sector administrative expenses, allows risk sharing practice, alleviates budget constraints, and enhances access to the public sector market, all of which assist economic growth. In this sense, the research calls on the concerned government body to develop an appropriate PPP structure along with the implementation procedures as there is a potential demand as well as driving reasons for PPP in the road construction industry. Additional implication stems from the importance of PPP for the mentioned reasons to solve the infrastructure backlogs as both public and private sectors work collaboratively by making partnership. From this, private sector can gain an insight about the leading reasons for PPP to participate and exploit resources, expertise, and technologies in the public sphere.

The study results can be seen as a first attempt to contribute to a shift from traditional procurement systems to public-private partnerships. Further researches can study model-specific potential implementation to provide details. Moreover, it remains to be studied in depth about the opportunities of PPP road projects to get ahead in the PPP market. Since this study is limited to road sector, the driving factors for PPP adoption in other sectors of Ethiopia including the energy and housing sectors can also be addressed through further studies.

The study would have been more encompassing if an increased number of PPP-specific experts in Ethiopian road sector had been available for obtaining data. In addition to this, the limitation of the study was the absence of cases to conduct case studies in road projects since PPP implementation is new and progressing in Ethiopia.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Acknowledgments

This research was funded by Adama Science and Technology University under the grant number ASTU/SM-R/374/21. The authors would like to thank the Ethiopian Roads Authority and the Ministry of Finance (Public-Private Partnership Directorate General) for their assistance and cooperation in supplying the relevant documents and information. All industry practitioners from the public and

private sectors are also acknowledged for their participation in the questionnaire survey and interview, which contributed to the study. This article has previously been published as a Masters' thesis in [56].

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