CAUSES OF CONSTRUCTION PROJECT DELAYS IN ZIMBABWE'S PUBLIC SERVICE

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ABSTRACT

The study sought to investigate the causes of construction project delays in Zimbabwe's public service. This was to be achieved through examining the causes of project time overruns in the public service construction projects, to establish the challenges being faced in the implementation of public service construction projects.

The relevant literature was consulted and the research's empirical evidence did explore what other studies had established. With respect to the methodology, the pragmatism philosophy was adopted as this strengthened the study by embracing both qualitative and quantitative techniques. A survey research design was adopted and the research sample comprised of 240 respondents from the Ministry Local Government, Public Works and National Housing and the Construction Industry Federation of Zimbabwe (CIFOZ). Both interviews and questionnaires were administered to the respondents.

From the findings, it was established that the major causes of project delays were the lack of adequate funds, project variations and inadequacy of resources. The major conclusion of the study was that the major causes of construction project delays were lack of funds and availability of resources. It was also concluded that financial challenges and poor government support resulted to be the major challenges faced by the public service. The researchers recommend that the contractors should source for enough funds to finance the project through equity or debt. This can be implemented through financial institutions and also appointment of financial advisors who would be able to advise and source for funds before implementation.

Keywords: Project time overrun, Financial Challenges, Project Implementations and Inadequate Resources

INTRODUCTION

The failure in effectively implementing the projects inevitably leads to project delays, as is the case with the public service construction projects. However, globally, due to the increasing project management standards, cases of construction project delays are on the decline, yet in developing countries such is not the case (Abdullah *et al.*, 2010). Trauner *et al.,* (2009) classify delay into four main groups critical and non-critical, excusable and non-excusable, compensable and non-compensable, concurrent and non-concurrent. However, other researchers such as Lindhard *et al.* (2014) and Santoso *et al* (2016) point out that there are three groups of delay compensable and non-compensable, concurrent and non-concurrent, excusable and non-excusable. Aziz (2013) and Doloi *et al.,* (2012) cites one more group of delay which is the critical and non-critical; they further argued that the primary focus in any study of delay in projects is to examine if the delay affects the progress of the entire project completion. Critical delays are the ones that affect the project completion or in some cases a milestone date. They also pointed out that the critical path analysis emerges from the critical path method.

Several project implementation factors influence the extent of delays in construction projects.

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Currently, bureaucratic processes can be some of the challenges, as supported by Lindhard *et al.,* (2014), who pointed out that delays in the approval of applications for payments by management may lead to delays in the construction process. He further argued that clients deliberately delay payments for their own financial benefits especially in releasing retention money to the contractors. Lindhard *et al.,* (2014) in their research pointed out that changes made by the client during construction led to the delay of the project. However, for all the cited projects, with less accountability, the actual causes are not known, and more specifically, whether there are common patterns in all the projects.

RESEARCH OBJECTIVES

(i) To investigate the causes of project time overruns in the public service construction projects.

(ii) To establish the challenges being faced in the implementation of public service construction projects.

LITERATURE REVIEW

Project Time Management

Project time management is a significant factor that may lead to project delays, or project success. This encompasses aspects such as project scheduling, sequencing, resource allocation, among other competencies (Levine, 2005). In this regard, to ensure that projects are completed in time, and that delays are evaded, as argued by Santoso and Soeng (2016), it is very important that the project managers/contractors should be able to accurately allocate resources, be it man-power or financial resources, or material resources, and any deviations from the schedule ought to be handled in time, and definitively to avoid non-excusable delays.

The significance of proper time management is substantiated by the fact that many projects are problem-bound, and in that case, the longer the project takes to be completed, the longer it will take for the problem to be resolved (Abdullah *et al.,* 2010). This applies for instance the building of dams to trap water in communities that whose livelihoods would depend on irrigation schemes for instance. The earlier the project is completed, the earlier the beneficiaries benefit from the project. To this effect, PMI (2018) provide the guideline that to ensure the measurability of project success, there are four principal stages that ought to be followed, and these include: planning, estimation, scheduling and control (Graham, 2010).

Causes of Delays in Construction

As put forth by Kazaz, Ulubeyli and Tuncbilekli (2012) the major factors that cause delay in construction are discussed below as: contractor related delays, client related delays. Material related delays and labour related delays. Chan (2008) summarised the factors of delay in a table. Table 2.1 illustrates the causes of delay as summarised by Chan, giving different categories, which are contractors, engineers, management, weather, material and exterior delay.

Contractor

In the context of the contractors, Murray *et al*. (2006) and Odenyika *et al.* (2010) argue that some of the causes of delays include inexperience of the contractor, incompetence, poor communication skills, poor team management as well as poor planning, with respect to budgeting and scheduling.

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Client

On the other hand, the client may be responsible for the delays. As argued earlier, according to Aziz (2013) and Kikwasi. (2012), the most common causes relate to the changes in the project specification, as well as the poor project funding by the owner of the project. Others take time to make a very important decision, which as a result lead to long waiting times by the contractor, while on the other hand, some of the owners can impose idealistic deadlines and variations.

Materials

Some of the delays tend to be linked to the materials. According to Lindhard and Wandahl (2014) as well as Odeyinka and Yusif (2010), due to unforeseen challenges by the suppliers, such as lack of forex can result in the delayed manufacturing of the materials, or delayed delivery. On the other hand, the consignment may be damages, or the quality of the material produced may be compromised.

Labour

Several studies identified the factors of labour related delays as one of the factors that cause project delays. Murray *et al* (2013) identified labour supply and labour productivity as factors that contribute to causes of delays. Several factors that are related to labour can be distinguished and categorized under the principle cause. The methodology of establishing the factors of this group of causes was similar to that of the material related delays. According to Murray *et al* (2013), human resources are a critical component such that when the expert labour force are not available, may lead to the delayed delivery. On the other hand, owing to problems in the economy, such as the illiquidity (PMI, 2018), this may lead to industrial action. Subsequently, this will lead to the lapse of days, if not weeks or months of variance. However, the labour force might be there, but if incompetent, this may result in reworking, which again consumes more time, thereby leading to delays.

Challenges faced in implementing projects

There are a number of challenges that are encountered in the implementation of construction projects. According to Nwachukwu *et al.* (2010), the majority of these challenges are finance-related, in some way. In this regard, they also stated that postponements in the approval of payments is one of the challenges being faced and it also leads to delayed execution of the project processes. Late payment might also be due to long processes that will be involved for a payment to be done, nowadays payments are not easily done due to the state of the economy, shortage of money on the market which is also a challenge to the contractors.

Sweis (2009) also stated that an increase in costs of the project as one of the challenges that is affecting project implementation, also the issue of a project taking more than its stipulated time as one of the challenges being faced. An increase in costs is a challenge as you would have to source for funds for the project for the increased costs not budgeted for. Odenyika and Yusuf (2010) posits that the project owner may make changes in the specifications of the project, which, in the long run affects the completion time. It is argued by Nwachukwu, *et al.,* (2010) that the challenges encountered are multifarious and thus require specialist skills as well as experience to be able to circumvent these challenges timely as well as well as with minimal losses.

Another challenge that is usually encountered in the implementation of projects is the leadership style that is attributable to the management in charge of the project. Jonna (2009) posits that the leadership style ought to be accommodative and transformational, citing the role that servant leadership play in the management of construction projects, but all the same

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being professional in the management of time as well as resource planning and project control. However, according to Kerzner (2018), contractors who tend to be fragmented in their operational setup tend to have departments or business units that are divorced of each other. In the long run, project control may be a tantamount and daunting task, which may eventually lead to project delays. As recommended by Doloi (2013), the recognition by the individual players of their integral role that they play in the full purview of the project is vital towards the consolidation of efforts, and thus leading to a mutual engagement towards the eventual attainment of the project objectives.

RESEARCH METHODOLOGY

The research design

Saunders *et al.* (2012) identify the research design as a plan of action that ensures the collection of objective and accurate data suitable for the research economically. This study took the form of a survey, leveraging on the records from the Ministry of Public Works as well as the Construction Industry Federation of Zimbabwe. According to Bryman and Bell (2015), the survey research design will enable the study of quantitative cross-sectional data collected from many respondents who range from project managers to auditors, accountants, engineers, surveyors, and among others, architects in this research.

Population and sampling procedures

The population is comprised of the key stakeholders of the construction industry registered with the Construction Industry Federation of Zimbabwe (CIFOZ) as well as the Ministry of Local Government, Public Works and National Housing, that is Associate Members and Contractors including project managers, engineers, architects, auditors, accountants, surveyors etc... In total, there are 600 registered members.

To compute the sample required for the study, Cochrane's formula was used (Field, 2016). Because of the fact that the registered members in the databases were scattered across Zimbabwe, with the possibility of a poor response rate, as some of the instruments would be administered using electronic means, as put forth by Field (2016), a margin of error of +5% would be tolerable for this study.

$$n = \frac{N}{(1 + Ne^2)}$$

$$= \frac{600}{(1 + 600e^2)}$$

$$= 240$$

Where n = sample size, N = total population and e = error tolerance =0.05. Total population is 600, at 95% confidence level. Thus, based on the above computation, a sample of 240 has been deemed to be appropriate for the study.

DATA PRESENTATION AND ANALYSIS

Causes of Construction Project Delays

The first research objective sought to determine the causes of project delays in the public service construction projects. A number of causes were presented to the respondents, and they were asked to rate these on a 5-point Likert scale. Effectively, the mean statistics were used to help interpret the research outcome, as prescribed by Field (2016). The results are presented in table 1.

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Table 1: Descriptive Statistics - Causes of Project Delays

	N	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error
Availability of resources	205	3.91	1.055	.242	.338
Approvals from local authorities	193	3.55	.951	-.861	.348
Lack of funds	205	4.19	.933	.680	.338
Mistakes on documents	200	2.98	.961	-.527	.342
Lack of communication between parties	200	3.51	.967	-.944	.342
Labour disputes	200	2.88	1.048	-.239	.342
Fluctuations of building material prices	193	3.62	.988	1.233	.348
Variations	205	3.96	.706	2.168	.338
Slow decision making by clients	200	3.82	.825	-.419	.342
Bad weather	193	3.02	1.362	-1.178	.348
Drawing changes	179	3.47	1.251	-.884	.361
Lack of information from consultants	186	2.94	1.231	-1.004	.355
Contractor's insolvency	193	3.32	1.237	-.849	.348
Project management problems	193	3.63	.899	-.724	.348
Availability of cash	193	3.50	1.137	-.935	.348
Valid N (listwise)	158				

Source: Primary Data (2019)

Based on the outcome above, it is evident that the major cause identified with the likelihood of project delays was the lack of funds, with the highest mean of 4.19. The respective standard deviation was less than 1.0, as well as having a positive kurtosis statistic of 0.680. Effectively, the distribution was leptokurtic, indicative of the fact that the majority of the respondents did concur with the computed mean.

The second highest was the aspect of variations; whose mean was 3.96. It is worth mentioning that this variable had the least standard deviation of 0.706, as well as having the highest kurtosis of 2.168. What this show is that despite the issue of funds being highly rated, the respondents tended to agree with respect to the rating of variations. The availability of resources was the third highest and had a mean of 3.91. Again, the kurtosis being positive (0.242), it followed that the distribution, again, was leptokurtic and that there was a high degree of coherence among the respondents in that regard.

Slow decision-making by clients was the fourth rated, with a mean of 3.82. Nevertheless, the kurtosis being negative, -0.419, it followed that the platykurtic distribution suggested the relative deviation from the mean by the respondents was rather high. In other words, there was not enough coherence among the respondents. The other positively rated causes included: approvals from local authorities, lack of communication between parties, fluctuations of building material prices, drawing changes, contractor's insolvency, project management problems, as well as the availability of cash, all being significantly greater than the median 3.0.

On the other hand, the respondents tended to be rather neutral with respect to two causes, that is bad weather (mean = 3.02) and mistakes on documents (mean = 2.98). These two bordered with the median 3.0, suggesting that these were neither positive nor negative. However, only two factors were identified as having the least effect on the delays of construction projects

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and these were labour disputes, with a mean of 2.88, as well as the lack of information from consultants with a mean of 2.94.

Ranking of the Causes

With a view to statistically ranking these causes, the Friedman Rank Test was computed, as prescribed by Field (2016), as well as IBM (2018). The summary of the Friedman test is presented below in Table 2.

Table 2: Friedman Test – Ranking of Causes of Delays

Test Statistics[a]	
N	158
Chi-Square	375.663
Df	14
Asymp. Sig.	.000

a. Friedman Test

Source: Primary Data (2019)

From the test above, χ^2 (14) =375.663; $p<0.05$. With the p-value being less than 0.05, it follows then that the extracted ranks were significant. These are presented in Table 3.

Table 3: Ranked Causes - Ranking of Causes of Delays

	Mean Rank	Rank
Lack of funds	10.74	1
Availability of resources	10.54	2
Variations	10.16	3
Slow decision making by clients	9.06	4
Availability of cash	8.65	5
Approvals from local authorities	8.47	6
Project management problems	8.35	7
Fluctuations of building material prices	8.09	8
Drawing changes	7.84	9
Lack of communication between parties	7.53	10
Contractor's insolvency	6.79	11
Bad weather	6.58	12
Labour disputes	6.09	13
Mistakes on documents	5.77	14
Lack of information from consultants	5.35	15

Source: Primary Data (2019)

From the foregoing analysis, it can be seen that the top five causes of project delays were:

1. Lack of funds
2. Availability of resources
3. Variations
4. Slow decision making by clients
5. Availability of cash

These findings do concur with the literature reviewed as the aspect of funds emerged as being one of the top reasons for the delays of projects. A case in point cites financial problems as the critical issue, which was further supported by Sweis *et al.* (2009) who established that funding-related issues seem to be the generic factor that is behind the majority of project

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delays as well as project failures. On the other note, it is evident that the least three causes were:

1. Labour disputes
2. Mistakes on documents
3. Lack of information from consultants

It may be noted that from the literature reviewed, such as Murali *et al.* (2007) their thrust is mainly on resource issues and hardly on the above three.

Challenges in Implementing a Project

The second research objective looked into the need to establish respective challenges that are characterized with the implementation of construction projects in the public service. This objective was reviewed from two dimensions, first from the perspective of the sources of resources, and second, from a scaled dimension of challenges rated on a 5-point Likert scale.

Sources of Funding for Projects

Table 4 below presents the respective sources of funding for the implementation of the construction projects.

Table 4: Funding Sources for Projects

	Frequency	Percent	Valid Percent	Cumulative Percent
Internal sources	46	21.2	21.2	21.2
External sources	19	8.8	8.8	30.0
Donor funded	13	6.0	6.0	35.9
All the Above	139	64.1	64.1	100.0
Total	217	100.0	100.0	

Source: Primary Data (2019)

From the analysis, the majority of the respondents cited that their funding was sourced from internal sources, external sources as well as from donors. Lack of funds was established earlier as being the principal cause of project delays, and the need to source the capital from all the possible sources must have been the best approach. With respect to the sources of the materials for the construction of the projects, the majority (57.6%) mentioned that they did source these from both the locals as well as importing. Only 8.8% mentioned that they exclusively imported, with 33.6% acquiring the materials locally. These figures are shown in table 5 below.

Sources of Materials for Projects

It should be noted that the need to import was necessitated with the scarcity of the key materials that would be needed to ensure the completion of the project, and this could eventually impact on the time as shipping of imports would possibly stall the project. Resorting to importing would as well contribute towards the increase in the cost of the project, as overhead costs such as duty and transportation would add on to the eventual cost.

Table 5: Sources of Materials for the Projects

	Frequency	Percent	Valid Percent	Cumulative Percent
Local	73	33.6	33.6	33.6
Imports	19	8.8	8.8	42.4
Both	125	57.6	57.6	100.0
Total	217	100.0	100.0	

Source: Primary Data (2019)

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Sources of Human Capital for Projects

The other dimension was the respective sources of human capital for the projects, with the two principal sources being either internal staff as well as outsourcing. The respective sources are summarized in Table 5. Based on the outcome, the majority of the respondents (66.4%) of the respondents concurred that they worked with both internal staff as well as outsourced. Only 21.3% of the respondents exclusively used internal staff, while only 12.3% exclusively outsourced. Effectively, the major challenge that would be presented would be the possibility of high costs of outsourcing.

Table 6: Sources of Human Capital for the Projects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Internal	45	20.7	21.3	21.3
	Outsourcing	26	12.0	12.3	33.6
	Both	140	64.5	66.4	100.0
	Total	211	97.2	100.0	
Missing	System	6	2.8		
Total		217	100.0		

Source: Primary Data (2019)

Overall Challenges

To complement the issues raised hereinabove, the respondents were asked to rate the extent to which a set of emergent issues were indeed significant challenges that impacted on the eventual implementation of the projects. This was rated on a 5-point Likert scale, and the results are summarized in Table 7.

Table 7: Descriptive Statistics - Challenges in Implementing a Project

	N	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error
Financial resources	205	4.44	.497	1.958	.338
Availability of foreign currency	197	4.15	.717	.827	.345
Government support	191	3.55	.960	.095	.350
Strict conditions from regulatory authorities	200	3.47	.918	-.856	.342
Unavailability of technical human resources	200	3.26	1.009	-.395	.342
Labour laws	200	3.17	1.047	-.298	.342
Valid N (listwise)	183				

From the foregoing analysis, the principal challenge characteristic with the implementation of projects was found to be financial resources, with the highest mean rating of 4.44, along with the standard deviation of 0.497. The corresponding kurtosis for financial resources was very high, 1.958, also reinforcing the significant role that project financing play towards project success, as also established earlier. This corresponded to the second challenge, which was the availability of foreign currency, with a high mean rating of 4.15, and again being leptokurtic in nature (kurtosis = 0.827). The role played by the government as an impediment was rated third, albeit the mesokurtic distribution, with a kurtosis of 0.095, which tended towards zero. It is thus confirmation that the government did not provide adequate support towards enabling the success of the projects. Strict conditions from regulatory authorities was rated

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fourth with a mean of 3.47, while the unavailability of technical human resources had a mean of 3.26, and labour laws, had a mean of 3.17.

From the foregoing, the significance of financial resources is again standing out, which is fully in line with the arguments by Essam (2006) and Sweis *et al.* (2009) identified earlier as being of the school of thought that there can be no other insurmountable project management issue that can outweigh the effects of poor project funding or poor project financial management.

Principal Component Analysis - Challenges in Implementing a Project

With a view to isolating the challenges, and further investigating the principal challenges that ought to be settled, along with their respective weights, the researcher considered the use of Principal Component Analysis, a dimension reduction technique which was considered to being the befitting approach. To validate the applicability of PCA to the data, according to Field (2016), the Kaiser-Mayer-Olkin (KMO) test for sampling adequacy as well as the Bartlett's tests for sphericity has to be carried out. The results are presented in Table 8.

Table 8: KMO and Bartlett's Test - Challenges in Implementing a Project

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.836
Bartlett's Test of Sphericity	Approx. Chi-Square	486.914
	Df	15
	Sig.	.000

From the analysis, the resultant KMO test was 0.836>0.5 (Hair *et al.,* 2010), and the Bartlett's Test of Sphericity was significant at p<0.05 (IBM, 2018). To this effect, having met the assumptions for PCA, the test was carried out with varimax as the rotation method with Kaiser normalization. The Total Variance Explained is presented in Table 9.

Table 9: Total Variance Explained- Challenges in Implementing a Project

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.414	40.234	40.234	2.414	40.234	40.234	2.245	37.414	37.414
2	1.410	23.492	63.725	1.410	23.492	63.725	1.399	23.312	60.726
3	1.101	18.354	82.080	1.101	18.354	82.080	1.281	21.354	82.080
4	.701	11.679	93.759						
5	.287	4.779	98.538						
6	.088	1.462	100.000						

Extraction Method: Principal Component Analysis.
Source: Primary Data (2019)

From the foregoing, only three components had eigenvalues greater than 1.0. In other words, from the challenges under study, these could best be classified into three major challenges. These explained 82.080% of the variance, with the greatest component/challenge explaining 37.414%, and the second highest explaining 23.312%. Table 10 below presents the resultant rotated component matrix. From the outcome, benchmarking the factor loadings to a minimum of 0.5 (IBM, 2018), component 1, which explained the greatest variance comprised of financial resources and availability of foreign currency. Effectively, this could best be understood as *financial resources*, with the greatest factor loading.

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Table 10: Rotated Component Matrix- Challenges in Implementing a Project

	Component		
	1	2	3
Unavailability of technical human resources	-.163	.136	.899
Financial resources	.972	.190	-.114
Availability of foreign currency	.869	.107	.954
Strict conditions from regulatory authorities	.163	.529	.526
Labour laws	.227	.811	.179
Government support	.141	.910	-.097

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.
Source: Primary Data (2019)

The second component comprised of strict conditions from regulatory authorities, labour laws and government support, which could be collapsed to *government support*. The last component related to the unavailability of technical human resources. To this effect, the results inform us that financial resources are the major challenge, followed by poor support from the government, and the aspect of human resources being the third significant challenge, and these findings are confirmed by Sweis *et al.* (2009). From a qualitative perspective, the other challenges that were pin-pointed were the high costs of EMA fees, market illiquidity, and the unavailability of construction materials locally leading to prolonged supply time for imported material, obsolescence of equipment, brain drain/turnover, as well as bureaucracy in decision making system.

CONCLUSIONS

With respect to the causes of project delays, this study concludes that the most significant cause for project delays relate to the inadequacy of resources. Of these resources, the most prominent and most significant are financial resources. Without adequate financial resources, the completion of the construction project is bound to be delayed. This has been severed owing to the poor economic milieu, which is characterized by significant illiquidity and poor funding. Effectively, the high volatility of the economy makes planning very difficult, leaving only contingency planning as the ideal approach.

Looking at the challenges being faced in implementing construction projects, the researcher concludes that project financing is project implementation is the primary challenge. From a broader aspect, the researcher further concludes that the evasive environment, characterized by high illiquidity, and scarce forex makes it further difficult for dependencies that ought to be imported. Effectively, it is difficult to plan as the time, cost and resource estimates falter making project planning, scheduling, and controlling rather difficult (West, 2008).

RECOMMENDATIONS

Basing on the project results, the major causes of construction project delays were lack of funds and availability of resources. Hence, the researcher recommends that the contractors should source for enough funds to finance the project through equity or debt. This can be implemented through financial institutions and also appointment of financial advisors who would be able to advise and source for funds before implementation. Another recommendation is that resources should be sourced before the implementation of the project, thus contractors should ensure that they have adequate and efficient equipment for the

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project. Contractors should also ensure that they have adequate human resource team for the project. In addition, the technical team should be experienced and outsource the expertise that might be lacking among project members, background checks to be done to ensure that they are the best. This can be done through advertising and use of employment agencies.

On the challenges for implementing the project, financial challenges and poor government support resulted to be the major challenges. Financially, contractors can make use of BOTs, build on transfer/ build operate and transfer. This can be implemented through relationship formed between the financer and project owner to avoid the financial challenge. Public private partnerships can also be made, that is partnership between the government and the private sector.

On poor government support, the researchers recommend that government should support local contractors through advance payments to implement the project, provide preferential treatment for local contractors i.e. giving 20% score mark to local contractors during tenders for the project. The government should also intervene on behalf of local contractors when projects are being done by foreign contractors for 40% to be given to the local contractors. Sourcing finance from international financers can be in terms of equipment which can be given to local contractors as loans. This would help in project implementation especially now that the country is facing foreign currency shortages.

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