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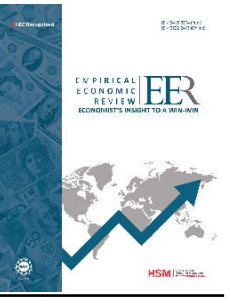

Title: **Exploring the Factors Causing Delays in Project Completion on Time: An Evidence-based Study from Pakistan**

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Exploring the Factors Causing Delays in Project Completion: An Evidence-based Study from Pakistan

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Abstract

The real estate market and housing projects play a vital role in the economy of Pakistan. Delays in these projects may negatively affect the economy, directly. The purpose of this study was to highlight the factors that cause delays in project completion. We explored the relationship between project planning factors and the on-time completion of real estate projects in Pakistan. Sample data comprised 440 observations collected through a structured questionnaire from contractors, managers, engineers, and supervisors related to construction projects. Confirmatory Factor Analysis (CFA) was used along with validity and reliability tests to conclude the significant factors. Through binary logistics regression, the study concluded that various internal and external factors, such as "contractor related causes", "material, labour and equipment related causes", and "contract relationships related causes" have a significant impact on the timely completion of projects. The findings of the study may be helpful to managers, supervisors, and builders for policy-making purposes in order to ensure the timely completion of projects.

Keywords: Binary Logistics Regression, Confirmatory Factor Analysis (CFA), project planning factors, timely completion

JEL Codes: O22, L74, C38

Introduction

In the progress of any country, significance of real estate development industry cannot be ignored. It is also essential for a country's economic growth and helps improve the living standard and quality of life (Ali et al.,

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2020). In 2017, a report on the Malaysian construction industry illustrated that construction activities have increased by 8.1% in the comparative quarter of the previous years (Ministry of Economic Affairs Malaysia, 2017). Conversely, a study by Rahman et al. (2012) reported that this industry faces problems with ineffective performance in terms of budget and time, construction material wastage, and other issues. Literature also shows that, despite all these problems, project delay can be categorized as one of the main barriers to the accomplishment of a project. Multiple studies have reported similar findings and declared that most of the projects become "sick projects" because of delay issues (Endut et al., 2009; Singh, 2017).

One of the main features of the project is that it has proposed starting and ending time. All the budgeting of required resources, costs and revenues are forecasted according to this time period. If time exceeds for unusual delays in planning, project cost exceed, revenue reduces, it leads to customer dissatisfaction and become a reason for different problems and disputes. Although, There are number of reasons including political issues, governmental legislations, inability of workers, insufficient resources and others that causes delay in the timely completion of project, but there are also certain Delay factors at different level of project planning that become the cause of exceeding time limit.

Project planning is the most important phase of any project, where the project manager and team, contractors and consultants decide to adopt tools and techniques for timely completion of the project. But Sometimes, number of factors are ignored by the concerned which cause Unusual delays in the timely accomplishment of the task. Empirical evidences show that most of the real estate development projects do not complete on time and bear heavy cost for unusual delays. Project delays are also caused by bad planning of different parties, including managers, supervisors, finance people, contractors and consultants. In this regard, Ahmad et al. (2020) reported the importance of fund's accessibility as far as clarifying project execution. Improvement in fund's access prompted results improvement in firm's project execution as estimated by work efficiency. Therefore, it is necessary to understand why delays are caused in projects.

The reason for undertaking this research can be relate back to the discussions in the literature, where it was studied by various researchers that delaying problems are the most common issue in various type of projects. This study aimed to explore the delaying factors in the planning process and

entities involve in the real estate development projects (like, contractor, consultant, labor, contractor relationships and external causes) that negatively influence the project effectiveness. The main objective of the study was to discover those delaying factors that may adversely influence the timely completion of a project. With the critical examination of literature, we established multiple delaying factors to figure out which of them have their presence in the real estate industry of Pakistan. The said sector does not appear much in previous literature of recent time which increases its necessity and importance.

The findings of this study may aid the concerned individuals in improving the efficacy of projects, since it investigates the approaches used to counteract the project delays during the planning phase of a project. This study assessed the usefulness of various project planning tools that can be used to complete the project on time within a given budget.

Researchers have pointed out on the role of project planning in preventing time and cost overrun in different projects due to which its importance cannot be undermined. A study by Khan et al. (2018) states that, people at managerial positions and supervisory people ought to keep an essential separation from aversive leadership and endeavor to drive and empower their subordinates or allies to achieve project objectives effectively. Findings of Another research investigated that aversive leadership becomes the cause of work stress, organizational and employee unorthodoxy, supporter forceful voice and adversely also fundamentally identified with lower work performance (Saeed et al., 2017). This also leads to delays and increases project completion time. This issue is further aggravated by the fact that most companies do not employ disciplinary approaches to amend work tardiness, causing unnecessary work delays. For this reason, it is necessary to investigate project management strategies that can be used to prevent such issues.

This study conducted primary research. Data was collected from 440 respondents via a structured questionnaire. The respondents included managers, supervisors and contractors from real estate development companies across Pakistan. For this purpose, factor analysis was used to explore the delaying factors and then binary logistic regression was applied. It was determined that project delays are caused by various internal system related causes as well as external cause, both of which increase the completion time of the project.

The later part of this research document is divided into the following sections. Section 2 deals with the review of previously published literature that is related to this study directly or indirectly. Section 3 elaborates on the research methodology adopted for conducting this research. Sections 4 provides the investigation conducted on the empirical evidences of the analysis. Section 5 provides the conclusion of the study.

Review of Literature

This section showcases and examines project delay factors as distinguished by different writing over the years. Hypotheses are developed accordingly.

Delay Factors

Every real estate development project has a pre-specified timeline and a schedule overrun could affect both the employer and the contractor. Although the contractor is more secure under the price adjustment clauses, schedule overruns normally result in cost overruns. At this juncture, either the contractor or the employer has to bear the financial burden. It is the consultant who has to determine whether the schedule overrun is caused due to the employer or the contractor. In such cases, the contractor has to initiate a case for an Extension of Time (EoT) through the consultant to the employer. The employer may approve such cases on the recommendation of the consultant (Assaf & Al-hejji, 2006). It is normal for real estate development projects to face schedule overruns around the globe. Even outstanding award-winning projects may encounter time delays, as is evident from the projects of Asian Development Bank, which could have delay of minimum nine months (Acharya, 2004).

With regards to the real estate development business, delays can be characterized as the additional time needed to complete a real estate development project. The yearning to complete a project on time, under the scheduled time plan, with the most elevated quality, and in a protected way are the shared objectives for all concerned parties, including the proprietor, contractual, worker and advisor. Delays, as a rule, result in misfortunes in some shape for everybody. Various studies demonstrates the impact of delays significantly affect the project and cause as time overwhelm, invade cost, arise political questions, assertion, civil suits and add up to relinquishment (Aibinu & Jagboro, 2002; Chan & Kumaraswamy, 2002; Sambasivan & Soon, 2007). To control such issues, there is a need to distinguish the cause of project delays during the project planning phase.

Furthermore, if the time, cost, and scope change, then the productivity of the project may be compromised. and the overall quality of the project may be affected (Sambasivan & Soon, 2007). During the execution of a real estate development project, various unforeseen factors could affect the momentum of the project. If a project is well-conceived at the planning stage, it would be easier to face and resolve unforeseen issues. In such a case, cost and schedule overrun can be avoided (Ahmed & Azhar, 2002).

On the other hand, if a project is ill-planned, then the concerned individuals may face delays at various stages of the project. Resultantly, change in scope and overall project cost can escalate (Sambasivan & Soon, 2007). To complete a real estate development project, it is always necessary to hire an experienced contractor, who has enough resources to complete the project on time. A well-deliberated project plan, and a strong conceptual and detailed design could help in overcoming the cost and schedule delays. Hence, delay in the completion of a project could be due to various factors, which are critically discussed in the next section.

Accessibility

It is the employer who has to ensure encumbrance free access to the contractor and its working parties to the site of the project. Once the contract is assigned and the contractor has been mobilized at side/the site, failure to give encumbrance free access to the project site could have serious financial implications for the employer. This could also result in spilling over the timelines (Chan & Kumaraswamy, 1997). It has been observed that during construction in urban areas, the provision of encumbrance free access to the project site is always a major concern for the employers. Before the mobilization of the contractor, they have to ensure that the land is fully available and there are no disputes with the locals of the area (Tran et al., 2015).

Site Condition

Delay in accomplishment of the project may also get affected due to site conditions. The suitability for the project must be determined before awarding and mobilizing the contractor at the site. An uneven land or land with high altitude may not be suitable for the real estate development of a specific type of bridge. Undesirable site, such as hard strata and boulders, could cause further delays in construction. Feasibility reports are always mandatory to determine if the site conditions are suitable and align with the

nature of the project (Collins & Zack, 2014). For instance, through soil testing, it can be determined that the land is suitable for the project or not (Lo et al., 2006).

Space Constraint

In built up areas, provision of enough space for the construction activity could be a major challenge. Contractors have to stack the construction material in the near vicinity of the project site. However, if there are space constraints, this could have serious consequences for the efficient completion of the project and resultantly cause project delays (Chavada et al., 2012). Therefore, the provision of enough space in or around the project site is essential for the smooth and efficient completion of the project (Dawood et al., 2019).

H1: External causes (ER) have a significant impact on the timely completion of the project

Fluctuation/Suitability Material and Availability of Labor

The fluctuation in the prices of construction materials is a common phenomenon, which may have implications towards the overall completion cost of the project. Time and price escalation are strongly interlinked. On the other side, the suitability of the material is also an important factor. It is the consultant who has to determine the suitability of the material through laboratory tests (Khaloufi, 1956).

H2: Material, labor, and equipment related causes (ML) have a significant impact on timely completion of the project.

Material Delivery

A delay in the execution of the project may be due to a problem on the side of the contractor, consultant, or employer (Assaf & Al-hejji, 2006). Material delivery could be a prime reason for delays/deferments in the completion of the project. Normally, consultants, being responsible for the quality of the material, do not agree to the use of faulty material, which could cause a delay in the execution of the project (McAnulty & Baroudi, 2010).

H3: Consultant related causes (CS) have a significant impact on the timely completion of the project.

Performances of Contractor

Contractor's performance is reflected by effectiveness in finishing the project on scheduled timeline while lacking and inadequacy of experience of contractual worker will lead to delays. One of the difficulties for the contractual worker is the confinement of capacity to impart and ordinarily they don't utilizing planning programming to diminish the occurrence of postponed venture (Tran et al., 2015).

Non-availability of contractors' staff and labour is also a critical factor, which causes a delay in the execution of a project. Lack of experienced manpower (experts in critical tasks such as scheduling, quality control, and safety management) may also result in schedule overrun, which could further adversely affect the cost of the project (McAnulty & Baroudi, 2010). Various delays are caused by temporary workers, subcontractors, or material suppliers. These temporary workers may be charged fine for unusual delays in project completion; however, this may be a temporary solution and may fines may cause more problems in the future (Alaghbari et al., 2007).

H4: Contract relationships related causes (CRR) have a significant impact on the timely completion of the project.

Most agreements ponder over the legally contractual labor to gain an expansion of time for tolerable delays, but yet no further monetary benefits (Alaghbari et al., 2007). Concurrent delays occur if more than one issue arises during the construction phase. (Alaghbari et al., 2007). The most broadly perceived kind of compensable delay is deficient drawings and conclusions. Ahmed and Azhar (2002) likewise attest that commitment in regard to delays is related to whether the legally binding specialist is conceded or is subject for costs and additional opportunity to complete the endeavor. Concurrent deferrals develop when more than one variable concedes the endeavor meanwhile or in covering time spans (Alaghbari et al., 2007).

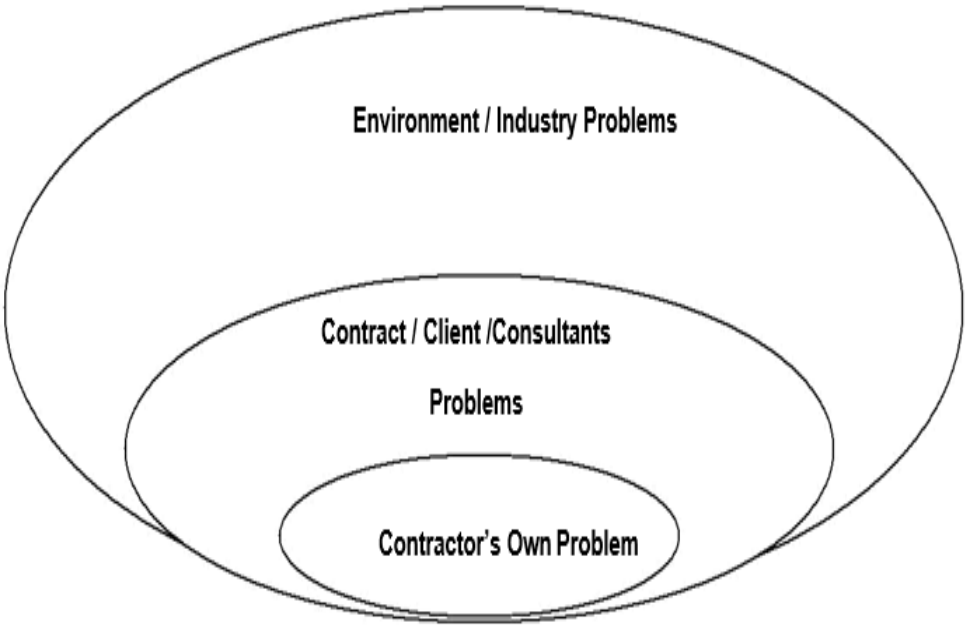
H5: Contractor related causes (CR) have a significant impact on the timely completion of the project.

Assaf and Al-hejji (2006) overviewed the timely execution of various sorts of development undertakings to investigate the reason for delays and their significance as indicated by venture members. The authors recognized seventy-three reasons for delays (Al-Momani, 2000; Chan &

Kumaraswamy, 1997; Kumaraswamy & Chan, 1998; Shah, 2016). Duy and Ogunlana (2004) conducted a contextual analysis of colossal development in Vietnam. The review uncovered that all issues were interconnected. The top positioned issues in term of event were gathered under five main considerations: clumsy planners and contract-based workers, bad (either over or under) estimations and frequent change in administration, social and mechanical issues, working site issues, and uncalled for systems and instruments.

Figure 1

Major groups of problems that cause delays in Construction based projects.



In their study, Toor and Ogunlana (2008) researched delayed projects in Thailand. They inspected the most noteworthy issues on deferral in real estate projects. The study demonstrated issues as fashioners, customers, contractual workers, multi-cultural and multi-lingual condition, substantial number of members and the contribution of remote architects. A vast majority of the issues were recorded by (Assaf & Al-hejji, 2006; Duy & Ogunlana, 2004). The review conducted by Assaf and Al-hejji (2006)

comprised two stages. The primary stage incorporated a writing audit and meetings with nearby contractual workers, design architects, and proprietors, where fifty-six reasons for deferral were distinguished. These variables were assembled into nine noteworthy classifications, that us, labour, material, equipment, financing, environment, frequent changes, government relations, contractual relations, and scheduling strategies.

Financial Planning

In this aspect, the findings of Ahmad et al. (2020) show the essentialness of fund's accessibility as far as clarifying project execution. Improvement in fund's access prompted resulting improvement in firm's project execution as estimated by work efficiency.

H6: Finance and payments of completed work (FP) has a significant impact on timely completion of the project.

Conclusion on Delaying Factors

The existing literature on delaying elements was utilized to fabricate a far-reaching rundown of postpone causes. Assaf and Al-hejji (2006) examined the biggest number of postponed causes. According to their findings, the most common causes were proprietor related variables, contractual worker related components, advisor related elements, planning group related elements, and materials, hardware, work, and outside elements.

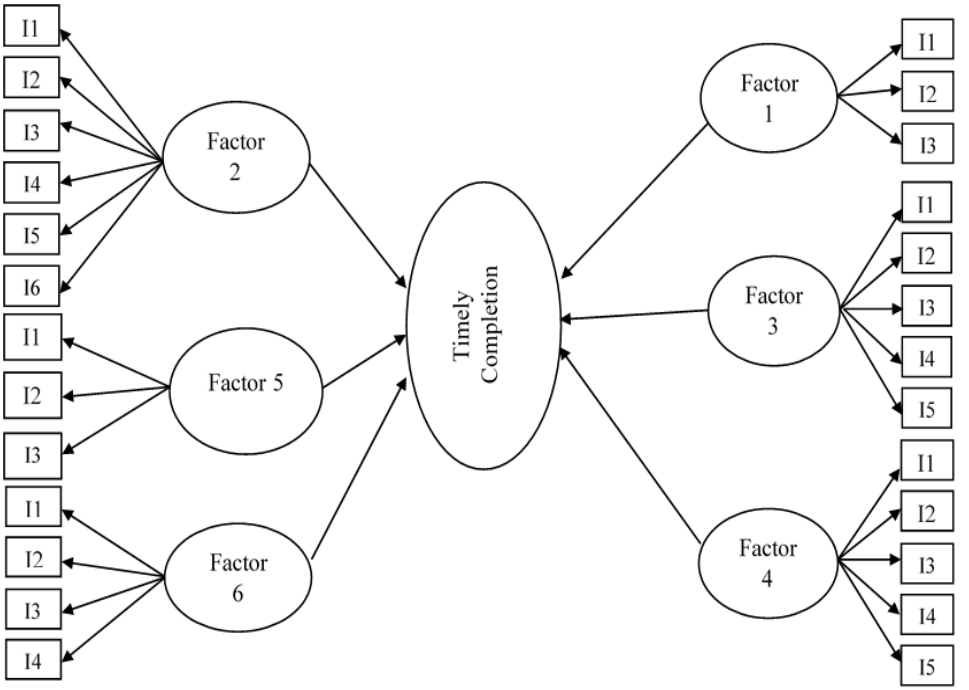
Odeh and Battaineh (2002) distinguished the real reasons for delays in development industry. These causes were arranged into the accompanying eight noteworthy groups: customer related variable, temporary worker, advisor, material, work and gear, contract, authoritative relationship and outside elements. These causes was also upheld by different scientists (Duy & Ogunlana, 2004; Toor & Ogunlana, 2008). The 28 reasons for delays fit this examination. They are categorized as a group category in Figure 1. These adjournments are likewise normal in Brunei's construction industry.

Methodology

This study conducted a primary study. The graphical representation of the theoretical framework followed in this research is given in Figure 2.

Figure 2

Graphical Representation of the Relationship Between Variables



The square boxes show the items (indicators) that collectively explain their relevant factors (parent construct). In this framework, six delaying factors related to the planning process were concluded as reflective measures and were named numerically from factor 1 to factor 6. This structural modelling helps interpret the relationship of the study variables. The research approach for this study focused on the deductive approach. It investigated the claims of various researchers to determine how the delays in the planning process affect the timely completion of the project. This approach gives weightage to factors responsible for causing a delay in a project.

Sampling Technique and Data Collection

Keeping in view the time and budget constraints of the study, a convenient sampling technique was employed for the purpose of data collection (Cohen & Morrison, 2002; Sekaran & Bougie, 2013).

The primary data was collected through structured questionnaires from the targeted population by using random sampling. Our respondents included managers, contractors, and supervisors. With the help of previously published literature, 44 questions were designed to measure the six unobserved variables (latent variables) showing delaying factors. To collect data, a structured questionnaire was distributed among more than 600 respondents. Out of them, 493 responses were collected and 53, partially incomplete responses, were removed later. For basic examination, 440 complete responses were sorted in Microsoft Excel. The following mathematical model was run to check the impact of independent variables on the dependent variable.

$$\rho(y) = \frac{1}{1+ e^{-(\alpha+ \beta1(FP)+ \beta2(CR)+ \beta3(CS)+ \beta4(ML)+ \beta5(CRR)+ \beta6(ER)+ \varepsilon)}} \quad (1)$$

Where,

α is the constant (it shows the starting point of the regression line)

β is the slope coefficient

FP, CR, CS, ML, CRR & ER are independent variables

ε is the random error term

And y is the categorical dependent variable

In case: y = 0 (zero shows project completes on time)

y = 1 (one shows project does not complete on time)

Data Management and Analysis Techniques

A pilot testing is a critical apparatus in accumulation of information that watches out for the feasibility of scales which are utilized in investigation (Aldana & Liljenquist, 1998). Initially, pilot testing was used to enhance the scales and dispersed among 25 respondents. Later, the refined questionnaire was spread to the target respondents. Multiple sources were used to collect data during three inconsecutive months with a six months gap in-between each to enhance the response quality. Later, the data was imported into SPSS by using the excel sheet for measurements. Finally, Confirmatory Factor Analysis (CFA) along with reliability and validity tests were conducted on the data. After that, Binary Logistics Regression analysis was used to analyze the impact of these factors on the dependent variable given in equation 1.

Analysis and Results

Expressive insights outline the information into significant frame and build up a superior thought of test's characteristic under investigation (Pallant, 2020).

Normality of the data is the basic assumption needed to be fulfilled before proceeding toward the empirical investigations. Skewedness and Kurtosis values can help determine whether the data is normal or not. If the values lie between +3 to -3, the data can be considered normally distributed (Hair et al., 2010). The SD values of all variables are found standardized.

The sample adequacy is important to have unbiased estimates. If the sample size is very poor/small (less than 50), the results would be biased and cannot be generalized. According to previously published literature, a sample size of less than 100 is considered poor, a sample size equal to 200 is considered fine, a sample size of more than 300 hundred is considered very good, and a sample size of more than 500 is considered enough. The very two basic assumptions for measurement modelling are "sample adequacy" and the "sufficient significant positive correlation" between variables. To check these, we can apply the "Kaiser-Meyer-Olkin (KMO)" test and Bartlett's Test of Sphericity, respectively. The acceptable value for the KMO must be greater than 0.6 and Bartlett's test must have a p-value less than 0.05 (Kaiser, 1974). Hutcheson and Sofroniou (1999) considered the value of KMO as average, good, great and outstanding if lies between 0.5 to 0.7, lies between 0.7 to 0.8, lies between 0.8 - 0.9 and lies more than 0.9 respectively. Our study sample qualifies both tests. As can be seen in Table 1, the value of the KMO test is 0.841 which is greater than minimum acceptable value and can be considered as great. Moreover, the p-value for the Bartlett's test is also significant at 0.01 percent.

Table 1

Reported KMO and Bartlett's Values

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.841
Bartlett's Test of Sphericity (Sig.)	.000

We apply "principle component analysis" is SPSS to run the exploratory analysis to bind them together into single factors (latent variables). The reported tables are enlisted along with their details and purposes.

Table 2
Total Variance Explained Using Principal Component Analysis

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percentage Variance	Cumulative Percentage	Total	Percentage Variance	Cumulative Percentage	Total	Percentage Variance	Cumulative Percentage
1	7.27	16.53	16.53	7.27	16.53	16.53	4.41	10.03	10.03
2	4.16	9.47	25.99	4.16	9.47	25.99	3.81	8.65	18.68
3	3.02	6.87	32.86	3.02	6.87	32.86	3.76	8.55	27.23
4	2.55	5.80	38.66	2.55	5.80	38.66	3.42	7.79	35.02
5	2.22	5.04	43.70	2.22	5.04	43.70	3.15	7.16	42.18
6	1.61	3.67	47.37	1.61	3.67	47.37	2.28	5.19	47.37
7	1.31	2.98	50.35						
8	1.22	2.78	53.13						
9	1.15	2.60	55.73						
10	1.04	2.36	58.10						
11	.962	2.19	60.28						
12	.946	2.15	62.43						
13	.911	2.07	64.50						
14	.832	1.89	66.39						
15	.819	1.86	68.26						
16	.762	1.73	69.99						
17	.748	1.70	71.69						
18	.708	1.61	73.30						
19	.683	1.55	74.85						
20	.658	1.50	76.34						
21	.654	1.49	77.83						
22	.648	1.47	79.31						
23	.602	1.37	80.67						

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	Percentage Variance	Cumulative Percentage	Total	Percentage Variance	Cumulative Percentage	Total	Percentage Variance	Cumulative Percentage
24	.573	1.30	81.98						
25	.569	1.29	83.27						
26	.551	1.25	84.52						
27	.534	1.21	85.74						
28	.479	1.09	86.82						
29	.474	1.08	87.90						
30	.461	1.05	88.95						
31	.445	1.01	89.96						
32	.436	0.99	90.95						
33	.426	0.97	91.92						
34	.405	0.92	92.84						
35	.384	0.87	93.71						
36	.376	0.86	94.57						
37	.356	0.81	95.38						
38	.351	0.80	96.18						
39	.328	0.75	96.92						
40	.325	0.74	97.66						
41	.306	0.70	98.36						
42	.275	0.62	98.98						
43	.240	0.54	99.52						
44	.209	0.48	100.0						

Table 2 illustrates that a total of 6 factors were generated based on shared variance. Generally, the Eigen value was greater than 1. In the rightmost column, the first factor illustrates almost 10% variance in the model. The variance explained by other factors can be observed in the list given in Table 2.

To determine the representation of the components, we used the rotated component matrix. In statistical mode, we referred it as loadings. Appendix-1 shows the number of factors prioritized on the basis of maximum shared variance explained. All the loaded items on each factor explain some variance. We use the cut off value 0.5 as loading score subjected to the model reliability and model good fit. If model is good fit, This value is acceptable according to the literature.

Table 3

Goodness of Fit

Model	NPAR	CMIN	*df*	*p*	CMIN/DF	GFI	AGFI	RMSEA	NFI	CFI
Default model	84	559.46	215	0.00	2.60	0.92	0.86	0.06	0.92	.98

The Eigen value for the factor 7 to 10 are reported in Table 2. These values are greater than 1 and are loaded independently. The variance explained by these variables is less than the benchmark value which is 0.6. For this reason, we ignore these factors in our empirical evidence. This study used Confirmatory Factor Analysis (CFA) because the questionnaire was designed using authenticated items in previous studies. We used AMOS 21 to run CFA. The standardized variance explained by each item can be viewed in related tables. CFA) was used to check the fitness of the overall model. The model for this study comprised six constructs, that is, finance and payments of completed work (factor 1), contractor related causes (factor 2), consultant related causes (factor 3), material, labour, and equipment category causes (factor 4), contract relationship-related causes (factor 5), and external causes (factor 6). A complete measurement model was constructed in Amos and indicators were loaded on their parent construct. Subsequently, the same model was run to obtain the results. Then, the first measurement model was run to determine the fit indices of the first model. They were found to be under acceptable values. The trimmed model was run again after dropping the items containing substandard loading. It

should be noted that due to substandard loading, a few items were dropped from the analysis.

In addition to the model fit some other measures are also needed.We check the goodness of fit (through Chi-square, GFI, AGFI) and the badness of fit (through RMSEA, CFI, NFI, TLI). Generally, the acceptable value of Chi-square is less than 3. Reported goodness of fit indices (GFI) and Adjusted GFI is above the minimum acceptable value that is .921 and .86 respectively. Similarly, the Badness of Fit measure (RMSEA) should be less than 0.08. The values of Incremental Fit Indices (NFI, CFI) are also acceptable. This mix of parameters validate the model fitness (see Table 3).

We also test convergent validity. We used the average variance extracted (AVE) score, factor loading score, and composite reliability (CR). According to the criteria suggested by Hair et al. (2010), factor loadings were greater than cut off values. They were greater than 0.5 and were considered significant at 0.01. Furthermore, the values obtained from the AVE score calculated through Fornell and Larcker (1981) criteria revealed that the values are greater than 0.50. Hence, the results of factor loading and AVE score showed that the measure employed has good convergent validity. We also observe the discriminant validity by comparing the forward and cross-loading scores in the un-rotated matrix. All the forward loading scores were greater than the cross-loading score, which validated the discriminant validity of the studied variable. To check consistency, we used Cronbach's alpha and composite reliability. Generally, the value of Cronbach's alpha should be greater than .70 and the value of composite reliability should be greater than .8, showing that the measures have good reliability. These results also indicate that the instrument used is reliable. It should be noted that reliability values above 0.60 are good and bear significance (Sekaran & Bougie, 2013), while Cronbach's α greater than 0.5 shows that the data in social sciences is reliable and satisfactory (See Table 4).

According to fit criteria by (Hooper et al., 2008; Hu & Bentler, 1999), this model is a good fit with our data. After validation of the measurement model, we checked how different factors (heterogeneous externally and homogenous internally) affected the timely completion of the project in structural model. Table 5 illustrates the regression results.

Table 4
Composite Reliability, Average Variance Extracted, Cronbach's Alpha

	CR	AVE	Cronbach's Alpha
FP	.941	0.529	.856
CR	.895	0.633	.849
CS	.923	0.526	.883
ML	.834	0.626	.943
CRR	.933	0.571	.911
ER	.899	0.542	.850

Table 5
Logistic Regression Results

Outcome		Predictor	Estimate	OR	S.E.	*p*
Timely Completion	<---	FP	.032	1.033	.049	0.513
Timely Completion	<---	CR	.086	1.090	.042	0.041
Timely Completion	<---	CS	.093	1.097	.059	0.114
Timely Completion	<---	ML	.669	1.952	.078	0.001
Timely Completion	<---	CRR	.334	1.396	.094	0.000
Timely Completion	<---	ER	.264	1.302	.084	0.001
No. of obs.	440					
Chi-square	0.002					
Pseudo R^2	0.45					

Investigating based on logistic regression, a statistic's equivalent to R-squared is not necessary. To ensure the goodness-of-fit of the model, numerous pseudo R-square was developed since the similarity in scale to R-square, ranging from 0 to 1, with upper values demonstrated better model fit. We can see that the value of pseudo R^2 is equal to 0.45, which is acceptable and denotes to a good model fit. The value of chi-square is 0.002, which is also within an acceptable value range.

During the structural model evaluation, all the values of standard errors were in the normal range. Coefficient estimates for the FP and CS were 0.032 and 0.093, while the odd ratios were 1.033 and 1.097, respectively. These values are insignificant since the p-value is greater than the significance level of 5%, showing zero effect. Keeping in view the empirical results, we reject the alternative hypothesis 3 and hypothesis 6. Therefore, with respect to our findings, it was determined that (consultant related causes) and (finance related causes) have no relationship with the timely completion of the project in our case. However, On the other hand, CR is significant at 5% significance level with coefficient value of 0.086 and odd ratio of 1.090 which means increased likelihood of delaying in project completion because of CR "contractor related causes" is 1.090. So, we can accept our alternative hypothesis 5.

Similarly, ML, CRR and ER are significant at 1% significant level with coefficient values of 0.669, 0.334 & 0.264 and odd ratios as 1.952, 1.396 & 1.302 respectively. This shows that these factors are working as the cause of delay in project completion on time. There is increased likelihood of delaying in project completion because of ML (material, labor and equipment category causes) by factor 1.952. Similarly, the increased likelihood of delaying in project completion because of CRR (Contractor relationship related causes) is by factor 1.396. Moreover, increased likelihood of delaying in project completion because of ER (External Cause) is by factor 1.302. So we accept our study alternative hypothesis 2, alternative hypothesis 4 & alternative hypothesis 1 respectively, and reject their null hypothesis. This shows that these factors have significant impact on timely completion of the project. The findings of our study are in agreement with the previous findings (Ahmad et al., 2020; Alaghbari et al., 2007; Assaf & Al-hejji, 2006; Chavada et al., 2012; Khaloufi, 1956).

Conclusion

This study sheds light on the delaying factors in planning process of different parties and objects which are involve in the construction project (like, contractor, consultant, labor, contractor relationships and external causes) that negatively influence the project effectiveness. We identified multiple delaying factors by reviewing previously published literature in order to figure out which factor significantly affects the real estate development industry of Pakistan. We used a questionnaire to collect data from respondents. The results determined the six most common delaying

factors (heterogeneous externally and homogenous internally) with the help of empirical evidence. These delaying factors were categorized as "finance and payments of completed work", "contractor related causes", "consultant related causes", "material, labor and equipment related causes", "contract relationships related causes", and "external causes". But not all shows its impact on the timely completion of the project. Study shows the significant impact of contractor related causes, material, labor and equipment category causes, contract relationships related cause. Along with these causes there are some external matters as well that cause delay in timely completion. These are not the planning issues but have their negative impact and can be concluded as Climate conditions, regulatory changes, Problem with neighbors, and unforeseen site conditions. In nutshell, If the managers critically monitor these factors, and design efficient operational practices, they can reduce the chances of delays in project's timely completion and can save themselves from cost overrun. The beneficiaries of this study include managers of civil projects, investors, contractor and supervisors. This study identifies delaying factors in project completion which is helpful for managers, supervisors and builders in policy making to avoid them for ensuring better success.

Every study has its limitations in some aspect. If we consider the real estate development industry in Pakistan, these factors may vary between industries and even between countries. Therefore, these results may be generalized for the real estate development companies of other countries. Also, the delaying factors showing the don'ts, dos as success factor may be explored and studied. Similarly, a large sample from multiple countries may be considered for further study.

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Appendix

Rotated Component Matrix

Items	Component									
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Quality issues of raw material	0.70									
Absence of raw material	0.66									
Availability of labor	0.64									
Efficiency of labor	0.60									
Accessibility or failure of equipment	0.55									
Major disagreements		0.84								
Inappropriate organizational structure in respect to project		0.74								
Absence of communication b/w the parties		0.71								
Contract execution			0.72							
Acceptance of drawings			0.64							
Quality control			0.58							
Time wastage on test and inspection			0.53							
Errors & discrepancies in contract draft			0.53							
Climate situations				0.68						
Regulatory modifications				0.66						
Neighborly issues				0.61						
Unanticipated site circumstances				0.56						
Subcontractors					0.64					
Site management					0.63					

Items	Component									
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Construction approaches					0.58					
Insufficient planning					0.58					
Errors during construction stage					0.56					
Inadequate skill of contractors					0.55					
Ingenious					0.54					
Owner intrusion						0.57				
Sluggish decision making						0.56				
Unrealistic imposed requirements						0.50				
Delay in attaining permits from town							0.50			
Weather effect								0.44		
Variations in Govt. regulations & laws									0.44	
Unsatisfactory data collection & survey before design										0.46

Note. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.