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ASSESSMENT OF DELAY FACTORS IN BUILDING PROJECT COMPLETION IN UNIVERSITY OF NIGERIA NSUKKA.

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ABSTRACT

Prolonged delays leading to building project abandonment adversely affect the educational environment and learning facilities. This study assessed the delay factors in building projects completion in University of Nigeria. The objectives were to classify and determine the ranking of the delay factors; to ascertain the degree of agreement in the ranking of the delay factors by the clients, contractors and consultants. Forty-one projects formed the study population. Data was collected from the Department of Physical Planning. The projects sites were inspected and necessary data collected. The findings were that the causes of project delays could be classified as bureaucracy and financial problems, corruption tendencies and contractor's site mismanagement, weather and economic uncertainties, delayed actions by consultants, and others. The top ten delay factors were identified. Spearman rank correlation coefficient for the ranking of the delay factors were: clients and contractors (0.912), clients and consultants (0.898), and contractors and consultants (0.889).

Keywords: Building Projects, Building Project Completion, Delay Factors, University of Nigeria

1.0 INTRODUCTION

Delay occurs in almost every building project and their magnitude vary considerably from project to project, ranging from a few days to years. It is generally understood that construction delay is the most critical factor affecting the delivery of construction projects in terms of time, budget and the required quality (Hancher and Rowlings, 1981). However, it is very important to identify the exact causes and their significance in order to minimize and avoid the impact of delays in building projects. This is more so as buildings projects completed on time indicates project efficiency. Mansfield et al (1994) stressed that construction process depend on a number of unpredictable factors that occur from various sources. These sources include the performance of construction stakeholders, availability of resources, site conditions, contract types, weather conditions and the contractual relations between stakeholders. Projects are rarely completed within specifies time and budget.

The education sector of any economy is fundamental to its human capital development which in turn is a veritable tool for sustainable wealth creation and national development. Education is key to sustainable civilization, development, and advancement. A functional university system requires functional support facilities and infrastructure for excellence in the academic activities of learning, teaching and research. Adequate infrastructure in a university environment is a must, not an option and management of these facilities must also be routine culture (Akunyili, 2010). The need for functional support facilities brings to the fore, the issue of project management challenge in the running of university campuses. The University of Nigeria Nsukka (UNN) located in Nigeria is one of the many existing universities in Nigeria faced with project management challenges.

Delay in completion of tertiary institution building projects have significant financial and social impacts on all parties involved in the projects. There is high impact on project cost and time. The adverse effects of delay in completion of building projects in tertiary institutions on the general well-being of their staff and student/researchers cannot be over emphasized. Also prolonged delays on these projects short change the society as there is wastage of general resources and the students, researchers and academics are subject to academic environment not adequate for sound learning and teaching. The abandoned projects pose security threats and reduces the environmental aesthetics of the University community.

In UNN today with increasing demand for structural facilities to facilitate learning, and a number of building projects are yet to meet this basic requirement of project management. This is as a result of delay factors pertinent to UNN. It against the foregoing discussion that this study seeks to assess the delays in building project completion in UNN, ascertain their ranking and to suggest how to minimize their impact.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Construction Delay: It Nature

Delay in construction industry refers to time/schedule overruns or extension of time to complete the project. Braimah (2008) asserts that delay is the extension of time for any activities in a project. Delay is an event that causes extended time to complete all or part of a project (Sanders and Eagles, 2001). Delay is time overrun either beyond the date for completion specified by the contract or beyond the extended contract period where an extension of time has been granted (Assaf et al, 1995). Delay is a situation when the contractor and the project owner jointly or severally contribute to the non-completion of the project within the agreed contract period (Aibinu & Jagboro, 2002). Alias and Mydian (2013); and Odeh and Battaineh (2002) defined construction delay as construction project interruption and stoppage as the time overruns either ahead of the contract date or further than the date that the parties agreed upon for delivery. Bartholomew (1998) viewed delay as a situation in which the progress of work has not entirely stopped

but has slowed down. Pickavance (2005) defined construction delay as delay causing postponement of one or more completion dates; prolongation of the contractors and/or subcontractors time related cost; delay to progress causing loss and/or expense to be suffered by contractors or sub-contractors; and reduction in productivity(or disruption) causing loss and/or expense to be suffered by contractors and/or subcontractor.

2.2 Empirical Review

2.2.1 Construction Delay Factors in Nigeria

Mansfield et al (1994) assessed sixteen major factors that caused delays and cost overruns in Nigeria. The causes of delay and cost overruns were identified as finance and payment arrangement, poor contract management, and shortages in materials, inaccurate estimation and overall price fluctuation. Odeyinka and Yusif (1997) examined the causes and effects of construction delays on completion cost of housing projects in Nigeria. the client related delay factors were variation orders, slow decision-making and cash flow problems, while contractor-related delays include financial difficulties, materials management problems, planning and scheduling problems, inadequate site inspection, equipment management problem and shortage of manpower. Aibinu and Jagboro (2002) studied the effects of delays in project delivery in Nigeria construction. The study administered questionnaire to construction practitioners. The study revealed client related delay is significant in Nigeria.

Koko et al (2013) studied the causes of time overrun in Education Trust Fund Building Projects in North Central Nigeria. Questionnaire was administered to clients, consultants, and contractor. The study revealed that 73.91% of the project surveyed had cases of time overrun and factors responsible for this were design changes, poor contract management, poor financing and mismanagement of mobilization fee by the contractors. Mohammed and Isah (2012) examined the causes of delay in Nigeria construction industry. Data was retrieved from clients, consultants and contractors. The study revealed that this causes of project delays were improper planning, lack of communication, design error, shortage of supply, financial issues, shortage of materials, cash flow problems during constructions etc.

2.2.2 Construction Delay Factors in Other African Countries Apart From Nigeria

Fugar and Agyakwah-Baah (2010) grouped 32 identified delay factors affecting projects in Ghana into nine groups. The highest factors was financial factor, followed by material, scheduling and controlling factors. The financial factors were delay in honoring payment certificate, difficulty in accessing credit and fluctuation in prices. Muhwezi et al (2014) studied construction delay factors in Uganda. The study identified and ranked 81 project delay factors grouped into four main groups of consultant related, contractor related, client related, and external related. The significant factors of construction delays were

delay in assessing changes in the scope of work by consultant; financial indiscipline/dishonesty by the contractor; inadequate contractors experience; design errors made by designers; and inadequate site investigation by the consultant. Baloyi et al (2011) examined the causes of construction cost and time overrun of the construction of 2010 FIFA World Cup Stadia in South Africa. The study revealed that the factors that affected the project arose out of actions of client, designers, and the contractors such as inaccurate quantity surveying, change orders, design errors and omissions, slowness in decision making by client, lack of communication, delay in work approval and incomplete drawings.

2.2.3 Construction Delay Factors in Pacific Rim Region

Sambasivan and Soon (2007) examined the causes of delay in Malaysian construction industry. The study identified this factors as contractor improper planning, contractor poor site management, inadequate contractor experience, inadequate clients finance and payment for completed works, shortage of materials, amongst other delay factors. Chan and Kumaraswamy (2002) revealed that delay factors in Hong Kong building projects are poor site management and supervision, unforeseen ground conditions, low speed of decision making involving all project teams, clients initiated variation and necessary variation in work. Majid (2006) reveals that the causes of delay in Aceh construction industry are insufficient number of equipment, inaccurate time estimation, monthly payment difficulty, inaccurate cost estimation, poor site management, shortage of construction materials, improper project planning and scheduling, contractor financial difficulties amongst other identified delays factors. Alwi and Hampson (2003) revealed that the delays factors in building construction projects in Indonesia are slowness in decision making, design changes, poor distribution of labour, inappropriate construction methods, and poor coordination among project participants.

2.2.4 Construction Delay Factors in Europe

Nkado (1995) identified the delay factors in construction projects in United Kingdom to be clients specified sequence of completion, contractors programming of the construction work, complexity of project, project location, availability of construction management team amongst other delay factors identified.

2.2.5 Construction Delay Factors in USA

Ahmed et al (2003) revealed that the delay factors in construction projects in Florida, USA are building permit approval, change order, change in drawings, incomplete document, change in specification, design development, changes in law and regulation, amongst other identified delay factors.

From the review of extant literature, it can be concluded that each study identified significant delay factors, but there are different sets of construction delay factors for different types of project. Previous

literature has shown that the causes of delay in construction industry varies from country to country, due to different environments and the techniques applied that can affect the cinstructiion processes. Delay factors of construction projects in Nigeria will therefore be different, shaped by cultural, social and administrative factor. The study of Koko et al (2013) is the only study that focused on construction delay factor in school construction project, hence signifying that there is a huge paucity of study/gap in literature on delay factors in school construction projects. Hence the need for this study to fill this gap in literature.

3.0 STUDY AREA

University of Nigeria Nsukka is one of the federal universities of Nigeria located in the South Eastern part of the Nigeria. It has its main campus at Nsukka in Enugu State. It has another campus called University of Nigeria Enugu Campus (UNEC) in the city of Enugu (the capital city of Enugu State) and its teaching hospital called University of Nigeria Teaching Hospital (UNTH) at Ituku/Ozalla near Enugu. It also has a language campus in Aba, Abia State. A law to establish a university in the Eastern Region of Nigeria was passed on May 18, 1955. The University of Nigeria Nsukka was the first full-fledged indigenous and first autonomous university in Nigeria. The university offers 82 undergraduate programs and 211 postgraduate programmes.

The main campus of the University is located on 871 hectares of hilly savannah in the town of Nsukka. Additionally, 209 hectares of arable land are available for an experimental agricultural farm and 207 hectares for staff housing development. The Nsukka campus houses the Faculties of Agriculture, Arts, Biological Sciences, Education, Engineering, Pharmaceutical Sciences, Physical Sciences, Social Science and Veterinary Medicine. The Enugu Campus which is located at the heart of Enugu the capital of Enugu State sits on land size of 200 hectares. The Faculties of Business Administration, Environmental Studies, Health Sciences, Law, and Medical Science are located at the Enugu Campus. The teaching hospital UNTH attached to the University is sited at Ituku-Ozalla on a 500 hectares site. It also hosts the Faculty of Dentistry, and Health Sciences and Technology.

4.0 METHODOLOGY

This study adopted survey research design. This research necessitated field survey for data collection from clients, consultants and contractors of the various projects. Primary data was collected through the use of project delay factors assessment questionnaire structured in likert format developed for data collection administered to the clients, consultant’s and contractors. Structured interview pro forma was developed to interviews some of the study respondents. Projects were visited for direct observation and confirmation of facts from the questionnaire and interviews using a direct observation checklist. Forty one

on-going and abandoned building projects in UNN was studied. The client's representatives, contractors and consultants for the 41 building projects constituted the population of the study. Data obtained from the field survey were collated, summarized and presented with the aid of frequency tables, pie chart and bar char and order descriptive statistics. Hypothesis was tested using Principal Component Analysis, Spearman Rank Order Correlation and Multiple Linear Regression Model at 0.05 level of significance.

5.0 DATA PRESENTATION & ANALYSIS

5.1 Building Project Features

Forty-one on-going and abandoned building projects in UNN (Nsukka and Enugu campuses) were studied. The projects are sponsored by TETFUND, Internal Generated Revenue, Capital Appropriation and Donor Projects. Twenty-eight (28) projects were located in Nsukka Campus while fourteen (14) were located in Enugu Campus. Hence most of the projects were in the main campus, Nsukka. Eleven (11) projects were capital appreciation projects, eleven (11) were TETFund Projects, six (6) were IGR and thirteen (13) were donor projects. All the ongoing and abandoned projects were commenced between 2008 to 2021 except for UNN auditorium which commenced in 1992 and Princess Ukachukwu Social Science Building which commence before 2006. Some of these abandoned projects are serious threat to the University in terms of project abandonment.

5.2 Respondents Profile

The respondents included client's representatives, contractors and consultants for the 41 building projects. Thus, the three key project participants represented each project.

Table 1: Distribution of Questionnaire Amongst the Stakeholders

Targeted No of Questionnaire to be Administered	Questionnaire Administered	Questionnaire Returned
123	114	110

Source: Field Survey and Analysis, 2021

Table 1 shows that 114 questionnaire were administered, out of the 123 targeted, however, Four questionnaire were not returned. The questionnaire were returned by 110 respondents, comprising 40 clients, 36 contractors and 34 consultants.

Table 2: Frequency Distribution of Respondent Academic Qualification

Highest Educational Qualification	Frequency	Percentage (%)
WASC	1	0.9
OND	2	1.8
B.Sc/HND	59	53.6
PG.D/M.SC	46	41.8

Ph.D	2	1.81
Total	110	100

Source: Field Survey and Analysis, 2021

Table 2 reveals that 1.81% of the respondents have attained Ph.D level of education, while those at PG.D/M.Sc level and B.Sc/HND are indicated by 41.8% and 53.6% respectively. This means that majority of the respondents hold B.Sc, HND, PG.D and Master Degree. Thus, the respondents comprise of highly educated individuals and professional capable of independent reasoning and with requisite academic and practical/technical knowledge.

Table 3: Working Experience with the Respondents

Years of Working Experience	**Frequency**	**Percentage (%)**
Less than 5years	54	49.1
6-10 years	32	29.1
11-15 years	15	13.6
16-20 years	6	5.5
Above 20 years	5	2.7
Total	110	100

Source: Field Survey and Analysis, 2021

5.3 Project Delay Factors

Table 4: Means of Responses and Overall Ranking

S/N	**Delay Factor Description**	**Client**	**Contractor**	**Consultants**	**Overall Ranking**
1	Change orders	3.25	3.27	2.65	9
2	Delay in payments	4.25	4.83	4.47	1
3	Corruption tendencies	2.07	2.31	2.29	21
4	Slowness in decision making	2.87	3.86	3.21	7
5	Delay in site delivery	1.95	1.94	2.24	25
6	Lack of capable representative	1.05	1.78	1.65	31
7	Underestimation of cost of project	2.50	2.67	2.32	16
8	Unrealistic imposed contract duration	1.38	1.81	1.47	30
9	Difficulty in financing the project	3.52	4.22	2.74	3
10	Inadequate human resources	2.98	2.75	2.91	12

11	Unreliable sub-contractors	1.83	2.06	1.85	27
12	Poor site management and supervision	3.70	2.97	3.76	4
13	Rework due to errors	2.38	2.75	2.76	14
14	Ineffective planning and scheduling	3.43	2.78	3.35	10
15	Inappropriate construction methods	2.90	2.47	2.97	13
16	Equipment shortage and failure	2.28	2.44	2.15	20
17	Late delivery of materials	3.35	3.83	3.44	2
18	Inadequate contractor experience	1.85	1.25	1.68	29
19	Delay in performing inspection and testing	2.20	2.28	1.94	23
20	Insufficient data collection and survey before design	2.15	2.22	1.82	24
21	Poor communication and coordination among parties	2.38	2.94	2.38	15
22	Poor design	2.50	2.67	2.06	17
23	Delay in assessing/evaluating major changes in scope of work	3.45	3.36	3.03	8
24	Delay in reviewing and approving design changes	3.25	3.25	2.85	11
25	Price fluctuation of construction materials	3.55	3.47	2.88	6
26	Weather condition	2.15	2.19	2.03	22
27	Unfavorable/unforeseen site condition	2.02	2.17	1.94	26
28	Global financial crises	2.57	2.42	2.12	18
29	Government regulations and laws	2.50	2.25	2.12	19
30	Legal disputes between the project participants	1.68	1.39	1.35	32
31	Shortage of construction materials	3.42	3.58	3.06	5
32	Accidents during construction	1.15	1.25	1.09	33
33	Mistakes and discripancies in contract documents	1.93	1.58	1.62	28

Source: Field Survey and Analysis 2021

5.4 Test of Hypothesis

Hypothesis One: Factors that cause delays cannot be significantly identified and classified

Decision Rule: Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (not < 0.6), Barletts test of sphericity should be significant ($p<0.05$) for the factor analysis to be considered appropriate. Determine how many components (factors) to extract (Eigen Value ≥ 1).

Results: PCA result showed KMO index of 0.776, Barletts test of sephericity significant ($p<0.000$), eight (8) components with Eigen Value ≥ 1 extracted.

Table 5: Components/Delay Factor Groups

Delay Factors	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Change order								.512
Delay in payment	.731							
Corruption tendencies		.556						
Slowness in decision making	.544							
Delay in site delivery								.736
Lack of capable representative						.766		
Underestimation of cost of project								
Unrealistic imposed contract duration	.549		.503					
Difficulty in financing the project	.760							
Inadequate human resources		.700						
Unreliable sub-contractor								.583
Poor site management and supervision		.850						
Rework to error								
Ineffective planning and scheduling		.656						
Inappropriate construction methods					.772			
Equipment storage and failure								
Late delivery of materials						.651		
Inadequate contractor experience								

Delay in performing inspection and testing		.498						
Insufficient data collection and survey before design								
Poor communication and coordination among parties								
Poor design					.729			
Delay in assessing/evaluating major changes in scope of work				.915				
Delay in reviewing and approving design changes				.921				
Price fluctuation of construction materials			.630					
Weather condition			.687					
Unfavorable/unforeseen site condition						.541	.499	
Global financial crises			.795					
Government regulations and laws								
Legal disputes between the project participants					-.502			
Shortage of construction materials								
Accidents during construction							.857	
Mistakes and discrepancies in contract documents								
Eigen Value	**9.319**	**3.427**	**2.852**	**2.017**	**1.680**	**1.517**	**1.309**	**1.188**
% of Variance	**28.238**	**10.383**	**8.643**	**6.112**	**6.090**	**4.596**	**3.967**	**3.599**
Cumulative %	**28.238**	**38.621**	**47.264**	**53.376**	**58.466**	**63.062**	**67.029**	**70.628**

Source: SPSS Version 22

Table 5 shows the PCA result which reduced the thirty three (33) variables analysed into eight (8) components. The Eight (8) components extracted and their factors loadings are showed in Table 5. The Eight (8) components contributed 70.6% of the variance. Thus they are very significant. The factor loadings is the expression of correlation between specific observed variables and specific factors or components. Analysis of PCA result in Table 5 showed that beauracracy and financial problems were the greatest cause of for project delays in UNN. It contributed 28.2% of variance from PCA carried out,

whereas total variance of the components loaded is 70.6%. There is slowness in decision making increased by too much bureaucracy in the system. Component 1 has difficulty in financing the project with the highest factor loading of 0.760. This is closely followed by delay in payment (0.731) and slowness in decision making (0.544). The Eigen value for component 1 is 9.319.

Component 2 has poor site management and supervision with highest factor loading of 0.850 and contributed 10.4% of variance with Eigen value of 2.852. Component 3 showed that global financial crises with highest factor loading of 0.795 and contributed 8.643% of variance with Eigen Value of 2.852. Component 4 revealed delay of reviewing and approving design changes as having the highest factor loading of 0.921 and contributed 6.1% with Eigen value of 2.017. Component 5 showed that inappropriate construction methods had highest factor loading of 0.772 and contributed 5.1% of variance with Eigen value of 1.680.poor design had a loading of 0.729.

Component 6 showed that lack of capable representative had highest factor loading of 0.766 and contributed 4.6% of variance with Eigen value of 1.517. Component 7 comprised accidents on site (0.857) and contributed 3.967% of variance with Eigen value of 1.309. Component 8 comprised delay in site delivery (0.736), change order (0.512), unreliable sub-contractor (0.583) and contributed 3.599% of variance with Eigen value of 1.188.

Decision: Null hypothesis one is thus rejected as the delay factor were significantly identified and classified.

Hypothesis Two: The degree of agreement among the clients, contractors and consultants on the ranking of the delay factors is insignificant.

Decision Rule: Significantly positively or negatively correlated with $p<0.05$ significance level

Result: Table 6 shows the correlation result

Table 6: Spearman Correlation Result for Testing Ranking

			Clients	**Contractors**
Spearman's rho	Clients	Correlation Coefficient Sig. (2-tailed) N	1.000 . 33	.912 .000 33
	Contractors	Correlation Coefficient Sig. (2-tailed) N	.912 .000 33	1.000 . 33
	Consultant	Correlation Coefficient Sig. (2-tailed) N	.898 .000 33	.889 .000 33

Source: SPSS Version 22

Decision: Spearman rank correlation coefficient for the ranking of the delay factors were (0.912), (0.898), and (0.889) for clients and contractors; clients and consultants; and contractors and consultants respectively. Thus, there was significant positive relationship in their response ($p<0.05$). the alternate hypothesis that all three parties generally agreed on the rank was accepted.

5.5 Discussion of Findings

The 33 delay factors identified and classified in Table 5, was reduced to Eight (8) factors which are: Bureaucracy and financial problems; corruption tendencies and contractors site mismanagement; weather and economic uncertainties; delayed actions by the consultants; wrong designs and inappropriate construction methods; management and site factors; accidents on site; and clinets influence and sub-contractors problems.

The findings that default in progress payment and financial problems (component 1) including non-access to suitable credit facility as a delay factor in the study area is in consonance with similar findigs in the works of Fugar and Agyakwah-Baah (2010); Manfield et al (1994); and Odeyinka and Yusif (1997). The findings that corruption tendencies (component 2) is as a delay factor in the study area is in consonance with similar findings in the works of Muhwezi et al. (2014). Corruption tendencies encompasses all acts in the course of the projects execution likely to induce or further bribery and corruption. The findings that wrong designs and unforeseen site condition is a delay factor in the study area is consonance with similar findings in the works of Muhwezi et al. (2014); Koko et al (2013); and and Odeyinka and Yusif (1997). Consultants with inadequate building experience, complex nature of the project and non-use of professional builder's expert opinion during the design stage are most likely reasons for wrong designs.

The findings that consultant unnecessary delay in evaluating work done prior to preparing payment certificate is a delay factor is in most of the assessed subject project is in consonance with similar findings in the works Fugar and Agyakwah-Baah (2010); and Koko et al (2013). Recent federal government economic policies such as Treasury Single Account (TSA) led to delays in most project completion. The finding that delay actions by the consultant is a delay factor in the assessed project is in consonance with similar findings in the work of Alagbari et al (2007). The findings of this study that there was significant relationship between the building project completion and the delay factor groups. This delay have great adverse effect of elongating the project duration among adverse effects like costs overruns and great risk of the projects abandonment.

5.6 Summary of Findings

Below are the major findings of this study:

1. Delay factors of the building projects in UNN identified and grouped into Eight (8) components are: Bureaucracy and financial problems; corruption tendencies and contractors site mismanagement; weather and economic uncertainties; delayed actions by the consultants; wrong designs and inappropriate construction methods; management and site factors; accidents on site; and clients influence and sub-contractors problems.
2. Bureaucracy and financial problems are the greatest cause of project delays in UNN. It contributed 28.2% of the variance from PCA carried out, whereas total variance of the components loaded is 70.6%.
3. The top three delay factors were delay in payments, late delivery of materials, and difficulty in financing the project.
4. There was positive relationship in responses of the major stakeholders (clients, contractors and consultants). All three parties generally agreed on the ranks of delay factors
5. TETFund projects are the most likely projects to be completed though not usually according to schedule. Capital projects are more likely to be abandoned.
6. The absence of consultants or long distance of their office from project site affected communication among the parties.
7. A good number of the 2009 UNN NUGA Games projects are still on-going or abandoned.

5.7 Recommendations

Based on the findings of this study, the following recommendations are made:

1. UNN should conceptualize a credible and long term system of increasing its internal generated revenue, to help facilitate the completion of relatively small projects started even with other sources of finance.
2. Consultants should have competent representation on the site to make quick decisions and prepare payments as and when due.
3. The incremental building approach should be adopted to finish up all abandoned projects where it is feasible as long as the need for the project is highly justified.
4. Contract for large projects carried out simultaneously should be spread to as many companies as it will help reduce delay emanating from inadequate building resources.
5. The Department of Physical Planning should always maintain an accurate and up-to-date progress report of the on-going and abandoned projects especially donor projects.

5.8 Conclusion

A sound university system essentially require financial support facilities and infrastructure for excellence in academic activities of learning, teaching and research. The construction industry provides the physical structure needed to sustain the educational sector. Delays occur in almost every building construction project and their magnitude varies considerably from project to project, ranging from a few days to years. The significance of establishing the issues related to the construction project delays will provide a greater insight and understanding on the causes of delay particularly among the main project players: contractor, client, and consultants. Hence all the main project players need to be united in mitigating delay factors in building projects within public tertiary educational institutions.

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