

AN APPRAISAL OF THE MAINTENANCE MANAGEMENT PRACTICES OF HIGH-RISE RESIDENTIAL BUILDINGS IN LAGOS STATE

Victor I. OPARA^{1*}, F.O. Idowu², Anthony A. Hungbo² and Kehinde O. Akinsanya²

¹Department of Quantity Surveying, Lagos State Polytechnic, Ikorodu, Lagos

²Department of Quantity Surveying, Yaba College of Technology, Yaba, Lagos

E-mail: primewaters@yahoo.com (*Corresponding author)

Abstract: An excellent maintenance management is greatly needed to increase the life cycle of the building and to minimize unexpected breakdown or deterioration effects. Therefore, the performance of maintenance management practices has to be continuously reviewed and analyzed in order to ascertain a high quality service. The aim of this research was to appraise the maintenance management practice of high-rise residential buildings in Lagos State. The objectives were to identify the maintenance management practices used in the maintenance of high-rise residential buildings and identify the challenges encountered when undertaking maintenance activities of high-rise buildings. Twenty-eight (28) structured interviews conducted on maintenance managers and facility managers and 122 questionnaires administered on occupants, owners, maintenance managers, facility managers, estate managers as well as public administrators. The data collected were analyzed using measures of frequency and measures of central tendency of descriptive statistical method. The study revealed that most of the respondents carry out one form of maintenance activities or the other. Emergency maintenance ranked 1st with a Relative Significant Index of 0.88 and routine maintenance ranked 2nd with a Relative Significant Index of 0.82, are the mostly practiced in the maintenance of high-rise residential buildings. Accessibility to the building ranked 1st with RSI value of 0.879, as the most Challenge encountered when carrying out maintenance work on high-rise residential buildings. The study recommends that to improve the maintenance practices of residential high-rise buildings, awareness of discernable maintenance culture, consideration for future maintenance requirement and adequate funds should be provided for effective maintenance practices.

Keywords: Building maintenance, high-rise residential buildings, maintenance activities, maintenance management, management practices.

Introduction

Building Maintenance is the process by which a building is kept usable at a predetermined standard for the use and benefit of its occupants or users. The standard may vary according to the function of a building. Maintenance practically begins the day the builder leaves the site. Design, materials, workmanship, function, use and their interrelationships, will determine the amount of maintenance required during the lifetime of a building. High-rise buildings face immediate burden to preserve existing building facilities within the precincts and enhance the

capacity of their high-rise status to address growing demands of an increasing influx of the human populous and her activities. Ofide, Jimoh and Achuen (2017) stated that, there is no doubt that dilapidated and unhealthy buildings in a decaying environment depresses the quality of life and contributes in some measure to antisocial behaviors'. High-rise buildings in most locations in Nigeria only receive top management attention when there is a problem. The purpose of maintaining a building is to preserve it in its initial state, as far as practicable while retaining, where appropriate, its investment value and presenting a good appearance so that it effectively serve its purpose Chanter and Swallow (2007) Lack of proper maintenance can lead to dangerous situations like accidents and health problems. Therefore, an efficient maintenance management will produce a systematic and excellent maintenance management which will increase the operation, productivity and performance of the building whereas improper conduct decreases the performance of level and affect the life cycle of the building. An excellent practice of maintenance management is needed to increase the life cycle of the property and to minimize unexpected breakdowns and deterioration effects. Therefore the aim of this research was to appraise the maintenance management practices of high-rise residential buildings in Lagos State, Nigeria with the view of identifying the most efficient and effective maintenance management practices to be employed in maintenance of high-rise residential buildings. The objectives were to identify the maintenance management practices used in the maintainability of high-rise residential buildings and identify the challenges encountered when undertaking maintenance activities of high-rise buildings. Maintenance management is an orderly and systematic approach to planning, organizing, monitoring and evaluating maintenance activities and their costs (Technical Information Document (TID), 2000). A good maintenance management system coupled with knowledgeable and capable maintenance staff can prevent health and safety problems and environmental damage; yield longer assets life with fewer breakdowns and result in lower operating costs and higher quality of life for the occupants and users (Technical Information Document (TID), 2000). The performance of the maintenance management operations have to be continuously reviewed and analyzed in order to ascertain a high quality service, (Myeda and Nizam,2011) More importantly, the present prohibitive cost of new High-rise buildings has imposed on individuals, corporate bodies and the nation as a whole the need to invest more in maintenance. Though problem may not be lack of funds alone but also inadequate allocation of funds as a result of the general lack of appreciation of the need for maintenance and the low priority accorded it (Odediran, Opatunji and Eghenure, 2012).

Housing maintenance becomes more difficult according to age of the structure and this depends on the quality of the original building coupled with the rate of maintenance of the structure. The condition and quality of buildings reflects public concern or indifference, the level of economic prosperity in an area as well as social values and behavior. Maintenance, in this sense, involves both preventive and corrective work including cyclical repairing, rewiring and servicing of mechanical and electrical equipment, and repair or replacement of defective part of the building. When there is lack of proper planning of maintenance work to be carried out, this can lead to failure of the building elements, or the building itself which can cause damage to life and other properties. According to (Adenuga, Odusami and Faremi 2007) the financial consequences of neglecting maintenance is often not only seen in terms of reduced asset life and premature replacement but also in increased operating cost and waste of related, natural and financial resources. In order to ensure sustainability, maintenance management practice is carried out as detailed in B.S 3811, cited by (Fagbenle, 2014) through the following strategies; Planned Maintenance: It is a proactive approach in which maintenance work is planned, directed, controlled and scheduled to be carried out at pre-determined intervals on various building components and elements to ensure that the building is operating correctly and to therefore avoid any unscheduled breakdown or failure.

Corrective Maintenance: This can be described as the maintenance task carried out after failure of an element or component is detected and isolated and is aimed at restoring an item to a condition in which it can perform its intended function.

Preventive Maintenance: This involves the systematic inspection and servicing of an item in satisfactory operating condition where potential problems are detected and corrected either before they occur or before they develop into major defects in order to prevent failure of such item.

Periodic Maintenance: This is also called time based maintenance. It is the significant tasks carried out regularly (according to predetermined schedule) to maintain the condition or operational status of a building, building components or elements.

Emergency Maintenance: This are maintenance task carried out when a situation requires immediate attention because of failure that could cause significant damage to the building, building components or systems and pose a threat to the life, health, security of the occupants of the building.

Routine Maintenance: simple, small-scale task carried out (usually requiring only minimal skills) for the regular (daily, weekly, monthly, etc) upkeep of a building necessary to prevent normal wear and tear or the failure of critical and non-critical building systems.

In Nigeria, the culture of maintenance is very poor except in emergency situations when it might have become too late and even costly to achieve the desired results (Olanrewaju, Sharafadeen and Ojo 2015) The users do not always make use of the property and the services in good condition, often users do not obey the information contained in the maintenance manual of the building if it exists at all, (Siyanbola, Ogunmakinde and Akinola, 2013). Maintenance work is considered waste of money and time by most property owners, funds are usually directed towards new buildings rather than the upkeep of existing ones. To each resident, it is required to pay service charge with regard to the services given (that is, maintenance of the building). Unfortunately, to collect this fee is no easy task (Olanrewaju, Sharafadeen and Ojo, 2015) (Olarenwaju, 2008) revealed in a study, that there is a huge backlog of building maintenance in Malaysia even though expenditure on maintenance is on the increase. Certainly, the maintenance backlog will continue to increase, as buildings require maintenance to be functional. Buildings require effective maintenance; otherwise they become a burden to clients, users, and the general public. Building maintenance management should be extended beyond the current condition, based on the availability of funds. According to (Yahya and Ibrahim 2012) the fundamental aspect in building management is to develop communication system between maintenance management and building occupants in order to support value aspect in the building. (Clowes, 2000) stated that lack of information is a significant factor that contributes to miscommunication in operation and maintenance processes. According to (Ali, Sun, Petley and Barrett 2002) a lack of knowledge sharing and poor communication between maintenance management teams and building occupants had caused main problems specifically on technical and documentation aspect. As (Lee and Wordsworth, 2000) noted, poor communication between maintenance management group and building occupants is one of the factors that affect working efficiency and is a reason for the relatively low productivity of the building maintenance.

Based on a study determining the problems faced by property managers in managing high-rise condominiums in Malaysia, it was concluded that the most frequent complaints lodged by the tenants were defects not being attended to within the time specified, poor workmanship, and services and facilities not being in good condition even when taking over the building from the developers (Noraziah, 2006). Accessibility plays a vital role in the maintenance of high-rise

buildings, because provision for easy access for the various building elements such as the external wall, roof, lift, basement and services can make maintenance more efficient (Nayanthara, 2013). For instance, some complex shapes of the external façade, embedded services, and insufficient spaces provided may hinder the easy accessibility for the maintenance activities, this in turn increases the maintenance cost by hiring special access system or due to the escalating number of defects created under these circumstances.

As there are different challenges faced by owners, occupants, maintenance management professionals in the maintenance of the buildings, the fundamental aim of building maintenance management remains to enhance the productivity, satisfaction, and efficiency of activities taking place in and around the building, (Lateef 2008). In other words, it is a proactive procedure that is used to achieve efficient maintenance activities in a building by minimizing the expenditure and optimizing the value derived. Therefore, there is need to address the issues of the different maintenance management practices and the challenges inherent in maintenance of high-rise residential buildings in Lagos State, Nigeria.

Methodology

The Simple Random sampling technique was adopted for this research, it is a systematic empirical inquiry used to create sample as per ease of access, readiness to be a part of the sample, availability at a given time slot or any other practical specifications of a particular element. A sample size of 28 high-rise residential buildings from the, Eti-osa, Local government area of Lagos State, Nigeria, was selected out of a population of 86 high-rise residential buildings within the Area. In determining the number of buildings, purposive sampling was used. This is a non-probability sampling procedure which is usually used in qualitative research that has to do with selecting the respondents based on the researcher's knowledge on the appropriateness and typicality of the sample selected (Cohen, Manion and Morrison, 2005). The focus on this Area was based on its commercial/economic status and concentration of high-rise buildings, professionals and good representation of the population. The reliability and validity of the data collected stem from the fact that the tests conducted using Statistical Package for Social Sciences (SPSS 19) showed that, cronbach alpha > 0.6 and the correlation value is $> r$ table respectively, it is concluded that the data is reliable and valid.

Results and Discussion

The data collected for the study was processed using descriptive statistics method; percentages, mean, and Relative Significant Index (RSI) was determined.

Bakhary (2005) gave an equation that was used in determining the Relative Significant Index (RSI)

$$\text{The Relative Important Index is expressed} = \frac{\sum w}{5N} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N}$$

Where, n_1 = Number of respondents who answered the negative option, n_2 = Number of respondents who answered for less negative option, n_3 = Number of respondents who answered for neutral option, n_4 = Number of respondents who answered for less positive option, n_5 = Number of respondents who answered for most positive option, A is the highest weight and N = Number of Respondents. The relative importance index ranges from is 0 to 1 (Tam and Le, 2006)

The demographic features of the respondents as shown on Table 1 reveal that 24.6% of the respondents are home owners, 45.9% are occupants, 13.1% are maintenance managers, 11.5% are facility managers and 4.9% are public administrators. The study also showed that 31.1% are female while 68.9% are male. The years of occupancy/ownership shows that 72.1% are above 5 years. 19.7% of the respondents are builders, 13.1% are estate managers, 4.9% are maintenance managers, 8.2% are civil/structural engineers, 6.6% are services engineers, 13.1% are property managers/developers and other professional backgrounds are 34.4%.

Table 1: The background and demographic features of the respondents

S/N	Demographic Characteristics	Frequency	Percentage	Total %
1	Gender (N = 122)			
	Male	84	68.9	
	Female	38	31.1	
2	Type of Respondent (N = 122)			
	Home Owners	30	24.6	
	Occupants	56	45.9	
	Maintenance Managers	16	13.1	
	Facility Managers	14	11.5	
	Public Administrator	6	4.9	
3	Years of occupancy/Owner (N = 122)			
	Less than 5years	34	28	
	6-10years	54	44	

11-15years	18	15
15-20years	12	10
Above 20years	4	3
4 Professional background (N = 122)		
Business men and women	60	49
Civil servants	17	14
Professionals	45	37

Table 2: Identified maintenance management systems

S/N	Maintenance Management System/Practices	1	2	Total	%	RSI	Rank
1	Planned Maintenance	82	40	122	67.21	0.66	2
2	Corrective Maintenance	11 6	6	122	95.08	0.52	5
3	Preventive Maintenance	76	46	122	62.29	0.69	1
4	Periodic Maintenance	76	46	122	62.29	0.69	1
5	Emergency Maintenance	10 8	14	122	88.52	0.56	3
6	Routine maintenance	11 2	10	122	91.80	0.54	4

Table 2 shows that out of 122 respondents, 62.29% identified that preventive and periodic maintenance is been practiced which ranked 1st with a Relative Significant Index of 0.69. This shows that most of the occupants are knowledgeable about the adequate working conditions of the various building elements; which enable identified problems to be detected and corrected before they occur or before they develop into major defects.

67.21% identified that planned maintenance is been practiced which ranked 2nd with a Relative Significant Index of 0.66 and 88.52% identified that routine maintenance is been practiced which ranked 3rd with a Relative Significant Index of 0.56.

Table 3: Level of usage of the Identified Maintenance Management Practices.

S/ N	Maintenance Management Practices	Level of Usage					Total	RSI	Rank
		1	2	3	4	5			
1	Planned Maintenance	19	24	6	5	7	61	0.46	6
2	Corrective Maintenance	4	3	11	31	12	61	0.74	3

3	Preventive Maintenance	14	23	11	6	7	61	0.50	4
4	Periodic Maintenance	18	15	14	11	3	61	0.49	5
5	Routine maintenance	3	5	5	17	31	61	0.82	2
6	Emergency Maintenance	1	4	4	14	38	61	0.88	1

From Table 3 above, it shows that emergency maintenance was ranked 1st with a Relative Significant Index of 0.88, meaning that emergency maintenance is frequently practiced. This implies that urgency or quick response is usually attached to maintenance related issues here as any deal could lead to damage to the building element or pose threat to life or security of the occupants of the building, it is followed by routine maintenance which was ranked 2nd with a Relative Significant Index of 0.82 and corrective maintenance which ranked 3rd with a Relative Significant Index of 0.74, in the level of usage of maintenance management practices

Table 4: Maintenance Work

S/N	MAINTENANCE WORK	1	2	3	TOTAL	%	RSI	RANK
1	Day to day mopping/Sweeping and cleaning of the building	28	26	68	122	57.73	0.78	1
2	Mechanical cleanup	30	22	70	122	57.38	0.778	1
3	Services cleanup, repair and replacement	46	34	42	122	34.43	0.66	3
4	Elemental (ceiling, door, window, roof, etc) replacement	42	34	46	122	37.70	0.68	2
5	Re-painting	54	24	44	122	35.07	0.64	4
6	All of the above	64	46	12	122	9.84	0.52	5

From table 4 above, it described the nature and types of maintenance works often carried out by users of the residential buildings. The result showed that 122 respondents, 57.73% carried out daily mopping/sweeping and cleaning of the building, 57.38% carried out mechanical clean up, 34.43% carried out services clean up, repair and replacement, 37.7% carried out elemental (ceiling, door, window, roof, etc) replacement, 35.07% carried out repainting and 9.87% showed that they carry out all the maintenance work indicated above.

Table 5: Operational period

S/N	Operational Activities	1	2	3	4	5	TOTAL	RSI	RANK
1	Daily	38	14	6	24	40	122	0.62295	2
2	Weekly	36	6	6	58	16	122	0.619672	3
3	Monthly	30	32	14	30	16	122	0.55082	5

4	Quarterly	26	10	44	24	18	122	0.596721	4
5	Yearly	24	4	24	38	32	122	0.681967	1

From table 5 above, the respondents were also asked how often they carry out maintenance work on the building. Out of 122 respondents, 40 carry out maintenance work daily which ranked 2nd with a relative significant index of 0.623, this shows that the most of the occupants believe in maintaining a clean surrounding, while 16 carry out maintenance work weekly which ranked 3rd with a relative significant index of 0.619, also 16 carry out maintenance work monthly which ranked 5th with a relative significant index of 0.55, another 18 carry out maintenance work quarterly which ranked 4th with a relative significant index of 0.597, and 32 carry out maintenance work yearly which ranked 1st with a relative significant index of 0.682.

Table 6: Level of Responsiveness to Maintenance Work

S/ N	Variables	Level Of Responsiveness				Total	RSI	Rank
		1	2	3	4			
1	Owners	10	56	38	18	122	0.63	4
2	Occupants	2	14	62	44	122	0.80	3
3	Maintenance managers	0	2	56	64	122	0.88	1
4	Estate managers	32	32	42	16	122	0.59	5
5	Facility Managers	2	8	70	42	122	0.81	2

From the table6 above, it was discovered that maintenance managers which ranked 1st with a Relative Significant index of 0.88 which means that they respond to maintenance work very well, this can be attributed to the fact that most of the maintenance managers are usually on duty in the residents, followed by facility managers ranked 2nd with a Relative Significant index of 0.81, followed by occupants which ranked 3rd with a Relative Significant index of 0.80, followed by owners which ranked 4th with a Relative Significant index of 0.63, followed by estate managers which ranked 5th with a Relative Significant index of 0.59.

Table 7: Challenges Encountered When Undertaking Maintenance Work in High-rise Residential Buildings.

S/N	CHALLENGES	1	2	3	4	5	TOTAL	RSI	RANK
1	Lack of discernible maintenance culture	8	4	6	44	60	122	0.836	5
2	Improper management of the facilities	4	18	4	54	42	122	0.784	9

3	Absence of a form of planned maintenance programs	8	4	2	48	60	122	0.843	3
4	Attitude of users towards maintenance and misuse of the building	4	2	2	66	48	122	0.849	2
5	Difficulty in procurement of spare parts due to unavailable funds	6	60	52	88	32	122	0.656	14
6	Lack of communication between users and maintenance managers/personnel	4	6	4	70	38	122	0.816	7
7	Natural deterioration due to age and environment	6	22	18	54	22	122	0.705	12
8	Lack of skilled personnel in maintenance department	8	18	8	66	22	122	0.725	11
9	Lack of skilled manpower to maintain works in buildings designed and constructed by expatriates	10	14	8	68	22	122	0.728	10
10	No long-term arrangements made for the supply of essential parts for replacements	9	32	24	46	14	122	0.649	15
11	Use of poor quality components and materials	4	12	0	50	56	122	0.833	6
12	Complexity of design and non-involvement of maintenance experts during design stage	0	4	18	66	34	122	0.813	7
13	Level of technology, cultural background and environment not been considered	2	4	8	62	46	122	0.839	4
14	Inflation of cost of maintenance by the operatives	16	32	16	40	18	122	0.620	16
15	Frequent shortage of materials and spare parts due to absence of efficient inventory system	6	34	14	44	24	122	0.675	13
16	Lack of consideration for future Maintenance requirement and budget	24	28	20	34	16	122	0.584	17
17	Accessibility to the building	10	0	2	30	80	122	0.879	1

Table 7 showed the challenges encountered when carrying out maintenance work in high-rise residential buildings. Accessibility to the building ranked 1st with RSI value of 0.879, this account for why loss of lives and properties are often recorded, when accessibility to high-rise buildings become difficult during emergency or hazard, Absence of a form of planned maintenance programs ranked 2nd with RSI value of 0.849, Attitude of users towards

maintenance and misuse of the building ranked 3rd with RSI value of 0.843, Frequent shortage of materials and spare parts due to absence of efficient inventory system ranked 4th with RSI value of 0.839, Lack of communication between users and maintenance managers/personnel ranked 5th with RSI value of 0.836.

Table 8: Solutions for the Identified Challenges

S/N	SOLUTIONS	1	2	3	4	5	TOTAL	RSI	RANK
1	Awareness of discernable maintenance culture to users	0	0	0	32	90	122	0.947	1
2	Proper management of the facility	0	18	4	36	64	122	0.839	8
3	Consideration for future maintenance requirement and budget	0	0	0	34	88	122	0.944	2
4	Use of good quality components and materials	0	0	0	38	84	122	0.938	4
5	Availability of planned maintenance programs	0	0	2	32	88	122	0.941	3
6	Involvement of maintenance experts during design stage	2	10	0	50	60	122	0.856	7
7	Good response towards maintenance by users	0	2	2	58	60	122	0.889	6
8	Availability of skilled manpower to maintain works in buildings designed and constructed by expatriates	2	0	0	60	60	122	0.889	6
9	Proper communication between users and maintenance managers/personnel	0	0	0	38	84	122	0.938	4
10	Long-term arrangements made for the supply of essential parts for replacements	0	14	16	42	50	122	0.810	9
11	Consideration towards level of technology, cultural background and environment	0	2	2	48	70	122	0.905	5

Table 8 suggested solutions that that can further improve the maintenance management practices of high-rise residential buildings. Awareness of discernable maintenance culture to users ranked 1st with RSI value of 0.947, Consideration for future maintenance requirement and budget ranked 2nd with RSI value of 0.944, Availability of planned maintenance programs ranked 3rd with RSI value of 0.941, Frequent Use of good quality components and materials

and Proper communication between users and maintenance managers/personnel ranked 4th with RSI value of 0.938, Consideration towards level of technology, cultural background and environment ranked 5th with RSI value of 0.836.

The study revealed that most of the respondents carry out one form of maintenance activities or the other. The findings of this research show that emergency maintenance was ranked 1st with a Relative Significant Index of 0.88, meaning that emergency maintenance is frequently or mostly used or practiced, The finding of this study validates (Olanrewaju, Sharafadeen and Ojo 2015) that in Nigeria, the culture of maintenance is very poor except in emergency situations when it might have become too late and even costly to achieve the desired results. On operational period, carrying out maintenance work yearly which ranked 1st with a relative significant index of 0.682, justifies (Olarenwaju, 2008) who revealed in a study, that there is a huge backlog of building maintenance in Malaysia even though expenditure on maintenance is on the increase. With more number of users carrying out daily maintenance work, the findings of Ofide, Jimoh and Achuen (2017) that stated, there is no doubt that dilapidated and unhealthy buildings in a decaying environment depresses the quality of life and contributes in some measure to antisocial behaviours would be mitigated. On the level of responsiveness to maintenance work, maintenance managers ranked indicating that they respond to maintenance work splendidly as one of the parties involved towards the maintainability of high-rise buildings. This can be attributed to their near or ever presence within high-rise buildings. The most encountered challenge facing the Maintenance managers and the workers was identified as accessibility to the property. This authenticates (Nayanthara, 2013) who stated, that accessibility plays a vital role in the maintenance of high-rise buildings. Loss of lives and properties are often recorded, when accessibility to high-rise buildings become difficult during emergency or hazardous situations. Other challenges include attitude of users towards maintenance and misuse of building, absence of a form of planned maintenance programs. Solutions were, thus proposed in order to mitigate the challenges encountered and to further improve the maintenance management practices of high-rise residential buildings, which includes, Awareness to discernable maintenance culture, consideration for future maintenance requirements and budget, frequent use of good quality components and materials and proper communication between users and maintenance managers/personnel

Conclusion

The overall objectives of this research was to identify and assess the maintenance management practices used in maintainability of high-rise residential buildings in Lagos State and finally to

identify and assess the challenges or problems encountered in the maintenance of the building. This research has given an insight to users, building management professionals, as well as public administrators on the need for maintenance on a building. The study showed that emergency maintenances practices are mostly used and accessibility to the building as the most Challenge encountered when carrying out maintenance work on high-rise residential buildings. Based on the findings of this research, it is recommended that, to improve the maintenance management practices of residential high-rise buildings, awareness of discernable maintenance culture to users, consideration for future maintenance requirement and adequate funds should be provided for effective maintenance practices. Also allocating balanced budgets in every maintenance task, participation of tenants and residents in housing maintenance works, including educating tenants and residents on the need for maintenance should be put in place by the maintenance stakeholders. The maintenance team should ensure that there are precautions to be taken to guaranty quality of materials when they are purchased for maintenance work and also carry out regular inspections of the existing buildings and not to wait until structure needs repairs. They should maintain and repair as urgent as timely any tasks, before further defects occurs. The is a need to develop a standard building maintenance policy to be enforced legally by the appropriate agency, in order to ensure quality, safety and good service of the building and ensure adaption to planned maintenance practice. The implication of this research is that stakeholders in the maintenance practice are now aware of solutions that will be employed to further improve the maintenance management practices of high-rise residential buildings.

This study was limited to Eti-osa Local government area of Lagos State, Nigeria in the South west geopolitical zone of the Country due to its high concentration of high-rise residential and office buildings, further studies can be carried out on other areas of same dwelling concerns.

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