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COMPARATIVE IMPACT OF PROCUREMENT-RELATED CONTRIBUTORS ON COST AND TIME PERFORMANCE OF SUBEB BUILDING PROJECTS IN KADUNA STATE

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ABSTRACT

In construction, numerous factors known as contributors such as procurement processes/ procedures, directions etc that brings about the achievement of client's project objectives have potentials to impact project performance outcomes. Hence, the need through field survey investigates the comparative impact of 20 Procurement Related Contributors (PRC) with 4 sub- groups (project payment, procurement, selection and conditions of contract related factors) impact on the cost and time performance of building projects. Data was collected through 105 questionnaires distributed to construction professionals in State Universal Basic Education Board (SUBEB) building projects in Kaduna State and analyzed using SPSS 22, applying Mean Score (MS), ranking etc. The research discovered that, the respondent's highest response scale for cost is moderate impact = 2.50-3.49 and time is high impact =3.50-4.49 with (50% and 80% overall response for most factors). Additionally, the highest impact factors from the 4 sub-groups are: Payment arrangement motivations to contractor on both cost and time performance (MS = 3.90 and 4.80 respectively). Procurement method type and project responsibilities/contractual obligations to people/organization on cost (MS = 4.08 each) and variation orders in project on time (MS = 4.47). Participation of many decision makers on both cost and time performance (MS = 4.06 and 4.50 respectively). Contract documents coherent with the existing legal framework and contract conditions type on cost and time (MS = 3.65 and 4.20 respectively). It recommended that the highest impact factors should be given more priority compare to others by the construction professionals, in any building construction projects for better cost and time performance.

KEY WORDS: *Building Projects, Cost Performance, Procurement Contributors, SUBEB and Time Performance.*

INTRODUCTION

In the construction industry, the issue of project performance cannot be over emphasized, this is because construction project success is often evaluated for performance dimensions cost and time inclusive. Cost and time are one of the most significant dimensions of construction project performance and the driving force of project success (Babalola et al., 2015; Saraf, 2015 Mohammed, 2016). Soewin and Chinda, (2018);

Mahmoud, (2020); Bekr, (2017). all affirmed that the completion of any project within the estimated cost and time are the basic criteria for the success of any construction project regardless of size and complexity of project. In recent time due to the abnormal increase in the cost and over time of projects, cost and time of construction projects has received the attention of most stakeholders. This is because cost and time are among the major considerations from inception throughout the construction project life cycle. It is however obvious from previous studies (Dissanayaka and Kumaraswamy, 2002; Nyangwara, and Datche, 2015; Mahmoud, 2020; Jiya et al., 2024) that achieving cost and time performance of any construction project, cost and time dimension performance is related to numerous project related contributors such as client, contractor, environmental, procurement, payment related contributors etc impacting on the performance.

The study focused on project related contributors that impact project performance in terms of Procurement Related Contributors (PRC) (Dissanayaka and Kumaraswamy, 2002; Ogunsami, 2023; Jiya et al., 2021). CIOB (2010) supported that, procurement attributes are procurement related contributors absolutely crucial to the performance dimensions. These are the basis for the various processes that bring about the construction of project that meet the client needs known as procurement related factors which contains function attributes as incorporating principal procurement sub-systems and possible choices that are there in. The procurement related contributors include: payment modalities, selection methodologies factors, contract conditions among others Jiya et al. (2024). Procurement related contributors are essential in procurement process and project execution at the end impacting building project performance.

LITERATURE REVIEW

Project performance in the construction industry is the degree of achievement of certain effort or undertaking. It invariably involves placing consideration on the major project's contributory factors in meeting or exceeding stakeholders' needs and expectations within a given period of time, cost, quality, agreed terms among others (Rahman & Alzubi, 2015; Oladinrin, et al., 2013; Manknojiya & Ankitkumar, 2020; Ijigah et al., 2023).

Factors Impacting Project cost and time performance; the Global Perspectives

From literature, it was observed that there is no consensus on the identification of enormous factors known as contributors which impact construction cost and time performance of building projects, basically because researches have widely viewed the subject from diverse perspective to define or determine the performance of construction projects. Amongst several research works which have been conducted to identify project related contributors from diverse perspective on building project performance dimensions include:

The study conducted by Omran et al (2012) to investigate project performance in Sudan construction industry: A case study. The result found out that project availability of time, the size and complexity of projects, the type of project and duration of project, communication among project participants and overall managerial action, adequacy of design and specification, consultants commitment to ensure construction work according to specification, consultant cooperation to solve problems, consultants involvement to monitor the project progress, client

ability to brief the project objectives, the size of client's organization and client's ability to make decision, client's interference during construction, the economic environment, political, social, skillful workers, quality control of materials, enough supply of materials, procurement method, tendering method, project team leader experience, planning effort, budget progress monitoring. The result of a similar study by Saraf (2015) of India construction projects which was aimed to investigate factors affecting performance of construction project. The survey findings indicate that the most important factors affecting project performance are: improper planning, improper designing, site management, decision making, methods, shortage of labor and technical personnel, quality and shortage of materials, construction mistakes and defective work and productivity.

Eriksson and Vennstrom (2012) carried out a similar study to investigate the Effects of procurement on project performance. The result found that Cooperative procurement procedures of joint specification, limited bid invitation, soft evaluation parameters, joint sub-contractor selection, incentives, collaborative tools, contractor self-control and collaboration on project all have various effects on project performance. these factors according to Erickson and Westerberg (2012) shows how various procurement precedence the different procurement related factors at the design, bid invitation, bid evaluation and sub – contracting selection stages, compensation factors that can have various influences on project performance affect different aspects of project performance.

Nyangwara and Datche (2015) in Kenya supported that the most important factors agreed by the owners, consultants and contractors were: average delay because of closures and materials shortage; availability of resources as planned through project duration; leadership skills for project manager; escalation of material prices; availability of personals with high experience and qualification; and quality of equipment and raw materials in project. It was concluded that projects were delayed and the actual cost of projects was more than the estimated cost because of coastal region of Kenya political conditions and delayed payments which results to unavailability of materials.

Study by Mathonsi and Thawal (2012) also carried out a similar study in South Africa. On the selection of procurement systems in the South African construction industry. The result revealed factors such as internal factors (project and client characteristics) and external factors (market competition, information technology, regulatory environment, natural causes and globalization) influence of the project life cycle, expedited project delivery; time, quality and price certainty. Dissanayaka and Kumaraswamy (2002) concluded that significant factors that mainly governed cost and time are contractual payment modalities and project characteristics and client/client representative characteristic.

The Nigerian Perspectives on Factors Impacting Project cost and time performance

In Nigeria, Oladinrin et al. (2013) conducted a study on the effect of the variants of procurement systems common to the Nigerian construction industry on building project performance (cost and quality). The study revealed that the traditional system of procurement is the most adopted option while the design and build system performs better in cost, but lag construction management system in

quality achievement in project execution in Nigeria.

The study conducted by Idiake, et al. (2015) on a comparative analysis of traditional and design and build methods of procurement in the Nigeria construction industry. Revealed that in terms of performance, design and build procurement method was discovered to perform better in terms of cost and time than the traditional method implying that projects under the design and build procurement methods usually completed within he estimated contract sum and duration and lower level of cost and time overrun are conceded.

Ogunsanmi (2013a) on the Effects of procurement related factors on construction project performance in Nigeria, shows that variation order factors strongly affect project performance causing time, cost overruns. Ogunsanmi (2013b) also conducted a similar study to investigate the correlates of procurement performance of traditional and labour-only methods in Nigeria. The result shows that procurement challenges in both methods affect their unit cost, build time and total time and may be expensive to use both methods. Performances of both methods do not depend on contractual procedure, and designer's experience but that of Traditional method can be influenced by building type and final contract on performance.

Cost and Time Performance of Construction Projects

On project cost and time performance, the studies reviewed both locally and internationally, time and cost are more obvious interdependent variables of performance (Yeung et al., 2013). Project cost and time are one of the most important criteria of success of project and is of high concern to those who are involved in the construction industry. However, studies show that rarely projects are complete within stipulated budget and stipulated time (Saraf, 2015; Majeed et al., 2020).

Although different Procurement Related Contributors (PRC) on specific projects performance dimensions are identified by literature both locally and internationally. Project performance cannot be achieved by considering specific performance dimension against the attributes of a particular PRC sub- factor alone but a need for a holistic PRC impact on projects cost and time performance. This study therefore, recast and focused on only twenty (20) PRC which are further grouped into four (4) sub- factors and relate to SUBEB building projects cost and time performance.

The Procurement Related Contributors (PRC) Impacting Project Cost and Time Performance are subsequently presented in Table 1:

Table 1. PRC Impacting Building Project Cost and Time Performance

PRC	Sub- Factor's description	Source
Project payment method factors	Type of Payment arrangement	Dissanayaka and Kumaraswamy (2002), Nyangwara and Datche (2015), Ogunsanmi (2013a), Jiya et al. (2021), Jiya et al. (2024)
	Payment arrangement motivations to contractor	Olubunmi and Ayo (2013), Mahamid (2016), Jiya et al. (2021)
	Payments in an efficient manner by the client	Jiya et al. (2021), Olubunmi and Ayo (2013),
	Payments in an economic manner by the client.	Dissanayaka and Kumaraswamy (2002), (Babalola et al. (2015), Jiya et al. (2021)
Project procurement method factors	Procurement method type	Dissanayaka and Kumaraswamy (2002) Ogunsanmi (2013a), Jiya et al. (2021), Jiya et al. (2024). Adeyemi and Kashiwagi (2014)
	Project structure and elements identification	Jiya et al. (2021)
	Appropriate project processes and procedure	Eriksson and Vennstrom (2012), Jiya et al. (2021)
	Project responsibilities and contractual obligations to people and organizations	Rashid et al. (2006), Jiya et al. (2021)
	Project work co-ordination	Jiya et al. (2021)
	Contract award price and time	Jiya et al. (2021)
	Variation orders in project	Jeptepkeny (2015), Ogunsanmi (2013a) Jiya et al., 2021, Saraf, 2015, Manknojiya & Ankitkumar (2020)
Selection method related factors	Selection method type	Dissanayaka and Kumaraswamy (2002) Mathonsi and Thawal (2012) Ogunsanmi (2013a) Jeptepkeny (2015) Jiya et al. (2021), Jiya et al. (2024), Ajayi. (2010)
	Participation of many decision makers	Jiya et al. (2021)
	Consideration of a wide range of necessary and sufficient decision criteria	Jiya et al. (2021)
	Early consideration of selection method of the project	Jeptepkeny (2015), Ogunsanmi (2013a), Jiya et al. (2021)
Project conditions of contract related factors	Contract conditions type	Dissanayaka and Kumaraswamy (2002) Jiya et al. (2021), Jiya et al. (2024), Kareemt et al. (2024), RIBA (2018)
	Legal obligations, roles and responsibilities between parties	Akanni et al (20 15), Jiya et al. (2021)
	Amended contract conditions clauses to client's advantage sue for the project	Jiya et al. (2021)
	Contract documents coherent with the existing legal framework	Jiya et al. (2021)
	Contract documents reduce uncertainties, disputes and interference	Jiya et al. (2021)

METHODOLOGY

Research Design

The research adopted a quantitative, survey approach and primary data were collected by means of 105 questionnaires, returned and 98 found appropriate for analysis. The questionnaires based on projects were administered to the professionals (Quantity surveyors, Architects, Engineers, builders) in State Universal Basic Education Board (SUBEB) and Government Agencies who have handled SUBEB building projects across the 23 LGAs in Kaduna State. Purposive sampling selection of well reputable and experienced construction professionals and completed building projects were made within the study area.

Data Collection Techniques

Based on a Five (5) -point Likert scale. The scale was on the frequencies 1 to 5 with 1 = very low impact and 5 = very high impact was employed to establish the perception of the respondents on the extent to which twenty (20) PRC with four (4) sub-groups impact on building projects cost and time performance. The Data collected by self-administered questionnaires with the assistant of two other professionals were analyzed using descriptive statistical methods in SPSS; mean scores and rank were obtained.

The study interpretation for the Mean Score (MS) values for the research questions in which $1.00 \geq MS \leq 1.49$ very low impact., $1.50 \geq MS \leq 2.49$ means low impact, $2.50 \geq MS \leq 3.49$ means moderate impact, $3.50 \geq MS \leq 4.49$ means high impact and $4.50 \geq MS \leq 5.00$ means very high impact was used. The decision rule: if the mean score is 3.0 and above the item would be regarded as, has impact but would be regarded as low impact if the mean score falls below 3.0

RESULTS AND DISCUSSIONS

The results of the descriptive statistical assessment are subsequently presented in tables: 2- 6.

Respondents Background Information

The respondents and projects profile are subsequently presented in Table 2:

Table 2: Respondents and projects profile

	Category	Frequency	Percentage
i	Years of working experience		
	1- 5years	8	19.5
	6-10years	10	24.4
	11-15years	16	39.0
	16-above	7	17.1
	Total	41	100.0
ii	Project executed within the research scope		
	1- 10	13	13.27
	11-20	17	17.35
	21- 30	22	22.45
	31- 40	30	30.61
	>40	16	16.32
	Total	98	100.0

Table 2 (i -ii) above shows that 41 professionals that responded to the questionnaire with 11 – 15 years of working experience (39%) and have executed 31 – 40 number of projects, representing 30.61% of the 98 projects used within the research.

PRC Comparative Score for Cost and Time Performance

The comparative scores on the extent to which 20 procurement related contributors with 4 sub-groups impact cost and time performance of building projects were measured using a five Likert scale is subsequently presented in fig 1 and Table 3-6.

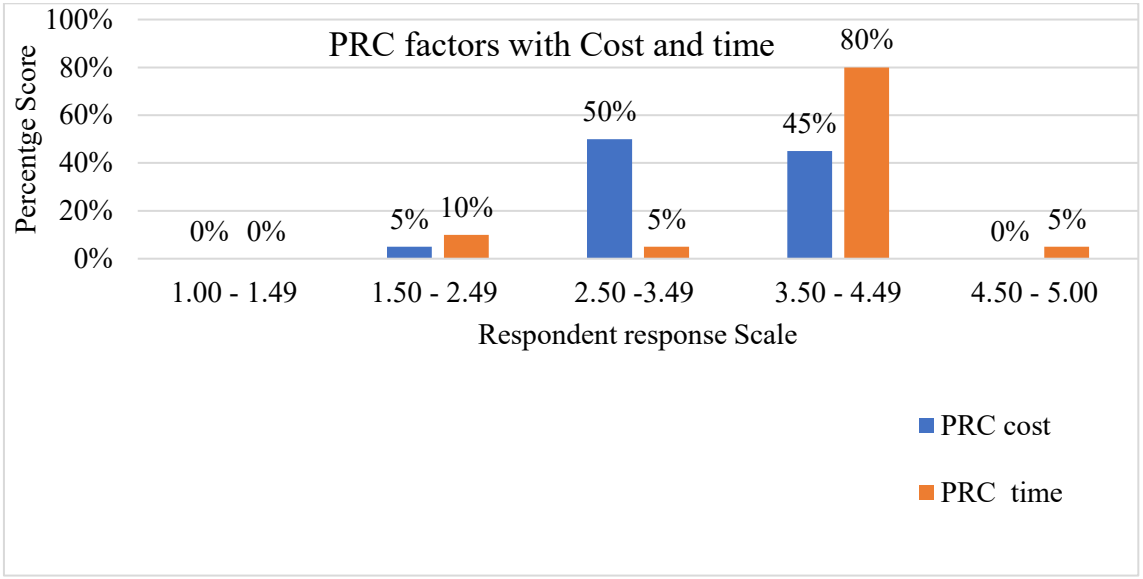

Fig.1: Scale score of PRC factors with cost and time

It is notable from Fig.1 that the majority of respondents scored PRC factors impact on cost and time between scale 2.50-3.49 and 3.50-4.49 with percentage scores = 50% and 80%, respectively), reinforcing the validity and consensus of the results. Scale 1.00-1.49 is the least respondent response scale for both PRC on cost and time with 0% each. Meaning that, the high percentage response scale which is not less the 50% fall within the 'moderate to high impact' range for most factors (scale 2.50–4.49), and the consistency between cost and time responses underlines the reliability of the assessment.

Table 3: Project payment method factors impact on cost and time performance

S/N	Project payment method Factors	PRC Mean score (Cost)	Rank	PRC Mean score (Time)	Rank	Decision	
						Cost	**Time**
1	Type of Payment arrangement	2.37	4	4.02	2	Low impact	High impact
2	Payment arrangement motivations to contractor	3.90	1	4.08	1	High impact	High impact
3	Payments in an efficient manner by the client	3.29	2	2.12	4	Moderate impact	Low impact
4	Payments in an economic manner by the client.	2.78	3	3.96	3	Moderate impact	High impact
	Average mean score (AMS)	**3.17**		**3.55**		**Moderate impact**	**High impact**

The results reveal that, payment arrangement motivations to contractor indicate high impact on both cost and time performance, with mean score of 3.90 and 4.80 respectively. Jiya et al. (2021) supported this, emphasizing project payment motivations to contractor as a critical factor to achieving both project cost and time performance. But interestingly, type of payment arrangement and payments in an efficient manner by the client was associated with the lowest impact on cost and time (with mean scores = 2.37 and 2.12 respectively). On the contrary Babalola et al. (2015) mentioned that, contractors' progress payment should be made on time during construction to avoid negative performance outcomes. This suggests that while the overall structure of how payments are arranged to contractor is critical for controlling cost and time, type of payment arrangement on the cost of project execution may be relatively limited as while as payments in an efficient manner by the client to contractor on the duration of project execution may be relatively limited compared to other factors. On Average Mean Score (AMS), project payment method factors exert a moderate to high impact on cost and time performance (with AMS of 3.17 and 3.55 respectively). Also, the responses were not consistent with one another on cost and time individually. However, as shown by the average mean scores, both values are not less than 3.00, meaning the factors have impact on both cost and time performance

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Table 4: Project procurement method factors impact on cost and time performance

S/N	Project procurement method Factors	PRC Mean score (Cost)	Rank	PRC Mean score (Time)	Rank	Decision	
						Cost	**Time**
1.	Procurement method type	4.08	1	4.12	3	High impact	High impact
2	Project structure and elements identification	3.65	5	4.02	5	High impact	High impact
3	Appropriate project processes and procedure	3.53	6	4.37	2	High impact	High impact
4	Project responsibilities and contractual obligations to people and organizations	4.08	1	4.06	4	High impact	High impact
5	Project work co-ordination	3.80	3	4.02	5	High impact	High impact
6	Contract award price and time	3.69	4	3.53	7	High impact	High impact
7.	Variation orders in project	3.06	7	4.47	1	Moderate impact,	High impact
	Average mean score (AMS)	**3.70**		**4.08**		**High impact**	**High impact**

It can be seen from Table 4 that project procurement method factors were deemed generally high impact for both cost and time performance by the respondents. This implies that the procurement method factors are all crucial for achieving project cost and time performance which Dissanayaka and Kumaraswamy (2002); Mathonsi and Thawala (2012) highlights as essential for achieving effective project performance. On the Average Mean Score (AMS), project procurement method factors exert high impact on both cost and time performance (with AMS = 3.70 and 4.08 respectively). Also, the responses were consistent with one another, as shown by the average mean scores of not less than 3.00, meaning the factors have high impact on both cost and time performance.

Table 5: Tender (Selection) factors on cost and time performance

S/N	Tender (Selection) Method Factors	PRC Mean score (Cost)	Rank	PRC Mean score (Time)	Rank	Decision	
						Cost	**Time**
1	Selection method type	3.19	2	4.20	2	Moderate impact	High impact
2	Participation of many decision makers	4.06	1	4.50	1	High impact	Very high impact
3	Consideration of a wide range of necessary and sufficient decision criteria	2.53	4	4.01	3	Moderate impact	High impact
4	Early consideration of selection method of the project	2.69	3	3.82	4	Moderate impact	High impact
	Average mean score (AMS)	**3.12**		**4.13**		**Moderate impact**	**High impact**

From Table 5 participation of many decision makers indicates high impact on both cost and time performance, with mean score of 4.06 and 4.50 respectively. Eriksson and Westerberg (2012); Ogunsanmi (2013a) supported this, emphasizng the different selecting method factors crucial project performance, moreover, involvement of many decision makers as a critical process and can affect project performance at the different stages of construction work. But interestingly, the consideration of a wide range of necessary and sufficient decision criteria and early consideration of selection method of the project were associated with the lowest impact on cost (with mean scores of 2.53 and 2.69 respectively). This suggests that while the other factors in the overall structure of how project selection method factors are critical for controlling cost and time, consideration of a wide range of necessary/sufficient decision criteria and early consideration of selection method of the project on the cost of project execution may be relatively limited. Thus, it is important that these factors be taken into logical consideration in projects execution and tailored to reach project objectives, hence, a need for proper and effective procurement process On the Average Mean Score (AMS), selection method factors exert a moderate to high impact on cost and time performance (with AMS = 3.12 and 4.13 respectively). Also, the responses were not consistent with one another on cost and time individually. However, as shown by the average mean scores, both values are not less than 3.00, meaning the factors have impact on both cost and time performance.

Table 6: Project conditions of contract factors impact on cost and time performance

S/N	Project conditions of contract Factors	PRC Mean score (Cost)	Rank	PRC Mean score (Time)	Rank	Decision	
						Cost	**Time**
1	Contract conditions type	3.43	3	4.20	1	Moderate impact	High impact
2.	Legal obligations, roles and responsibilities between parties	3.46	2	3.96	2	Moderate impact	High impact
3	Amended contract conditions clauses to client's advantage sue for the project.	2.90	5	2.71	4	Moderate impact	Moderate impact
4	Contract documents coherent with the existing legal framework.	3.65	1	3.96	2	High impact	High impact
5.	Contract documents reduce uncertainties, disputes and interference	3.24	4	2.49	5	Moderate impact	Low impact
	Average mean score (AMS)	**3.34**		**3.46**		**Moderate impact**	**Moderate impact**

Result in Table 6 shows that, contract documents coherent with the existing legal framework factor and contract conditions type, indicates high impact on cost and time performance, with mean scores =3.65 and 4.20 respectively. This is supported by

Rijn (2005) Royal Institute of British Architects (RIBA) (2018) who emphasizes that project performance achievement relies on project specific conditions of contract coherent guidelines in any construction scenario. But interestingly, contract documents reduce uncertainties, disputes and interference was associated with the lowest impact on time (with mean score = 2.49). This suggests that while the other factors in the overall structure of how project conditions of contract factors are critical for controlling cost and time, contract documents reduce uncertainties, disputes and interference may be relatively limited for controlling time. On the Average Mean Score (AMS), project conditions of contract factors impact of generally exert moderate impact on both project cost and time performance (with AMS = 3.34 and 3.46 respectively). Also, the responses were consistent with one another on cost and time individually. However, as shown by the average mean scores, both values are not less than 3.00, meaning the factors have impact on both cost and time performance. On the Average Mean Score (AMS), impact of project conditions of contract factors on cost and time performance (with AMS = 3.12 and 4.13 respectively). Also, the responses were not consistent with one another on cost and time individually. However, as shown by the average mean scores, both values are not less than 3.00, meaning the factors have impact on both cost and time performance.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study established that:

1. Project performance is dependent on the impact of numerous factors known as contributors in any building construction project.
2. Some contributors were identified as the topmost factors from the PRC (4 sub-groups) impacting SUBEB building projects. These are: payment arrangement motivations to contractor on both cost and time performance, procurement method type and project responsibilities/contractual obligations to people/organization on cost and variation orders in project on time, participation of many decision makers impact on both cost and time performance, and contract documents coherent with the existing legal framework on both cost and time performance.
3. The study came to the conclusion that payment arrangement motivations to contractor, procurement method type, project responsibilities/contractual obligations to people/organization, variation orders, participation of many decision makers and contract documents coherent with the existing legal framework are all crucial in the execution of any building project for controlling and determining better building project cost and time performance.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. The consideration of the numerous factors impacts on building project performance to be appropriate, the building construction professionals and the construction industry should be guided by the main contributors and sub- factors
2. The topmost impact procurement related contributors: payment arrangement motivations to contractor, procurement method type, project

responsibilities/contractual obligations to people/organization, variation orders, participation of many decision makers and contract documents coherent with the existing legal framework should be given more priority compare to other factors by construction professionals in building project execution to improving project cost and time performance.

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