

PERCEPTION OF THE EFFECTS OF DELAY IN CONSTRUCTION PROJECTS: A CASE OF GAUTENG

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Abstract

Construction industry globally is bemoaned by project delays despite the importance of the industry in most of the countries. In context of this sentiment this study examined the causes of construction project delays, the effects of construction projects delays, and strategies to improve construction projects delivery. A quantitative research methodology was used. Questionnaire was developed from literature review. A total of 76 conveniently sampled respondents were sent the questionnaires. Forty two useable questionnaires were returned representing response rate of 55.26%. The respondents were concentrated in Gauteng province in South Africa. The questionnaire consisted of twenty two factors defining causes of construction project delay, six factors related to effects of delays and ten proposed strategies to improve project delivery. The statistical parameters used were mean score and percentage and were computed using excel statistical method. The findings indicated that the most common causes of delay reported were improper planning, poor site management and supervision, poor communication, skills shortages and corruption. The most common effects of delay were cost overrun, time overrun, disputes, litigation and total abandonment. Lastly the five highest strategies to improve project delivery established were complete and proper design at the right time, site management and supervision, proper material procurement, clear information and proper communication channels and frequent co-ordination between the parties. The study suggested that the construction companies should concentrate on the strategies in order to stifle project delay. A model to reduce or prevent delays from occurring on construction projects is advocated.

Key words: Construction Industry, Delay, Effects, South Africa

Introduction

The South African construction industry underpins economic growth and social development. It is the construction industry that creates and maintains these facilities in the built environment. Furthermore the built environment reflects a nation's developmental progress, as well as the physical foundation for economic and social advance into the future (Construction Industry Development Board 2004). However, according to Mail & Guardian (16th November 2012), the Gauteng department of infrastructure development has struggled to deliver quality infrastructure on time and within budget. Turner et al., (2009) indicates that delay of projects is one of the common problems in the construction industry. According to Aibinu and Jagboro, (2002) delay is a situation when the contractor and the project owner jointly or severally contribute to the non-completion of the project within the original or the stipulated or agreed contract period. In context to this definition delays will lead to the late delivery of construction projects, hence client dissatisfaction. Hence, this study will investigate the causes of project delay in construction projects in Gauteng in South Africa.

Problem Statement

Despite the importance of the construction industry highlighted, the challenge in the form of delay bemoans the importance and vital position the construction industry plays in South African economy. Construction projects fail to be delivered within the required time, cost and quality leading to disgruntlement of the parties involved in construction projects namely the clients, consultants and contractors. In order to investigate the problem stated, specific research objectives were posited, namely:

- To determine the causes of delay in construction projects;

- To determine the effects of delay encountered in construction projects; and
- To determine the strategies for improving projects delivery without delay.

Literature Review

Types of delays

According to Ahmed et al. (n.d) delays can be grouped in the following four broad categories according to how they operate contractually:

- Non-excusable delays;
- Excusable non-compensable delays;
- Excusable compensable delays; and
- Concurrent delays.

Non-excusable Delays

Non-excusable delays are delays, which the contractor either causes or assumes the risk for. These delays might be the results of underestimates of productivity, inadequate scheduling or mismanagement, construction mistakes, weather, equipment breakdowns, staffing problems, or mere bad luck. Such delays are inherently the contractor's responsibility and no relief is allowed. These delays are within the control of the contractor or are foreseeable; however, it is not necessary that they be both (Ahmed et al., n.d).

Non-compensable Excusable Delays

When a delay is caused by factors that are not foreseeable, beyond the contractor's reasonable control and not attributable to the contractor's fault or negligence, it may be "excusable". This term has the implied meaning that neither party is at fault under the terms of the contract and has agreed to share the risk and consequences when excusable events occur. The contractor will not receive compensation for the cost of delay, but he will be entitled for an additional time to complete his work and is relieved from any contractually imposed liquidated damages for the period of delay. Example typically includes acts of God, unusual weather, strikes, and fires (Ahmed et al., n.d).

Compensable Excusable Delays

Excusable, compensable delays are classified as "Owner Responsible Delays," or an "ORD". An ORD, in addition to granting time extension, warrant monetary compensation to the contractor for extra costs incurred – commonly referred to as delay damages. Generally, compensable delays constitute a delaying event that is within the control of, is the fault of, or is due to the negligence of the owner. A compensable delay occurs when (1) the delay is caused by the owner or someone within the owner's control, (2) the delays results in actual monetary damages to the contractor, and (3) the contractor has not assumed risk to delay through a "No Damages for Delay" clause. If such a clause should exist in a contract, the contractor is entitled to seek time extension for owner-caused delays, but not compensation (Arcuri and Hildreth, 2007). The usual equitable adjustment clauses in owner issued contracts that apply to delay are:

- Changes;
- Differing Site Conditions; and
- Suspension.

Changes

When a contractor takes on any type of work that deviates from the original contract, or from the scope of work or plan of action reasonably anticipated under the contract, that results in an increase in performance time, the contractor may seek an adjustment. Before determining the impact of the change on the schedule, the change must be identified as truly being a change from the original contract or merely a situation that should have been anticipated by the terms of the original agreement (Bramble et al., 1990). These changes may have a direct impact on the schedule, as where a change in method requires a greater or lesser period of performance or its effects may be subtler, as where the change merely re arranges priorities. In addition to a time extension, the contract's clause provides compensation for any delay resulting from a contract change by allowing an equitable adjustment for the increased cost of the performance of the work caused by the change (Ahmed et al., n.d)

Differing Site Conditions

The portion of the clause addressing cost or time adjustments for 'differing site conditions' provides: If such conditions do differ in material and thus cause an increase or decrease in the Contractor's cost or time required for performance of the work, an equitable adjustment will be made pursuant to the general condition titled "Changes". No claim of the contractor under this clause will be allowed unless the contractor has given the required notice. The main intention is to leave the contractor neither damaged nor enriched because of the resultant delay. The differing site conditions clause must not be confused with the site conditions clause in owner issued contracts - the so-called "Exculpatory" clause. Its intent is to disallow any claims for delays relating to conditions at the site, which the contractor should have anticipated. The exceptions are limited to those conditions defined in the differing site conditions clause (Ahmed et al., n.d).

Suspension

A suspension of work is a written directive by the owner to stop all work on the project, either because the contractor has failed to perform in accordance with contract documents, or at the owner's convenience (Wickwire et al., 2003). Work will not continue until the owner has raised the suspension of work. A cost and time adjustment shall be made for any suspension of work ordered by the owner, as long as the contractor was not responsible for the suspension of work. As opposed to a pure delay, when an owner issues a suspension of work, the contractor is also entitled to equitable adjustment for profit (Wickwire et al., 2003).

Concurrent Delays

Concurrent delays occur when both owner and the contractor are responsible for the delay. Generally, if the delays are inextricably intertwined, neither the contractor can be held responsible for the delay (forced to accelerate, or be liable for liquidated damages) nor can he recover the delay damages from the owner. Until the development of Critical Path Method (CPM) schedule analysis, there was no reliable method to differentiate the impact of contractor caused delays from owner-caused delays. With the sophisticated computerized techniques now available, however, it has become possible to segregate the impacts of apparently concurrent owner and contractor delays in analyzing a delay claim; an analysis based on a comparison of the contractor's approved CPM schedule with the as-built CPM schedule should be performed to apportion proper responsibility for delay. Because the critical path may shift as the job progresses, it is updated based upon contractually required input from the contractor (Ahmed et al., n.d). Delays can quickly consume the time in your schedule, and it is important to understand the net effect of those delays:

- Non-excusable: the construction company gets no time or money;
- Excusable: the construction company gets time, but no money; and
- Compensable: the construction company gets time and money stakeholders, blacklist by authorities, waste of money and time and declination of reputation. (Ahmed et al., n.d).

Causes of delays

In Malaysia Sambasivan and Soon, (2007) identified five most common causes of delays as perceived by clients: contractor's improper planning, contractor's site management, inadequate contractors experience, labour supply problems, subcontractors' problem. In addition there were five most important causes of delays perceived by consultants: contractors' improper planning, contractor's site management, shortage in materials, inadequate contractors experience, inadequate client's finance and payment of completed work. Moreover there were five most important causes of delay perceived by consultants: contractor's poor site management, inadequate clients finance and payments of completed work, subcontractors, inadequate contractors' expertise, equipment availabilities and failures.

However, Tumi, Omran and Pakir, (2009) identified 43 causes of delays in Libyan construction industry, the five most common causes were: Improper planning, lack of effective communication, design errors, shortage of supply of materials, and slow decision making. According to Niazai and Gidado, (n.d) they identified ten causes of delay in Afghanistan by clients, contractors and consultants. The five most common causes of delay perceived by client were: poor qualification of contractor's technical staff, difficulty in financing project by contractor, poor communication and coordination by contractor with other parties. In addition, the five most common causes of delay perceived by contractors were: security, delay in progress payments by owner, corruption, suspension of work by owner, inadequate design team experience. Moreover there were five most causes perceived by consultants: poor qualification of contractors' technical staff, type of project bidding and award, poor site management and supervision by contractor, and corruption.

In the same line Wong and Vimonsatit, (2012) identified 48 causes of delay in Western Australia. The five most common causes perceived by clients were: skills shortage, design errors made by designers, slow delivery of materials, poor site management, and underestimation of time of completion. In addition the five most common

causes perceived by contractors were: financial difficulties, low speed of decision making, skills shortages, design errors made by designers, and unforeseen ground conditions. Moreover the five most common causes of delay perceived by consultants were: changes in specification during construction, financial difficulties, skills shortages, Shortage of labour, and unrealistic deadline for completion. According to Ahmed, Azhar and Castillo, (n.d) in United States of America: Florida causes of delays were categorized as follows: acts of god, design related, construction related, financial or economical, management or administrative, and code related. In the same line Alwi and Hampson, (2003) in Indonesia categorized causes of delay in the following manner: people, professional management, design and documentation, materials, execution, and external. Porroustam and Ismail, (2011) identified 27 causes of delays in Iranian construction projects. The five most common causes of delays as perceived by consultants were: poor site management, ineffective planning and scheduling of project by contractor, financial difficulties by contractor, late in reviewing and approving design documents by client, change orders by client during construction. Moreover there were five most causes of delays as perceived by contractor: poor site management, delay in progress payments by client, change orders by client during construction, delays in producing design documents, slowness in decision making process by client.

Table 1: Common causes of delay

Causes	Description
Improper planning	Contractors appoint Project Managers who are expected to draw up workable project plans and modalities for their implementation. A faulty plan will lead to delay in project completion. Most Local Contractors rarely have practicable work programs at the initial stage of project planning. Lack of appropriate work programs impairs monitoring of project progress against the stipulated time.
Poor site management	Contractor's employees that are not skilled in project management are not able to manage their project site appropriately, thus, culminating in faulty work, reworks and delay in completion of tasks.
Inadequate contractors experience	A contractor who does not possess requisite experience usually makes construction errors. These errors lead to rework and delays in activities.
Labour supply problems	Employment of unskilled personnel at the project sites impedes execution of work to specification and leads to error or mistakes during construction. Time is then spent on alterations and corrections.
Difficulty in financing project	Funds are not adequately released during relevant phases of projects' execution. Milestones payments are not made on time due to organizational lapses or bureaucracy. Inadequate cash flow leads to delay in delivery of materials and equipment to the site and delay in payment of workers' salaries.

Continued Table 1: Common causes of delay

Causes	Description
Subcontractor problem	Some aspects of construction works are subcontracted to nominated specialised subcontractors. These subcontractors must be properly coordinated by the Prime contractor to ensure timely delivery of assigned aspects of works. Contractors must therefore ensure that each subcontractor delivers at the stipulated time expected and to specifications.
Poor communication	Poor or inadequate communication between parties leads to misunderstanding and misrepresentation of facts. This could breed conflicts and consequently hinders smooth progress of activities.
Design errors made by designers	Improper design stalls project execution because of the time it takes for such design to be reviewed, amended and accepted for construction works. When errors are observed in

	the design, works are temporary suspended until such errors are removed. This is predominant in organisations where selection processes of vendors are compromised.
Underestimation of time of completion	This could be caused by wrong packaging of the contract document, political interference or inexperienced client's staff. Where the stated completion duration is impracticable, the onus lies on the stakeholders to review the initial expected completion time and make amends where necessary.
Delay in progress payments by owner.	This happens when agreed milestones for payment are not followed or when there is no cash flow projection in the project implementation plan. For Public sector projects, a delay in passage of the year's appropriation bill by the National Assembly could lead to delay in payment to Contractors and Consultants.
Low speed of decision making	Clients are the project Owners. When they do not make decisions on time regarding project matters, they slow down activities at the project sites. Slow decision making could be caused by an organization's internal bureaucracy or wrong channels of communication.
Acts of god	There are areas that usually experience natural disasters such as floods. These disasters are generally unpredictable. However, well established project management organisations possess requisite skills to manage natural disasters.

Data source: Cited by Sunjka and Jacob, (2013)

Effects of delays in construction projects

In Malaysia Sambasivan and Soon, (2007) identified the effects of delays perceived by clients to be as follows: time overruns cost overrun, disputes, arbitration, litigation, and total abandonment. The effects perceived by contractors and consultants are the same as those perceived by clients. In addition Tumi et al., (2009) identified the following impacts of delays in Libya: loss of interest by stakeholders, blacklist by authorities, waste of money and time, and declination of reputation. Haseeb et al., (2011) identified effects of delays in Pakistan construction industry as clash, claims, total desertion and slowing down the growth of the construction sector. Ramabodu and Verster, (2010) identified critical factors that cause cost overruns in construction projects as changes in scope of work on site, incomplete design at the time of tender, contractual claims (extension of time with cost), lack of cost planning and monitoring of funds, delays in costing variations and additional works. Kikwasi, (2012) identified effects of delay in Tanzania as time overrun, cost overrun, negative social impact, resources being idle, disputes, arbitration, delaying by the client to return the loans, poor quality of work due to hurry, delaying in getting profit by clients, bankruptcy, litigation, create stress on contractors and acceleration losses.

Time Overrun

When the stipulated completion time is pushed forward, the project is said to have experienced time overrun. Factors such as inadequate planning by the contractors, improper site management by the contractors, inadequate project handling experience of contractors, and delay in the payments for the work completed directly affect the completion of the project and cause time overrun (Sambasivan and Soon, 2007).

Cost Overrun

When a project is completed at a cost higher than what was budgeted, it is said to experience a cost overrun. Factors such as change orders (changes in the deliverables and requirements) and mistakes and discrepancies in the contract document result in cost overrun. Mistakes and discrepancies in the contract document can be in scope, deliverables, resources available and allocated, payment terms, achievement of various milestones, and the project duration. In most of the instances, time overrun leads to cost (Sambasivan and Soon, 2007).

Disputes

Factors such as delay in the payments for completed work, frequent owner interference, changing requirements, lack of communication between the various parties, problems with neighbours, and unforeseen site conditions give rise to disputes between the various parties. The disputes, if not resolved amicably, can lead to arbitration or litigation (Sambasivan and Soon, 2007).

Arbitration

Disputes can be settled by the arbitration process. A competent third-party can settle the disputes amicably without going to the court (Sambasivan and Soon, 2007).

Litigation

Disputes can be settled by the litigation process. The parties involved in the projects use litigation as a last resort to settle disputes through court when large penalties are at stake (Sambasivan and Soon, 2007).

Total abandonment

Delays in project execution could lead to total abandonment if issues leading to the delays are not resolved timorously.

Strategies to improve delivery of projects

Table 2: strategies to improve construction projects delivery

Frequent progress meeting (Majid, 2006)
Use up-to-date technology utilization (Majid, 2006)
Use proper and modern construction equipment (Majid, 2006)
Use appropriate construction methods (Majid, 2006)
Effective strategic planning (Majid, 2006)
Proper material procurement (Majid, 2006)
Accurate initial cost estimates (Majid, 2006)
Clear information and communication channels (Majid, 2006)
Frequent coordination between the parties involved (Majid, 2006)
Proper emphasis on past experience (Majid, 2006)
Proper project planning and scheduling (Majid, 2006)
Complete and proper design at the right time (Assaf, 2006)
Site management and supervision (Long, 2008)
Compressing construction durations (Long, 2008).

Research Methodology

Quantitative method was used, with a questionnaire survey for the collection of data. This questionnaire was piloted using two respondents to evaluate if there were any mistakes or if the questionnaire was clear. After the pilot study, a total of 76 questionnaires were distributed to a convenience sample of which 42 usable questionnaires were returned, representing 55.26% response rate. The data was analysed using excel package 2013. The questionnaire was divided in four sections; section A was the demographic information; Section B causes of construction delays, Section C, effects of construction delays, Section D, strategies to improve project delivery in the South African construction industry. Section B, C and D were on a 5-point likert scale. The likert-scale questions are discussed based on mean score. Therefore, the difference between the upper and lower ends of the used scale is 4.0 since there are five points. Hence, each range can be equated to 0.80 because the extent of the range is determined by a division between 4.00 and 5 (4/5). This approach has been adopted in previous studies of Emuze et al., (2011) and Emuze (2013). However, in the current study the meanings of the range are: > 4.21 ≤ 5.00 strongly agree; > 3.41 ≤ 4.20 Agree; > 2.61 ≤ 3.40 Neutral; > 1.81 ≤ 2.60 Disagree; > 1.00 ≤ 1.80 strongly disagree.

Findings and discussions

Background of respondents

From Table 3, 29% of respondents were females while 71% were males. Highest qualification 10% of respondents had no qualification, 50% had diplomas, 38% had degrees and only 2% had Masters' degree. 36% of stakes holders were clients, 40% were contractors, 21% were consultants and 2% were in the others category. Table 3 further indicates that are of speciality of the respondents. 17% were project manages, 7% were construction manager, 29% were quantity surveyors, 5% were project planners, 10% were architects and 33% were engineers.

Table 3: Demographic information

Gender	Frequency	Percentage
Male	30	71.0
Female	12	29.0
Highest Qualification		
No qualification	4	10.0
Diploma	21	50.0
Degree	16	38.0
Post graduate degree	1	2.0
Stakeholders		
Clients	15	36.0
Contractors	17	40.0
Consultant	9	21.0
Others	1	2.0
Professions		
Architects	4	10.0
Project managers	7	17.0
Construction managers	3	7.0
Quantity surveyors	12	29.0
Project planners	2	5.0
Engineers	14	33.0

Causes of delay in the South Africa construction industry

The first objective was to identify causes of delay in the South African construction industry projects. The mean score was computed for each cause to identify the most significant causes. The causes were ranked based on mean score values. From the ranking assigned for each cause of delays, we were able to identify the most prevalent factors or causes of delays in South African construction industry in Gauteng province. Table 4 indicated that the five most common causes of delay were, improper planning (4.023), poor site management (4.023), poor communication (3.976), skills shortages (3.786) and corruption (3.762). However, these factors did not fall in the band of strongly agree but tilted towards the agree band. These causes of delay identified are in line with the findings of Sambasivan and Soon, (2007) in Malaysian construction industry. Furthermore, corruption was also identified to cause delay and concurs with the findings of Niazai and Gidado, (n.d) in Afghanistan construction industry.

Table 4: Causes of delay in construction projects

Causes of delay in the projects	1	2	3	4	5	Total	MS	Rank
Improper planning	1	4	5	15	17	42	4.023	1
Poor site management	1	2	7	17	15	42	4.023	1
Poor communication	1	4	5	17	15	42	3.976	3
Skills shortages	0	4	9	21	8	42	3.786	4
Corruption	1	7	9	9	16	42	3.762	5
Inadequate contractors training	1	5	11	12	13	42	3.738	6

Continuation Table 4: Causes of delay in construction projects

Causes of delay in the projects	1	2	3	4	5	Total	MS	Rank
Change orders by client during construction.	0	3	12	20	7	42	3.738	6
Labour supply problems	1	4	10	20	7	42	3.667	8
Poor qualifications of contractor	0	8	11	13	10	42	3.595	9
Late in reviewing and approving design documents by client	3	0	15	17	7	42	3.595	9
Slow delivery of materials	2	3	14	15	8	42	3.571	11

Low speed of decision making	1	6	10	18	7	42	3.571	11
Design errors by designers	1	5	14	15	7	42	3.524	13
Underestimation of the time of completion	1	4	18	12	7	42	3.476	14
Shortage in materials	2	8	12	10	10	42	3.429	15
Subcontractor problem	1	10	8	17	6	42	3.405	16
Delay in progress payment by own	2	9	9	14	8	42	3.405	16
Suspension of works by owners	2	10	9	15	6	42	3.310	18
Unforeseen ground conditions	1	7	18	10	6	42	3.310	18
Inadequate design team experience	2	6	19	10	5	42	3.238	20
Difficulty in financing project	7	8	10	10	7	42	3.048	21
Acts of god	9	3	19	9	2	42	2.810	22

Effects of delay in the South Africa construction industry

The second objective was to identify causes of delay in the South African construction industry. The Mean Score (MS) was computed for each cause to identify the most significant causes. The causes were ranked based on MS values. From the ranking assigned to each cause of delays, we were able to identify the most common effect of causes of delays in South Africa construction industry. Table 5, implies that time overrun (4.31) was ranked the highest and cost overrun (4.26) was ranked second highest by the respondents. The mean scores indicated that the respondents strongly agree that the causes of delay had a negative effect on time and cost. Disputes MS was 4.14, this score indicates that the respondents agree that delays led to disputes. Other effects that were identified in construction projects were arbitration MS=3.95 and litigation MS=3.71. However, total abandonment of projects was not significantly supported as the rating was in the neutral band with MS=3.12. Time overrun, cost overrun, disputes and arbitration were deemed occur as a result of the causes of delay in the project. These finds is supported by the study of Sambasivan and Soon, (2007) in the Malaysian construction industry. This study does not support the finding of Sambasivan et al., (2007) that projects become totally abandoned.

Table 5: Effects of delay

Effects of delay	1	2	3	4	5	Total	MS	Rank
Time Overrun	0	2	4	15	21	42	4.310	1
Cost overrun	0	1	6	16	19	42	4.262	2
Disputes	0	1	6	21	14	42	4.143	3
Arbitration	0	1	12	17	12	42	3.952	4
Litigation	1	3	11	19	8	42	3.714	5
Total abandonment of project	6	7	10	14	5	42	3.119	6

Proposed strategies to improve projects delivery

Table 6 shows the results of proposed strategies to improve project delivery from the viewpoint of the practitioners working for clients, contractors and consultants. These strategies were ranked based on their mean score and ranked as shown in Table 4. The five highest ranked strategies to improve project delivery and avoid delays were; complete and proper design at the right time (4.357), site management and supervision (4.214), proper material procurement (4.214), clear information and proper communication channels (4.190) and frequent co-ordination between the parties (4.167). These mentioned strategies were also identified as the strategies to minimise delay by Majid (2006) and Long (2008).

Table 6: Proposed strategies to improve project delivery in construction industry

Proposed strategies	1	2	3	4	5	Total	MS	Rank
Complete and proper design at the right time	0	1	5	14	22	42	4.357	1
Site management and supervision	0	1	7	16	18	42	4.214	2
Proper material procurement	0	1	5	20	16	42	4.214	2
Clear information and communication channels	0	2	4	20	16	42	4.190	4

Frequent coordination between the parties involved	0	0	6	23	13	42	4.167	5
Effective strategic planning	0	1	8	17	16	42	4.143	6
Collaborative working in construction	0	0	8	20	14	42	4.143	6
Proper emphasis on past experience	0	2	6	23	11	42	4.024	8
Frequent progress meeting	0	3	9	18	12	42	3.929	9
Accurate initial cost estimates	0	3	10	21	8	42	3.810	10

Conclusion

There were three objectives determined in this study which have been achieved. The first objective was to identify causes of delays, the effects of delays, and the strategies to improve project delivery in the construction industry. The first objective of the study has been successfully examined. A total of 22 factors that causes delays were identified from literature. The top ten most critical factors that contributed to the causes of delay included: Improper planning , poor site management , poor communication , skills shortages, corruption, inadequate contractors experience, change orders by client during construction, labour supply problem, poor qualification of contractor's technical staff and late in reviewing and approving design documents by client. The identified effects of delays in construction projects were; time overrun, cost overrun, dispute, arbitration, litigation and abandoning the project. The results implied that time overrun and cost overrun, were the two most common effects of delays in a construction project. The third objective of this study identified the five important strategies to prevent project delay; complete and proper design at the right time, site management and supervision, proper material procurement, clear information and proper communication channels and frequent co-ordination between the parties.

Recommendations Further Study

Recommendation for further study is to test the causal relationship of the strategies proposed to prevent delay and the project outcome in order to develop a model. The study further suggests that the construction companies should concentrate on the strategies in order to stifle project delay.

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