

Impact of Lockdown due to Covid-19 Pandemic on Construction Industry of Pakistan

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Abstract- The construction industries worldwide are slowly restoring after lifting lockdowns due to the pandemic. The study plans to analyze the impact of lockdown due to COVID-19 pandemic on Pakistan's construction industry and help them mitigate any similar pandemic in the future. The budgetary crisis brought by the virus has hit a lot of organizations throughout Pakistan. Construction projects throughout Pakistan have been risked in different manners by the pandemic and many projects have shut down. Thus, there has been budgetary crisis in the field of construction and has resulted in unemployment. From the findings of this paper, the major impact includes delay in completion of projects, unavailability of raw materials, and increase in crime rate. The circumstance has caused incredible concern, vulnerability, and agitation in the construction industries with everything being considered. This paper additionally clarifies how it is feasible to proceed with construction work in the present circumstance. When the construction work goes ahead, the financial slump will be diminished, and unemployment will be decreased. There is not much research done related to this pandemic in Pakistan and this is one of the few research projects done related to COVID-19 in Pakistan.

Index Terms-- Construction Industry, COVID-19 Pandemic, Construction Projects, Ranking.

I. INTRODUCTION

COVID-19 (SARS-CoV-2) has been a big obstacle overall around the world. It has affected Pakistan's GDP also as the construction industries were at a total halt during the six months lockdown that was enforced for the safety of the precious lives of the civilians. An enormous number of construction companies had to shut down during the lockdown due to heavy loans, price hike of materials, psychological issues due to downsizing led to total bankruptcy. The total GDP of Pakistan before the pandemic hit was Rs. 316 billion of which the construction industries contributed 2.85% (Rs.9.006 billion). After the lockdown and temporary shutting down of the construction industries, the contribution of the construction industries of Pakistan dropped from 2.85% (Rs. 9.006 billion) to 2.3% (Rs. 7.268 billion) [1]. After the resume of the construction work by the industries, the issues were still standing as the availability of the labor was less and they were not familiar to work with the SOPs that were imposed for their safety. The aim is to analyze the problems that arose during the lockdown that was imposed due to the COVID-19 in March 2019 for almost 6 months. This affected the whole country in a very drastic way which included all people of Pakistan including construction industries. The problems are budgetary constraints, inflation of material costs, unavailability of labor, difficulty in following the SOPs, disruption in logistics, and

psychological issues. The major problem faced by the construction industry was funds. This was due to a couple of reasons that are that number of industries were unable to pay their credit due to the lockdown that was enforced which resulted in total bankruptcy as the banks did not give any type of margin for their clients. Only a few branches of every bank were open in various places for precautionary measures which resulted in a gap in cash withdrawal/transfer. One of the problems is the cost that spiked through the sky. The reasons are the restriction of the intercity traveling and local transport of goods resulted in the decline of production of construction materials like bricks, cement, crush, mud, timber, admixtures, steel etc. this all resulted in the price hike of the constructions materials and the raw materials. The companies that used rental construction machinery like concrete mixers, excavators, bulldozers, graders, compactors, dump trucks, wheel tractor scrapers, loaders, etc. were at a great loss as the rent also peaked through the sky. Another problem being faced by the construction industry was the task force. The reasons are that the labor was not aware of the gravity of the situation and did not follow the SOPs due to which they were exposed to COVID-19, and they fell ill. For example, the 20 to 39 age group (age group for laborers) is most affected by COVID-19, in which 21.8% are females and 78.2% are males. A good percentage from this age has labor proportion in it, most of the labor got fear of the disease and they stopped working which

resulted in a halt of ongoing construction, the restriction of the intercity traveling did not allow the labor that was on a visit to their homeland to return for their workplace which also was a cause for the unavailability of the labor. The workforce available was facing problems like the labor was not familiar with the COVID-19 and its risk so they were not taking the situation seriously and were not following the precautionary measures like wearing masks, use of hand sanitizers, or washing hands frequently. They were unable to maintain social distancing of 6 feet as their tasks required teamwork which cannot be performed individually. The supply chain/logistics were affected drastically as COVID-19 had a major impact on the supply chains of all manufacturers that provide construction raw materials, construction materials, construction equipment, and labor. Most companies have struggled to keep a flow of goods and services but have faced multiple obstacles. As the supply chain is disturbed, the construction is impacted drastically and results in delays for the completion of the projects on time [2, 3]. Many mental health issues started to rise after COVID-19 due to the reasons like the decline in work resulted in the downsizing of the construction industries as they were unable to bear the expenses of the labor and staff. This led to a boost to the unemployment rate as the contribution in the employment rate of the Pakistan construction industry was 7.6% which has been lowered. As everything was moving towards a halt due to the lockdown, the clients and investors were not very satisfied with the B/C ratio, so they decided to wait for the situation to get better. This made them concerned as they were unable to get recovery of their investment on time [4].

II. STATE OF THE ART

The COVID-19 pandemic, also, named the Covid pandemic, is a continuous pandemic of Covid sickness 2019 because of severe acute respiratory syndrome coronavirus 2. Several early infected humans had visited Huanan Seafood Wholesale Market, situated in Wuhan, Hubei, China. The infection that set off the flare-up is called SARS-CoV-2, a recently observed infection eagerly connected with bat Covids, pangolin Covids, and SARS-COV [5]. The virus reached Pakistan on 26th February 2020. On 18 March cases have been enlisted in each of the 4 regions, the 2 autonomous domains, and Islamabad Capital Territory, and by 17 June, each area in Pakistan had recorded something like one instance of COVID-19 [6]. The COVID-19 pandemic is affecting work markets and livelihoods in cutting edge economies. Be that as it may, what is the effect on the world's L-D-C-s, which together record for 1.3 percent of the worldwide GDP, 13% of the total populace, and 40 percent of the world's poor [7]. The problems after the virus reached Pakistan that arose in the construction industry were very severe. These included a hike in the cost of materials, labor availability, sanitizers and masks for labor, precautionary measures for labor, suspension/delay of projects, contracts clauses expiry, and changes in the clause. The purpose of the study is to benefit the construction industries that are facing problems due to the COVID-19 as they can review this study regarding the impact of COVID-19 for future precautionary measures in case any pandemic occurs again. It will also guide the

industries on how to meet the requirements and how to tackle the ongoing problems and issues. Industrialists can learn the problems and issues that are faced during the construction of mega infrastructures like performance measurement criteria and risk management.

III. METHADODOLOGY

The main aim of the research is to identify and rank the impacts of COVID-19 on the construction industries of Pakistan. The factors were tabulated, and structured interviews were conducted with 7 experts working as contractors and consultants. Considering the results, a poll overview was planned and was conveyed to more than 380 respondents. The values were ranked through relative importance index (RII) % [8]. A similar methodology was also implemented by Offei et al., [9]. Figure 1 presents the outline of the technique.

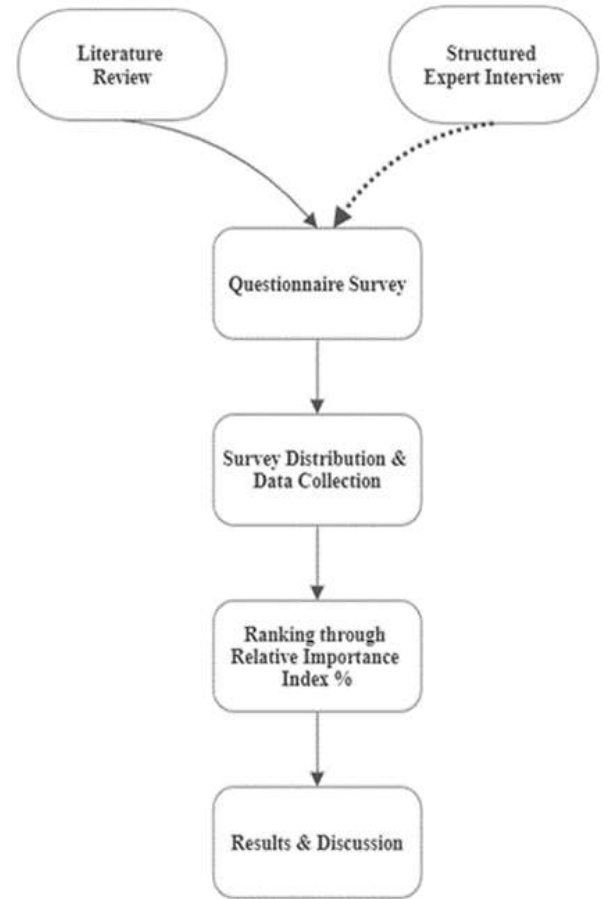


FIGURE 1. Flowchart of Methodology

A. DESIGN OF INSTRUMENT

An extensive literature review was conducted for this purpose. It helped in understanding the major impacts of COVID-19 on the construction industries of Pakistan. Literature review helped in formulating interview questions from experts in construction industries. The interviews helped in identifying 24 impacts that are presented in Table 1.

TABLE I
UNITS FOR MAGNETIC PROPERTIES

Sr.	Impacts	Sr.	Impacts
I-1	Unavailability of Funds	I-13	Difficulty in Working in Social Distancing
I-2	Announcement of Relief Package	I-14	Dismissal of Uneducated Labor
I-3	Reduction in Sales Tax	I-15	Unavailability of PPEs
I-4	Effect on Large-scale Industries	I-16	Supervision of SOPs
I-5	Hike in Cost of Rental Machinery	I-17	Hoarding of PPEs
I-6	Slow Production of Construction Materials	I-18	Disruption in Logistics
I-7	Unavailability of Raw Materials	I-19	Lack of drivers for Logistics
I-8	Lack of Manpower in Materials Production	I-20	Ban on Inter-city Transportation
I-9	Unavailability of Manpower led to Budget Constraints	I-21	Increase in Depression
I-10	Halt of Projects due to Lack of Manpower	I-22	Increase in Crime Rate
I-11	Low Wages to Labor	I-23	Increase in Suicide Rate
I-12	Project Delay	I-24	Poor Performance due to Fear

B. SAMPLING

The poll was appropriated among more than 380 respondents dealing with progressing foundation projects in Pakistan. It was sent via the internet (email, WhatsApp). According to Luangcharoenrat et al., [10] it is challenging to decide test size attributable to the appropriation technique. Accordingly, the overview stayed available for 5 months and maximum responses were collected. A total of 350 surveys were finished by exceptionally knowledgeable development experts including administrators, engineers, and academic experts, out of these, 341 were found completed and valid for further analysis while 9 were rejected from the research. The information was gathered in spreadsheets and IBM SPSS Statistics 17 was to examine the dependability and legitimacy of information. Eventually, ends were drawn considering acquired outcomes.

C. QUESTIONNAIRE SURVEY

A questionnaire survey was devised on the basis of impacts identified from literature and interviews. The respondents comprised consultants, contractors, project managers, and designers involved in construction projects in Pakistan. The questionnaire survey consisted of two sections; the first section gathered the general data of respondents such as their occupation. In the next part, respondents were procured about their impression of effects and the meaning of different effects as far as framework

project they were asked to give their remarks on a scale of Likert score 1-5 (1 = strongly disagree and 5 = strongly agree)

D. VALIDATION AND RELIABILITY

The information was accumulated in spread sheets and was investigated by IBM SPSS Statistics 17 [11, 12]. The reliability was checked through the most extensively used reliable test Cronbach's alpha which resulted in $\alpha = 0.77$. This suggests that the data is highly reliable for further analysis [13]. Furthermore, the ranking of various impacts was completed through RII % on the basis of the following equation.

$$\text{Relative Importance Index (RII) \%} = \frac{\sum_{i=1}^n A_i(N_i)}{A \times N} \times 100 \quad (1)$$

Where 'Ai' refers to Likert score (i.e., A1 = Strongly Disagree = 1 and A5 = Strongly Agree = 5). Similarly, 'Ni' refers to number of respondents who gave Ai an answer (i.e., 32 respondents said 'Agree' so Ni will be 32 for A4 = 4). Further, 'A' is the maximum Likert score (5 in this case), and N is the total number of respondents.

IV. ANALYSIS OF FINDINGS

A. RESPONDENT PROFILE

The expert interviews were held with renowned construction industrialists for a better and exact approach to the situation. The background of the interviewees is shown in Table 2. The overview was appropriated among different specialists. Table 3 gives an overall outline of the respondent's demography. Information is gathered from specialists with appropriate training and involvement with the key areas of work. This assisted with improving the trust in acquiring discoveries from the gathered information. Figure 2 represents the percentage of Contractors and Client/Supervisor Consultancy who participated in the survey. The second major impact of COVID-19 has been the unavailability of raw materials.

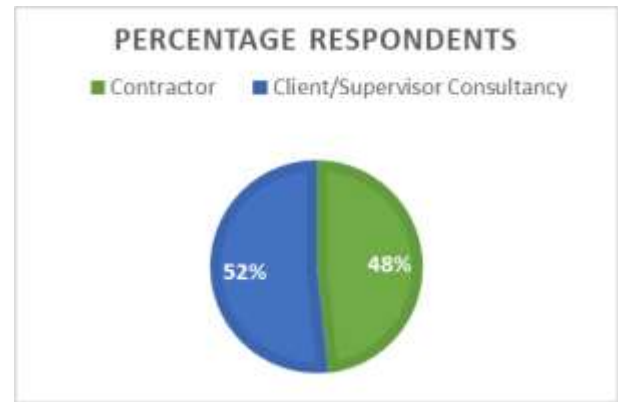


FIGURE 2. Graphical Representation of Percentage of Respondents

B. RELATIVE RANKING OF THE IMPACTS

The ranking of impacts of COVID-19 based on the survey response is given in a tabular form in Table 4 and in graphical form in Figure 4. The weighted total and the RII are calculated based on the response given by the respondents to the survey. The

first 3 impacts are briefly explained with general reference to their importance.

The major impact of COVID-19 has been a delay in project completion. Delay is the most basic component in the general execution of any development project since it expands the expense of the undertaking. Finishing a venture on time is gainful for every one of the gatherings in question in the project like the Consultant, Client, and Contractor. Considering that the pandemic caused everywhere financial slumps and vulnerabilities,

proprietors, financial backers, and organizations were progressively careful about putting resources into development undertakings and tasks. Hence, a few activities were dropped or transiently suspended. One more significant justification for dialing back continuous activities was the expansion in solicitations to reevaluate mechanical ventilation and air filtration frameworks. There were additionally worries on whether configuration changes should be joined in a post-pandemic world fully expecting future occasions [14].

TABLE II
BACKGROUND OF INTERVIEWEES

Code	Designation	Experience (years)	Education	Contractual Party	Location
A	Director	15	DAE	Contractor	Lahore, Pakistan
B	Director	16	Bachelors	Consultant	Lahore, Pakistan
C	Director	09	Masters	Consultant	Gujranwala, Pakistan
D	Director	23	DAE	Contractor	Lahore, Pakistan
E	Director	20	DAE	Contractor	Islamabad, Pakistan
F	Director	14	Masters	Consultant	Lahore, Pakistan
G	SDO	07	Bachelors	Client	Sheikhupura, Pakistan

TABLE III
SUMMARY OF RESPONDENTS (GENERAL DEMOGRAPHY)

Party	No. of respondents	Percentage
Contractors	164	48
Client/Supervisor Consultancy	177	52
Education		
DAE	92	27
B. Sc. / B. Eng.	147	43
M. S. / M. Sc. /M. Eng.	82	24
Ph. D. / D. Eng.	20	6
Experience		
Less than 1 year	44	13
1-5 years	51	15
6-10 years	61	18
11-15 years	82	24
More than 15 years	103	30
Age		
18-25	38	11
26-33	68	20
34-40	147	43
40+	88	26

According to American Standard Testing Material (ASTM), the obtainability of non-toxic, genuine, and crucial construction

materials is important to achieve the maximum standard for human life [16]. However, frequent materials shortages have been

recognized globally [15]. The American Standard Testing Material (ASTM) indicated that nearly 2 billion people have no access to basic and living safe construction materials [16] causing inferior construction and costly financial implication. The ASTM described material shortage as the supply of materials, construction products, and special material identified as essential by the construction industry is insufficient to meet government construction project's needs [17]. Further, it says that material deficiency implies a period when the interest or assessed interest for the material outperforms the gracefulness of the material [18]. Material deficiencies are not a modern issue; however, their scope and extent have prompted dramatically in recent years [19]. The third most major impact of COVID-19 has been the unavailability of funds. The expense has its demonstrated significance as the great variable for project achievement. Most of the critical variables influencing project costs are subjective, for example, client need on development time, worker for hire's arranging capacity, acquisition techniques, and economic situations including the degree of development movement. The organizations are not creating any sort of gain because of work stoppage in the organizations and on the opposite more misfortunes are being brought about and the organization is losing cash as well as all the providers who are giving the necessary materials to various organizations to be utilized in development area, that enormous number of providers are additionally bringing about tremendous misfortunes. Since the conclusion of the organization, the stockpile the chain has been closed and the industrial facilities that produce merchandise have halted creation, coming about in numerous misfortunes of them. In addition, because of the non-offer of plant created merchandise and conclusion of the development area, the public authority cannot gather appropriate expenses from this multitude of spots which are straightforwardly affecting the nation's GDP and when the country's GDP goes down, it influences the worldwide economy. It is accepted that development projects experience an increment in the expense of around 33% on normal [20]. The issue of cost invades is basic and should be concentrated on additional to lighten this issue from here on out. Cost overwhelms are a significant issue in both creating and created nations

C. POSITIVE IMPACTS

As everything has a good side and a bad side, in this pandemic, there were numerous bad impacts of COVID-19 on the construction industry but there are a couple of good impacts too which were highlighted by the expert industrialists during the interviews.

a) Developed better communication between Construction Companies and Clients

Right at the beginning of COVID-19, manufacturers, engineers, project workers, and so forth overwhelmed their clients with informing on how they were dealing with the emergency. They gave clear and applicable data on how the organization was tending to somewhere safe and secure safeguards, what a predictable course of events resembled, and more to assist with

facilitating the brain of clients. Development organizations ventured off-site and considered their client's requirements like never previously. In a period of vulnerability, development experts had the chance to be their client's greatest promoters, and it did not go unrecognized.

b) Creative & Collaborative Thinking

Coronavirus constrained the business to venture outside of the container and think imaginatively. Embrace a training that joins assets and understanding to give out-of-the-container and critical thinking strategies that work. This can be utilized to gain from one another and incline toward one another for help and direction. [21]

c) Reduction in Sales Tax and Excise Duties

These reductions will benefit everyone. People that are planning to build their houses or commercial buildings should avail this excellent opportunity. These reductions will undergo tax reduction. Sales tax on construction material was 4.5% before these reductions and now the Government of Pakistan has decided to reduce them. The effect of these reductions will be incredibly positive on the construction sector as prices may drop on the construction material resulting in less costly construction. Apart from that, the GST on construction material was from 8% to 16% is also being reduced by the government. [22]

d) Mean Composite Score

Composite scores of any data represent small sets of points that are related to one another, both conceptually and statistically. The scores are combined and presented as a single term to avoid information overload [11]. In this, both the occupations were kept as different sets i.e., Clients/Consultants and Contractors.

The 24 impacts were categorized under 6 different factors. 4 impacts were situated under each factor which are Budgetary Relief, Inflation, Labor Unavailability, Challenging SOPs, Logistics Disruption, and Psychological Issues. The graphical representation is given in Figure 3.

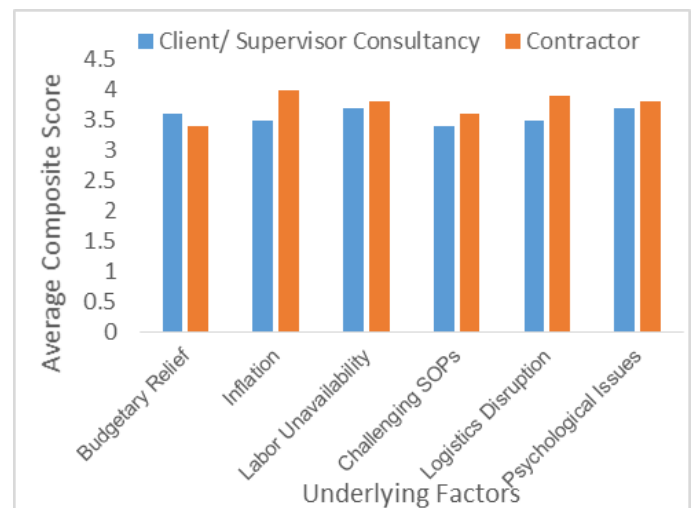


FIGURE 3. Bar Chart of Underlying factors

TABLE IV
RANKING BASED ON THE SURVEY RESPONSE

Sr#	Rank	Impact	Weighted total	RII	RII %
I-12	1	Project Delay	238	0.793	79.33
I-7	2	Unavailability of Raw Materials	234	0.780	78.00
I-1	3	Unavailability of Funds	231	0.770	77.00
I-22	4	Increase in Crime Rate	230	0.767	76.67
I-23	5	Increase In Suicide Rate	229	0.763	76.33
I-6	6	Slow Production of Construction Materials	228	0.760	76.00
I-21	7	Increase in Depression	226	0.753	75.33
I-18	8	Disruption in Logistics	225	0.750	75.00
I-11	9	Low Wages to Labor	224	0.747	74.67
I-5	10	Hike in Cost of Rental Machinery	220	0.733	73.33
I-17	11	Hoarding of PPEs	220	0.733	73.33
I-24	12	Poor Performance Due to Fear	219	0.730	73.00
I-8	13	Lack of Manpower in Materials Production	218	0.727	72.67
I-20	14	Ban on Inter-City Transportation	218	0.727	72.67
I-13	15	Difficulty in Working in Social Distancing	215	0.717	71.67
I-19	16	Lack of Drivers for Logistics	215	0.717	71.67
I-3	17	Reduction in Sales Tax	213	0.710	71.00
I-4	18	Effect on Large-Scale Industries	213	0.710	71.00
I-10	19	Halt of Projects Due to Lack of Manpower	211	0.703	70.33
I-9	20	Unavailability of Manpower Led to Budget Constraints	210	0.700	70.00
I-2	21	Announcement of Relief Package	209	0.697	69.67
I-14	22	Dismissal of Uneducated Labor	208	0.693	69.33
I-16	23	Supervision of SOPs	205	0.683	68.33
I-15	24	Unavailability of PPEs	204	0.680	68.00

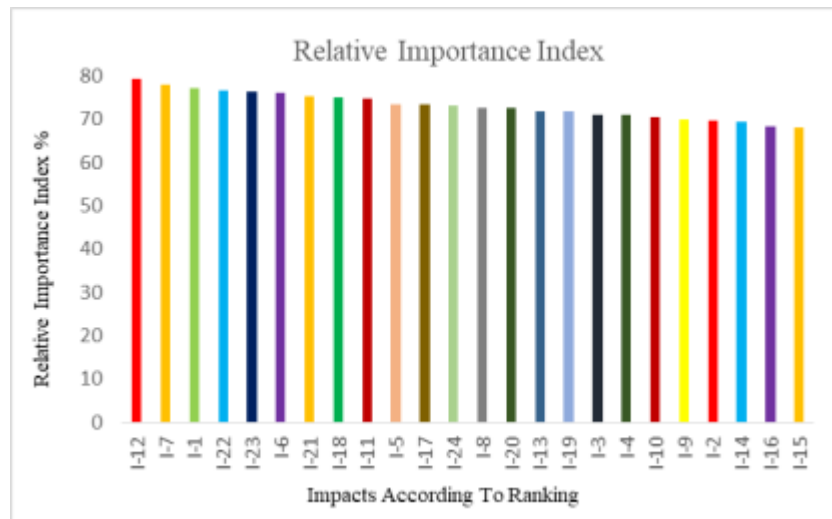


FIGURE 4. Relative Importance Index

V. CONCLUSIONS

1. The government's lockdown measures had a broad impact. The impact of the pandemic has been of the same intensity for both the parties involved in the Construction industry i.e., Client/Supervisor Consultancy and Contractors. Construction industries must take necessary measures for their staff and labor.
2. According to the RII, the most powerful impact of COVID-19 was that the contractors were unable to meet the deadline of the construction projects, the unavailability of raw materials of chemicals like admixtures affected the production rate of construction materials, unavailability of funds led to slow progress of construction projects.
3. Hopefully, any upcoming calamity will be faced with good and proper measures as people were not prepared. As of now, everyone is planning with caution and keeping the future in mind.

VI. LIMITATION

There are a few limitations of everything that exist. Likewise, there are limitations of this study which is the limited access to all the constructions industries across the country due to insufficient funds. Moreover, the pandemic was ongoing during this research due to which traveling around the country was challenging. Future examination can be directed involving more far-reaching information as cost, timetable, and agreement intend to confirm the discoveries of the writing.

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