

A Study on the Relationship between Performance of Contractors in Kenya and the Performance Determinants

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Abstract: The performance of a contractor is very critical as it means a lot to both the contractor and the various stakeholders in the industry. Even though the performance of contractors is considered as a very critical measure of either the success or failure of contractors, most of the contractors and most especially of the developing countries do not perform as expected. This has led to a number of studies in a bid to find out the factors affecting the performance of contractors. The factors affecting the performance of contractors as found out in the studies can be summarized into the following eight performance determinants: financial factors, construction management factors, construction technology factors, design factors, project management factors, materials factors, labour factors and external factors. This study therefore sought to find out the relationship between the performance of contractors and these performance determinants. The study employed the quantitative strategy as well as the cross-sectional research design. Quantitative data was collected through the use of structured questionnaires which were administered to local contractors of category NCA 1, 2 and 3. The contractors were sampled using the stratified random sampling and the systematic random sampling techniques. The data was analyzed using the Statistical Package for Social Sciences (SPSS for windows version 20). The method used for data analysis was correlation and multiple regression analysis. The analysis yielded a negative relationship between the performance of contractors and the following performance determinants: financial factors $\rho = -.448$, construction technology factors $\rho = -.117$, design factors $\rho = -.311$, project management factors $\rho = -.250$, materials factors $\rho = -.235$, labour factors $\rho = -.261$ and external factors $\rho = -.389$. Contrary to the conceptual framework, the construction management factors yielded a positive relationship with performance with a $\rho = 0.167$. This study therefore concluded that financial factors, construction technology factors, design factors, project management factors, materials factors, labour factors and external factors have an adverse effect on the performance of contractors in Kenya whereas the construction management factors did not have adverse effect on the performance of contractors in the country.

Keywords: Contractors performance, Performance determinants, Construction industry

I. INTRODUCTION

As found out in previous studies, the performance of contractors can be measured using a number of indicators. For instance, Akintoye and Takim (2002) state that, a construction project is acknowledged as successful when it is completed on time, within budget,

in accordance with specifications and in accordance to stakeholders satisfaction. Chonge, Mbiti, and Gwaya (2016), give thirteen performance indicators as follows: Time, cost, quality, client satisfaction, project participants' satisfaction, community satisfaction, profitability, productivity, environment protection, health and safety, sustainability of the development, communication and functionality of the development. Thus in order for contractors to be considered successful in their projects, they should meet these indicators/measures.

II. PERFORMANCE DETERMINANTS

The term performance determinants stand for the factors that influence on the performance of contractors. According to studies on the performance of contractors, contractors in many construction industries of the world and most especially those of developing countries have been found not to meet the performance measures. This has led to a number of studies which have aimed at finding out the factors influencing on the performance of contractors. For instance, Faridi and El-Sayegh (2006), stated that, shortage of skills of manpower, poor supervision, poor site management, unsuitable leadership, shortage and breakdown of equipment were some of the causes of poor performance of contractors in the United Arab Emirates. Mbachu and Nkando (2007) established that adherence to quality and attitude to service as some of the factors influencing on the performance of construction projects in South Africa. Chan, Chan and Kumaraswamy (2002), reveal a number of factors influencing on the performance of contractors such as; communication system, organization structure, client type and experience, project financing, scope of work, knowledge of construction organization, project manager's experience, the working relationship, project team leaders commitment in time, cost and quality, complexity and the size of the project, social, political and technical systems among others. These factors have been grouped under eight main categories in this study. These include: financial related factors, construction management related factors, construction technology related factors, project management related factors, design related factors, labour related factors, materials related factors and external factors.

2.1. Financial Factors

Money is the life line of any business. Therefore, construction contracting being a business, funding is very crucial for the performance of any construction project.

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In fact, the cost of construction work is a primary concern for the vast majority of construction client and has its proven importance as the prime factor of project success.

The financial related factors affecting the performance of contractors are: the financial difficulties faced by the contractors, delays in payments to the subcontractors and contractors, delays in settling of claims by the clients, financial constraints faced by the clients and inaccurate financial provision by the clients (Chonge et al., 2016).

2.2. Construction Management Factors.

Construction projects require skilled management as they are complicated and face many challenges and constraints such as time, cost, regulations, materials and environmental rules or customs (Walker, 2007). Brown and Adams (2000), affirm this by stating that management in construction industry is considered as one of the most factors affecting the performance of construction works.

Therefore, in order to meet the objectives of modern construction projects, it is essential that contractors are able to use as well as have management skills. These skills are: management knowledge and skills such as finance and accounting, sales and marketing, research and development; technical knowledge and skills such as having an understanding and proficiency in construction activities; business knowledge; human knowledge such as the ability to work with and through other people (Rida, 2015).

Other construction management related factors are: poor communication, ineffective planning and scheduling by the contractors, poor site management, inadequate experience of the contractors, fraudulent practices, site conflicts, not holding regular site meetings, not holding regular safety inspections on site, lack of safety regulation enforcement, lack of monetary/nonmonetary incentives to workers, not conducting safety training and education to workers and ineffective quality control by the contractors (Chonge et al., 2016).

2.3. Construction Technology Factors

The growth of new technologies in the construction industry is expected to have an impact on the way construction is performed in the future (Construction Training Fund, 2004). As with new technologies in other sectors, new methodologies, lead to the need of having changes in the composition of work force since the new construction technologies may require the attainment of new skills or trades.

Despite these facts, the construction industry in Kenya is still too traditional as the adoption of new technology is still low. This slowness in adoption of new technology has greatly impacted on the performance of contractors. One reason given by the contractors for their slow pace in adoption of new technologies is that adopting new technology is expensive (Chonge et al., 2016).

Some of the construction technology factors that impact on the performance of contractors as revealed by previous studies are as follows: improper construction techniques implemented by the contractor, use of obsolete technology by the contractor, shortage of equipment, failure of the equipment, lack of skilled equipment operators and low productivity and inefficiency of equipment (Chonge et al., 2016).

2.4. Design Factors

Designers play a vital role as their work starts from inception to completion of a project comprising of detailed building design process consisting of five disciplines which are; architectural design, structural design, civil design, mechanical design and electrical design (Chan, 1997).

According to a study by Peansupap and Rothmony (2015), design errors are unavoidable in any construction project and they can negatively affect the performance of contractors most especially on cost, schedule and safety since they have been found to contribute to reworks, cost overruns, schedule delays and unsafe environments.

Design errors should therefore be carefully managed to ensure the success of construction projects and to minimize difficulties in project performance as they were found to have a negative impact on the performance of construction projects (Chonge et al., 2016).

The design factors as outlined in previous studies are: the design team experience, project design complexity, delays in producing design documents, too many change orders/variations by the client and consultants, mistakes and discrepancies in design documents, unclear and inadequate details drawings, insufficient data collection and survey before design, misunderstanding of owner requirements by architect and design engineers and delays in drawings approval.

2.5. Project Management Factors

Since the middle of the last century, many organizations are using project management approach to bring about the change needed to meet organizational goals and objectives. This is because, every project be it internal or external is unique and has got its own unique challenges (Kejuo, 2012). Due to the complex nature of project activities, the project management factors explain why projects, even if not fully, fail. Thus Erling, Andersen, Svein, and Money (2006) indicate that if project managers can identify what constitutes a project success and the factors that determine a successful outcome of a project, their performance can improve.

Previous studies for example Chonge et al., (2016), have given various project management factors that influence the performance of contractors. These factors are: poor monitoring and feedback by the project manager /consultants, project manager's technical capability/experience, planning and scheduling deficiencies by the consultants /project manager, inadequate consultants experience, conflicts amongst the consultants, poor coordination and communication between consultants and other project participants, slowness in decision making by client and consultants, delays in inspection of works by consultants, excessive bureaucracy and delays in approving major changes in the scope of work by consultants.

2.6. Materials Factors

A wide range of construction materials are available for use in the construction projects.

These materials as previous studies have revealed, can also affect the performance of contractors. For instance, poor quality of materials, poor material handling, poor storage on construction site and inappropriate inventory management can lead to poor performance by contractors. Thus the material related factors are as listed below: poor quality of materials, delay of material delivery to site, poor material handling on site, poorly scheduled delivery of material to site, inappropriate/misuse of material, poor storage of material, waste of raw materials on site, material does not meet specification and loss of materials on site (Naik, Sharma and Kashiyani, 2012).

2.7. Labour Factors

Labour factors are those factors that influence labour productivity that is, factors that influence the units of work placed or produced per man hour.

Since construction is a labour intensive industry, the issue of productivity is very crucial for any construction industry to perform (Soekiman, Pribadi, Soemardi, and Wirahadikusumah, 2011). However, the level of productivity in construction has showed a decreased rate compared to other sectors (Bernstein, 2007). Labour being one of the resources used in the construction industry, it requires proper management if construction projects are to yield substantial savings in terms of cost and time. This has therefore led to studies on the identification of factors affecting labour productivity since the understanding of critical factors affecting productivity both positive and negative can be used to prepare a strategy to reduce inefficiency and to improve the effectiveness of project performance (Motwani, Kumar, and Novakoski, 1995).

Some of the factors identified are: material shortages, lack of labour experience, lack of labour surveillance, conflicts between labourers and superintendents, drawings and specification alterations during project execution, payment delays, labour disloyalty, inspection delay, overworking of labourers, tool and equipment shortages (Enshassi, Al-Najjar, and Kumaraswamy, 2009). Makulsawatudom and Emsley (2002) identified six key factors affecting labour productivity as follows: lack of materials, supervision delays, lack of tools and equipment, rework, absenteeism and interference. Another study by Brown and Adams (2000), indicate that low wages, lack of materials and unfriendly working atmosphere affect the productivity of construction projects.

2.8. External Factors

Like any other organizational endeavours, construction projects are part of a wider super-system of an organization and are also influenced by both internal and external forces (Kejuo, 2012).

Some of the external factors affecting the performance of contractors are: external forces such as government regulations, environmental forces, society, pressure groups, financial markets, labour markets, technology, customer influence, shareholders, adverse weather conditions, unavailability of utilities and unforeseen ground conditions (Chan, Scott, and Chan, 2004).

III. RESEARCH METHODOLOGY

This research employed the quantitative research strategy as well as the cross-sectional research design. The sample size was comprised of 80 contractors which were broken down as follows: NCA 1-26, NCA 2-22 and NCA 3-32. Stratified random sampling as well as systematic random sampling techniques was used to sample these contractors. Structured questionnaires with closed ended questions were administered to these local contractors seeking to find their performance based on their most recent completed as well as ongoing projects. Out of the 80 questionnaires distributed, 56 were returned representing a 70% response rate. Data collected was analyzed using correlation and multiple regression analysis methods which were achieved through the use of Statistical Package for Social Sciences (SPSS for windows version 20).

IV. ANALYSIS AND RESULTS

4.1. Respondents Response Rate

Out of the 80 questionnaires distributed, only 56 were returned giving a 70% response rate as indicated in the table 4.1 below

Table 4.1-Response Rate

| Respondents | Questionnaires Distributed | Questionnaires Returned | % of Response |
|-------------|----------------------------|-------------------------|---------------|
| Contractors | 80 | 56 | 70% |
| TOTAL | 80 | 56 | 70% |

4.2. Results and Discussion on the Relationship between the Performance of Contractors in Kenya and the Performance Determinants

The results and discussion on the relationship between the performance of contractors and the performance determinants are as shown in the sections below:

4.2.1. Performance versus financial factors

Table 4. 2. Correlation between the Contractor's Performance and the Financial Factors

| | | Performance | Financial Factors |
|-------------------|-------------------------|-------------|-------------------|
| Performance | Correlation Coefficient | 1.000 | -.448** |
| | Sig. (2-tailed) | . | .001 |
| | N | 56 | 56 |
| Financial Factors | Correlation Coefficient | -.448** | 1.000 |
| | Sig. (2-tailed) | .001 | . |
| | N | 56 | 56 |



** . Correlation is significant at the 0.01 level (2-tailed).

The table 4.2 above indicates that the spearman's ranking coefficient of performance of contractors versus the financial constraints is -0.448. This result indicates a moderate negative relationship between the variables meaning that, the performance of contractors will only increase as the negative financial factors reduce. Since the correlation is statistically significant at 0.01, therefore, any correlation of ≤ 0.01 is significant. The correlation significance value in this study is 0.001 which is highly significant. This implies that, on the population where this data was collected, the financial factors had adverse effect on the performance of contractors.

4.2.2. Performance Versus Construction Management Factors

Table 4. 3. Correlation between the Contractor's Performance and the Construction Management Factors

| | Performance | Construction Management Factors |
|----------------|-------------------------|---------------------------------|
| Spearman's rho | Correlation Coefficient | 1.000 |
| | | .167 |
| | Sig. (2-tailed) | . |
| | N | 56 |
| | Correlation Coefficient | .167 |
| | | 1.000 |
| Spearman's rho | Sig. (2-tailed) | .218 |
| | N | 56 |
| | Correlation Coefficient | .167 |
| | | 1.000 |
| | Sig. (2-tailed) | .218 |
| | N | 56 |

A spearman's correlation run to assess the relationship between the performance of contractors and the construction management factors indicated a spearman ranking coefficient of 0.167 as shown in the table 4.3 above. This coefficient indicates a weak positive correlation between the performance of contractors and the construction management factors which was not statistically significant at $p=0.218$. This suggests that, in the population where this data was collected, the construction management factors did not have adverse effects on the performance of the contractors contrary to the conceptual framework.

4.2.3. Performance Versus Construction Technology factors

Table 4. 4. Correlation between the Performance of Contractors and the Construction Technology Factors

| Performance | Construction Technology Factors |
|-------------------------|---------------------------------|
| Correlation Coefficient | 1.000 |
| | .167 |
| Sig. (2-tailed) | . |
| N | 56 |
| Correlation Coefficient | .167 |
| | 1.000 |
| Sig. (2-tailed) | .218 |
| N | 56 |

| | | | |
|----------------|---------------------------------|-------------------------|-------|
| Spearman's rho | Performance | Correlation Coefficient | 1.000 |
| | | | -.117 |
| | | Sig. (2-tailed) | . |
| | | | .391 |
| | | N | 56 |
| | Construction Technology Factors | Correlation Coefficient | -.117 |
| Spearman's rho | | | 1.000 |
| | | Sig. (2-tailed) | .391 |
| | | | . |
| | | N | 56 |
| | | Correlation Coefficient | -.117 |
| | | | 1.000 |

The table 4.4 above indicates that the spearman's ranking coefficient of performance of contractors versus the construction technology factors is -0.117. This result indicates a weak negative relationship between the variables meaning that, in order for the performance of contractors in Kenya to improve, the contractors must deal with these construction technology factors by reducing them. Since the correlation is statistically significant at 0.05, therefore, any correlation of ≤ 0.05 is significant. The correlation significance value in this study is 0.391 which is more than 0.05 meaning that it is not statically significant. This indicates that the construction technology factors as per the data collected have an adverse effect on the performance of contractors as the direction of influence is negative as expected despite the value not being statistically significant.

4.2.4. Performance Versus Design Factors

Table 4. 5. Correlation between the Performance of Contractors and the Design Factors

| | Performance | Design Factors |
|----------------|-------------------------|-------------------------|
| Spearman's rho | Correlation Coefficient | 1.000 |
| | | -.311* |
| | Sig. (2-tailed) | . |
| | | .020 |
| | N | 56 |
| | Design Factors | Correlation Coefficient |
| Spearman's rho | | -.311* |
| | | 1.000 |
| | | Sig. (2-tailed) |
| | | .020 |
| | | . |
| | | N |

*. Correlation is significant at the 0.05 level (2-tailed).

The table 4.5 above indicates that the spearman's ranking coefficient of performance of contractors versus the design factors is -0.311.

This result indicates a moderate negative relationship between the variables meaning that, in order for the performance of contractors to improve, the design deficiencies have to be dealt with by reducing or rather reversing them. Since the correlation is statistically significant at 0.05, therefore, any correlation of ≤ 0.05 is significant. The correlation significance value in this study is 0.020 which is highly significant. This implies that in the population where the data was collected, design factors have an adverse effect on the performance of contractors.

4.2.5. Performance Versus Project Management Factors

Table 4. 6. Correlation between the Performance of Contractors and the Project Management Factors

| | | Project Management Factors | |
|----------------|----------------------------|----------------------------|-------|
| Spearman's rho | Performance | Correlation Coefficient | 1.000 |
| | | Sig. (2-tailed) | .063 |
| | | N | 56 |
| | Project Management Factors | Correlation Coefficient | -.250 |
| Spearman's rho | | Sig. (2-tailed) | .063 |
| | | N | 56 |
| | | Correlation Coefficient | -.250 |
| | | Sig. (2-tailed) | .063 |
| Spearman's rho | | N | 56 |
| | | Correlation Coefficient | -.250 |
| | | Sig. (2-tailed) | .063 |
| | | N | 56 |

A spearman's correlation run to assess the relationship between the performance of contractors and the project management factors indicated a spearman ranking coefficient of -0.250 in the table 4.6 above. This coefficient indicates a weak negative correlation between the performance of contractors and the project management factors which was not statistically significant at $p=0.063$. This indicates that the project management factors as per the data collected have an adverse effect on the performance of contractors as the direction of influence is negative as expected. However, the value is not statistically significant.

4.2.6. Performance Versus Materials Factors

Table 4. 7. Correlation between the Performance of Contractors and the Materials Factors

| | | Materials Factors | |
|----------------|-------------------|-------------------------|-------|
| Spearman's rho | Performance | Correlation Coefficient | 1.000 |
| | | Sig. (2-tailed) | .081 |
| | | N | 56 |
| | Materials Factors | Correlation Coefficient | -.235 |
| Spearman's rho | | Sig. (2-tailed) | .081 |
| | | N | 56 |
| | | Correlation Coefficient | -.235 |
| | | Sig. (2-tailed) | .081 |

| | | Materials Factors | |
|----------------|-------------------|-------------------------|-------|
| Spearman's rho | Performance | Correlation Coefficient | 1.000 |
| | | Sig. (2-tailed) | .081 |
| | | N | 56 |
| | Materials Factors | Correlation Coefficient | -.235 |
| Spearman's rho | | Sig. (2-tailed) | .081 |
| | | N | 56 |
| | | Correlation Coefficient | -.235 |
| | | Sig. (2-tailed) | .081 |

The table 4.7 above indicates that the spearman's ranking coefficient of performance of contractors versus the materials factors is -0.235. This result indicates a weak negative relationship between the variables meaning that, the performance of contractors will only increase as the material factors are reduced. The correlation significance value in this study is 0.081. This indicates that the materials factors as per the data collected have an adverse effect on the performance of contractors as the direction of influence is negative as expected. However, the p-value is not statistically significant.

4.2.7. Performance Versus Labour Factors

Table 4. 8. Correlation between the Performance and the Labour Factors

| | | Labour Factors | |
|----------------|----------------|-------------------------|-------|
| Spearman's rho | Performance | Correlation Coefficient | 1.000 |
| | | Sig. (2-tailed) | .052 |
| | | N | 56 |
| | Labour Factors | Correlation Coefficient | -.261 |
| Spearman's rho | | Sig. (2-tailed) | .052 |
| | | N | 56 |
| | | Correlation Coefficient | -.261 |
| | | Sig. (2-tailed) | .052 |

A spearman's correlation run to assess the relationship between the performance of contractors and the labour factors indicated a spearman ranking coefficient of -0.261 as shown in the table 4.8 above. This coefficient indicates a weak negative correlation between the performance of contractors and the labour factors which was statistically significant at $p=0.052$. This implies that the labour factors, as per the data collected, have an adverse effect on the performance of contractors.

4.2.8. Performance Versus External Factors

Table 4. 9. Correlation between the Performance of Contractors and the External Factors

| | | External Factors | |
|----------------|------------------|-------------------------|---------|
| Spearman's rho | Performance | Correlation Coefficient | 1.000 |
| | | Sig. (2-tailed) | .003 |
| | | N | 56 |
| | External Factors | Correlation Coefficient | -.389** |
| Spearman's rho | | Sig. (2-tailed) | .003 |
| | | N | 56 |
| | | Correlation Coefficient | -.389** |
| | | Sig. (2-tailed) | .003 |

| | | | |
|------------------|-------------------------|---------|-------|
| External Factors | N | 56 | 56 |
| | Correlation Coefficient | -.389** | 1.000 |
| | Sig. (2-tailed) | .003 | . |
| | N | 56 | 56 |

**, Correlation is significant at the 0.01 level (2-tailed).

The table 4.9 above indicates that the spearman's ranking coefficient of performance of contractors versus the external factors is -0.389. This result indicates a moderate negative relationship between the variables meaning that, the performance of contractors will only increase as the external factors are reduced. Since the correlation is statistically significant at $p = 0.01$, therefore, any correlation of ≤ 0.01 is significant. The correlation significance value in this study is 0.389. This indicates that the external factors as per the data collected have an adverse effect on the performance of contractors as the direction of influence is negative as expected. However, the p-value is not statistically significant.

4.2.9. The Multiple Regression Model

The dependent variable (Contractors performance) was regressed with the eight independent variables. These independent variables were; financial factors, construction management factors, construction technology factors, design factors, project management factors, design factors, materials factors, labour factors and external factors.

The multiple regression model produced by this analysis is shown on the table 4.10 below.

Table 4.10. Multiple Regression Model

| Coefficients ^a | | | | | | | | | |
|---------------------------------|-----------------------------|------------|---------------------------|------|--------|--------------|---------|-------------------------|-------|
| Model | Unstandardized Coefficients | | Standardized Coefficients | Beta | Sig. | Correlations | | Collinearity Statistics | |
| | B | Std. Error | | | | Zero order | Partial | Tolerance | VIF |
| (Constant) | 5.817 | .462 | | | 12.604 | .000 | | | |
| Financial Factors | -.272 | .063 | -.464 | | 4.285 | .000 | -.428 | .530 | 1.228 |
| Construction Management Factors | .338 | .099 | .464 | | 3.428 | .001 | .147 | .447 | 1.924 |
| Construction Technology Factors | .020 | .097 | .037 | | .205 | .839 | -.112 | .030 | 3.512 |
| Design Factors | -.529 | .132 | -.818 | | 4.022 | .000 | -.295 | .506 | 4.340 |

| | | | | | | | | | | |
|----------------------------|-------|------|-------|--------|------|-------|-------|-------|------|--------|
| Project Management Factors | .328 | .218 | .472 | 1.505 | .139 | -.227 | .214 | .147 | .097 | 10.332 |
| Materials Factors | .014 | .176 | .020 | .080 | .936 | -.237 | .012 | .008 | .153 | 6.525 |
| Labour Factors | -.443 | .127 | -.516 | -3.491 | .001 | -.260 | -.454 | -.341 | .437 | 2.286 |
| External Factors | -.067 | .123 | -.069 | -.541 | .591 | -.366 | -.079 | -.053 | .584 | 1.711 |

a. Dependent Variable: Performance

The table 4.10 above correlates the eight independent variables and then gives the coefficients for the regression model.

The summary of the above correlations indicates the beta weight and the statistical significance. The results indicate that, five of the eight independent variables are statistically significant. These are: Financial factors (P-Value=0.001); Design factors (P-value=0.001); Construction management factors (P-value=0.000); Labour factors (P-Value=0.001) and Project management factors (P-value=0.012).

The standardized beta values indicate a great influence upon the dependent variable by the following independent variables; design factors (beta=-.818), labour factors (beta=-.516) and financial factors (beta=-.464).

Based on the regression model above, the analysis can be reduced to a general linear formulation as follows:

$$Cp = 5.82 - 0.27F + 0.34CM + 0.02CT - 0.53D + 0.33PM + 0.01M - 0.44L - 0.07E$$

Where,

Cp-contractor performance, F-financial factors, CM-construction management factors, CT-construction technology factors, D-design factors, PM-project management factors, M-materials factors, L-labour factors and E-external factors

V. CONCLUSION

The analysis findings yielded a negative relationship between the performance of contractors and the following performance determinants: financial factors $\rho = -.448$, construction technology factors $\rho = -.117$, design factors $\rho = -.311$, project management factors $\rho = -.250$, materials factors $\rho = -.235$, labour factors $\rho = -.261$ and external factors $\rho = -.389$. Contrary to the conceptual framework, the construction management factors yielded a positive relationship with performance with an $\rho = 0.167$. This study therefore concluded that financial factors, construction technology factors, design factors, project management factors, materials factors, labour factors and external factors have an adverse effect on the performance of contractors in Kenya whereas the construction management factors did not have adverse effect on the performance of contractors in the country.



Therefore, the contractors and other industry stakeholders need to reduce or improve on all these factors if they are to have the contractors improve on their performance.

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