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IMPACT OF KNOWLEDGE MANAGEMENT PRACTICES ON PERFORMANCE OF CONSTRUCTION FIRMS IN NIGERIA

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ABSTRACT

The performance of an organization is primarily driven by knowledge thus the essence of KM (Knowledge Management) in organizations. The need to improve performance of construction firms have been emphasized severally in literature. Impact of individual KM practice on performance is yet to be established. This study examined the relationship between individual KM practice and performance of construction firms in Nigeriaby identifying ten KM practices and six performance measures from the literature. Purposive sampling method was adopted. A structured questionnaire was administered to 358 construction firms out of which217 (60.6%) were completed and analyzed.Descriptive statistics and structural equation modeling were used in the analysis. The results of the descriptive statisticsshow that Knowledge process integration ranked the highest with a mean of 4.79 while the findings of performance measure show that efficiency and safety measures ranked the highest with mean of 4.28 each. The results of the structural equation modeling show that eight of the ten KM practices have significant influence on Performance of construction firms in Nigeria.Integration of HRM and KM should be encouraged for performance improvement in Nigerian Construction firms.

Keywords: ***Construction Firms, Knowledge management, KM Practices, Performance,***

INTRODUCTION

In the 1990s, Knowledge Management (KM) was identified as a management discipline. KM can be defined as the process of creating sharing and managing the knowledge and information of an organization for future use and application. (Ragab & Arisha, 2013). KM initially gained acceptance into commercial firms before penetrating into both public and private sectors (Kamhawi, 2012). It further gained acceptance in non-governmental organizations when major global funders such as the World Bank and the Department for International Development accepted and publicly supported it(Durst & Edvardsson, 2012). The development and sustenance of KM is vital for the success of a firm as it is believed that implementing KM practices is vital for attaining success in a business venture (Andreeva & Kianto, 2012). KM has been recognized as an instrument for achieving competitive edge as it enhances customer focus, employee relation, innovation and development, (Abdullahi *et al*, 2013; Cohen & Olsen, 2015). The effect of KM on the performance of organizations is an evolving topic (Theriou, Maditinos & Theriou, 2011)(Wang, Chiang & Tung, 2012)that has been investigated in various context, countries and industries as a novel and influential approach to management (Inkinen et al, 2015). It is a discourse widely promoted by consultants, academics, practitioners and the general business world because of its importance in the establishment of a framework with which innovative strategies that can influence performance of firms can be implemented. (Harvey *et al.*, 2015).

KM gives opportunity to firms to explore the tacit and explicit knowledge that exists in firms and convert the gathered knowledge into organizational asset for decision making, thereby enhancing the effectiveness

and efficiency of the workforce (Birasnav, 2014). Since the performance of an organization is primarily driven by knowledge, it can be argued that if the organizational knowledge quality is good, the organizational performance will improve significantly. Hence, the application of knowledge gives opportunity for higher performance (Donate & Canales, 2012; Lee et al, 2013). Performance of organization is the act that involves the analysis of what the firm has achieved against the set goals and objectives of the firm (Gupta & Chopra, 2017). It compares the real results obtained with the intended output. A correct adoption of KM practices can have a positive effect on organizational performance. Hence, the stronger the KM practices, the better the influence on performance over time (Hormiga, Batista-Canimo & Medina, 2011; Singha *et al.*, 2015). A review of recent literature shows that existing research appears to focus on issues relating to generic knowledge processes like knowledge acquisition, knowledge sharing and knowledge creation. Only a few studies such Chuang, Liao & Lin (2013), Chen and Huang (2009), Donate and Canales (2012) have examined the impact that the KM practices have on firm performance. To effectively assess KM, it should be carried by assessing the practices (Harvey *et al.*, 2015). The observable facets of Km are referred to as its practices which is the focus of this research. This study focused on the general aspect of firms' performance. Thus, the relationship between specific individual practices and performance is an issue worthy of further studies (Heisig, 2014; Perez-Arrauetal, 2014; Soto-Acosta *et al*, 2014). This study therefore investigates the relationship between specific KM practices and performance. this was achieved by identifying KM practices, examining performance measures and empirically establishing the relationship between the two concepts.

LITERATURE REVIEW

Knowledge Management Practices

Practices are observable facets of concepts (Wang et al, 2012). KM practices can be defined as activities initiated by management of firms aimed at improving the effectiveness and efficiency of the knowledge resources of organizations (Gracia-Morales et al, 2012). Such practices can be operated and managed by deliberate and focused activities of management. At the empirical level, the assessment of the existence of KM and what makes up KM is made at the level of practices (Heisig, 2014). Practices can be referred to as the observable facets of KM.Through the observable facets, managers work to achieve improvement in their firms (Valmohammadi& Ahmadi, 2015). KM can also be viewed as the aspect of organizations that can be deployed and intentionally controlled by the activities of management (Cao, 2013). KM practices are generally described as the set of managerial actions that aid organizations deliver value from the knowledge-based assets (Kim &Hancer, 2010). Ten KM practiceswere adopted for this study: Technology, Structure, Culture, Knowledge Process, People, Strategy, Leadership, Resources for KM, Network and alliances and Assessment of knowledge initiatives.

KM1: Technology:KM Technologies support strategies, processes, methods and techniques that aid in creating, sharing and the application of the best knowledge across the teams and across organizations (Kuo, 2011). They refer to the tools that aid in achieving success in adopting the practice. IT technology refer to IT support, involvement of hard IT practices, IT capable of supporting management decisions and knowledge work. It also includes KM systems and tools that are widely accepted and regularly updated, KM system capable of sharing data and information with all stakeholders and KM system sufficient to support daily work.

KM2: Structure: KM structure can be defined as the organization and arrangement of interrelated elements in a system, or the process of organizing a system (Wang *et al.*, 2012). It involves decentralization, less formalization, work teams, communities of practice, and expertise networks.

Km3: Culture: This refers to the right vison, strategies and tactics that aid organizations toachieve the benefits of KM and overcome its barriers (Tzortzaki & Mihiotis 2014). KM culture includes collaboration among employees, trust in the organisation, and constant learning.It also includes innovative culture to encourage research and development, culture that values knowledge-seeking and problem-solving, strong belief in the philosophy of sharing of knowledge. Employment of experienced employees to share knowledge with new recruits, team work for knowledge sharing, and environment that encourages to develop and implement ideas are also important in the development of KM culture.

KM4:Knowledgeprocesses: These refer to the sequence of actions or steps taken in order to achieve a successful KM adoption (Chen & Huang, 2009). The steps of Knowledge process include acquisition and absorption market focus, sensitivity to market changes, technological human capital pro?le and partnership with international customers. Other steps include the organizations values system, employees' attitudes and opinions. It considers if the organization has well-developed ?nancial reporting system, ensures that the organization gets information from market surveys, identifies internal source of expertise experiments/learns regarding customers and markets. It further includes experiments/learns regarding products and service, experiments/learns regarding operations and technology, and exploits external knowledge.

KM5: People(Integration of HRM and KM): Recent HRM literature recommends the need for organizations to investigate the coordination of HRM strategies and KM strategies to identify sources ofvalue creation (Hsiao *et al.*, 2011; Kushwaha & Rao, 2015). This can be achieved by combining different theoretical perspectives that originated in the field of knowledge management. They must have common objectives in the context of HRM theories such as T-shaped skills i.e. depth of skills and ability to collaborate across disciplines. Others include soft HR practices i.e. approach based on individuals, competence development and management based on rewards knowledge sharing (monetary incentives and non-monetary incentives), and knowledge sharing as a part of performance appraisal.

KM6: KM Strategy: This refers to plans that describe how organizations will better manage knowledge and information received for the benefit of the organization and its stakeholders (Lee *et al.*, 2012). This is a vital factor for the success of KM adoption sinceKM strategy must be closely aligned with the overall strategy and objectives of the organization. Understanding of the organization as an overall system, clear objectives for KM, and explicitly documenting the KM rules.

KM7: KM leadership: The role of leadership in driving the success of any organizational initiative cannot be over emphasized. Leadership is an important dimension in organizational success (Ragab & Arisha, 2013). The role of leaders is vital in achieving successful KM adoption. The cultural and maturity level of KM in most organizations echoes the role of leaders. It involves leaders acting as catalysts for knowledges sharing, establishing conditions set by management, ensures top management act as a role model for KM, and it involves the commitment and support to KM by top management.

KM8: Resources for KM: This refers to typical supply of funds, materials, staff, and other assets that can be drawn on by a person or organization in order to effectively adopt KM (Chien & Tsai, 2012). This can be referred to as the consideration of resource availability when investing in KM, budgeting for KM, suf?cient ?nancial resources for KM, suf?cient human resources for KM, and providing time to employees for KM.

KM9: Network and alliances: This is a process where the most effective members

for a team are selected and united for the common goal of an organization. Members that form alliance consist of individuals, organizations, businesses or groups (Chuang *et al.*, 2013). Common areas of interest and concerns are identified and shared. Available resources are used to achieve common goals. Network and alliance can generally be referred to as a manifestation of cooperative strategies to improve the operations of organizations. This involves dedicating resources to obtain external knowledge, participating in teams where external members are also members, membership of industry bodies, processes for customer feedback and processes for exchanging knowledge with business partners and suppliers.

KM10: Assessment of knowledge initiatives: KM initiatives are the actions taken or statements made with the intention of solving a problem. KM is not only about information, it also involves people recruited, trained, developed and promoted in an organization (Donate & Canales, 2012; Kianto et al, 2014). KM initiative provide resources to learn what works and what does not work and the reason for such failures. It further explores effective models that address urgent social challenges. Assessing KM initiatives involves benchmarking, assessment matrices (?nancial and non ?nancial) and measurement of intellectual capital.

Categories of Performance Measurement
PMBOK Guide (2007), grouped the mostly used performance measures into six general categories

1 **Effectiveness:** this can be referred to as the capability of producing a desired result or achieving a set goal. A process characteristic indicating the degree to which the process output (work product) conforms to requirements (Are we doing the right things?)

2 **Efficiency:** A process characteristic indicating the degree to which the process produces the required output at minimum resource cost. (Are we doing things, right?). this ensures that materials, energy, efforts and funds are not wasted in the process of achieving desired goals.

3 **Quality:** The needs of the client is paramount, the aim of any business venture or organization is to ensure that their customers are satisfied with the quality of output. The degree to which a product or service meets customer requirements and expectations.

4 **Timeliness**: Meeting the needs of customers at the expected or favorable time is important. Timely delivery is vital Measures whether a unit of work was done correctly and on time. Criteria must be established to define what constitutes timeliness for a given unit of work. The criterion is usually based on customer requirements.

5 **Productivity**: the efforts involved in any venture must be effective. Productivity measures how effective the input to a production process is. The value added by the process divided by the value of the labor and capital consumed.
6 **Safety Measures:** These are activities and precautions taken to improve safety, i.e. reduce risk related to human health, the overall health of the organization and the working environment of its employees.

KM Practices and performance
KM culturepractice should ultimately culminate in ensuring a competitive edge for the organization thus should positively influence performance (Hurmelinna-laukkanen, 2011). KM has increasingly become vital for the success of organizations, implementation of right technology for KM would positively influence performance (Valmohammadi & Ahmadi, 2015). Firms that are able to effectively implement and adopt KM practices will remain competitive in the long run even though the implementation mayexpensive and time consuming (Jian et al, 2014). Right adoption of KM technology and leadership practices will positively influence Organizational Performance (Wang et al, 2012). It is expected that the

benefits will offsetthe cost intensive procedure of KM adoption. KM literature has overtime supported the synergy between KM strategy and performance, it is believed it wouldimprove the performance of firms (Lee et al, 2012). KM Network and affiliation practices are of value to a manager as research has shown that successful KM adoption influences organizational effectiveness (Kianto et al, 2014). Well-planned and well executed KM Resources and Leadership practices function as enablers for the achievement of better performance of an organization. Performance benefits of KM adoption can only be achieved if firms develop strategies for filtering knowledge, strengthen the philosophy of corporate organizations and enhance effective communication (Steinfield et al , 2010; Palacios et al, 2013). Assessing Knowledge initiatives, integration of HRM and KM, KM technology and KM Structure enhances performance of organizations positively (Kushwaha & Rao, 2015). However, Chen & Huang (2009) believe that KM processes does not positively influence performance of firms. This is however yet to be empirically established.

METHODOLOGY

Data collection technique

The study considered theories and collect data hence the deductive approach will be the most suitable. Identifying the relationship between KM and performance will add an important level of understanding that can help in improving performance of organizations. The deductive approach points towards a survey method of data collection. A survey method allows for the collection of quantitative data which can be analyzed using descriptive and inferential statistics. The survey method has been used in past researches examining aspects of KM (Lee *et al.*, 2013), performance (Kuo, 2011) and relationship between KM and performance(Perez-Arrau *et al.*, 2014). According to quantitative methods can provide a high level of measurement precision, statistical power, and high levels of reliability of data. In order to utilize the statistical power of the quantitative method the data was analyzed using statistical (quantitative) analysis procedure.

This study focused on construction organizations registered with the Bureau of public procurement (BPP) in Nigeria. Firms not expressly practicing KM were included because they may not be specifically familiar with KM but may be practicing the principles routinely without knowing it. It means that their response will be practical rather than theoretical knowledge. A total number of 88,424 construction companies are registered with the BPP in Nigeria (Olaleye *et al.*, 2019).

Purposive sampling technique was adopted. A sample of 383 was drawn from the population at 95% level of confidence. A sample size of 383 is needed to arrive at a sample with a sampling error of at least 5%. This number (383) is further collaborated by the tables presented by (Saunders et al,2009, Cohen et al, 2007) the choice of 383 is consistent with the two tables for a population size of less than 100,000 with 95% confidence level and 5% margin of error. A total number of 383 questionnaires were administered to employees of construction firms and 217 (60.6%) were retrieved and analyzed.

The variables used in the questionnaire were extracted from a review of relevant literature, on a five-point Likert scale ranging from 5: strongly agreed, to 1: strongly disagreed, respondents were asked to indicate their perceived level of agreement with statements on KM and performance. The questionnaire was divided into three sections. Section A covered the demographics of the respondents, Section B covered questions on KM Practices while section C covered questions on the performance measures of the organizations studied.

Analysis and Results

A descriptive analysis of the collected data was done using SPSS version 21 and the partial least square structural equation modelling (Smart Pls 3) for the inferential statistics.

Table 1: Knowledge Management (KM) Practices

CODE	KM PRACTICES	MEAN
KM Technology		
K1A	Effect IT support in place	3.20
K1B	Hard IT Practices are identified and utilized	3.72
K1C	Available IT is capable of supporting management decision and Knowledge work	4.59
K1D	KM systems and tools are widely accepted and regularly updated	4.53
K1E	KM systems are capable of sharing data and information with all stakeholders	4.70
K1F	KM systems are sufficient to support daily work	4.22
KM Structure		
K2A	Decentralization of Processes and procedures	3.88
K2B	Less formalization of work procedure	4.03
K2C	Effective work teams in place	3.97
K2D	Communities of practices	4.17
K2E	Expertise networks	4.49
KM Culture		
K3A	Effective collaboration among stakeholders	4.11
K3B	Established trust in the system	4.42
K3C	Learning of Processes and procedures is enforced	4.43
K3D	innovative culture to encourage research and development	4.36
K3E	culture that values knowledge seeking and problem solving is in place	4.39
K3F	Believes in the philosophy of sharing knowledge	4.44
K3G	Experienced employees share knowledge with new recruits	4.40
Knowledge processes		
K4A	knowledge Process conversion	3.41
K4B	knowledge process application	3.54
K4C	knowledge process dissemination and sharing	2.66
K4D	knowledge process responsiveness	2.34
K4E	knowledge process integration	4.79
Integration of HRM and KM		
K5A	integration of T-shaped skills	4.67
K5B	Adoption of soft HR practices	4.62
K5C	Approach based on individuals	4.54
K5D	competence development and management based on competencies	4.65
K5E	rewards knowledge sharing	4.34
K5F	knowledge sharing as part of performance appraisal	4.04
KM Strategies		
K6A	Aligning the KM strategy with organizational strategy	4.23
K6B	Understanding the organization as an overall system	4.18
K6C	Clear objectives for KM	4.23
K6D	Explicitly documenting the KM rules	4.51
KM Leadership		
K7A	Leadership is acting a catalyst for knowledge sharing	4.03
K7B	establishes conditions by management	4.37
K7C	top management as a role model for KM	4.36
K7D	Commitment and support to KM by top management	4.31

Resources for KM		
K8A	Consideration of resources available when investing in KM	4.36
K8B	Budgeting for KM	4.53
K8C	Sufficient financial resources for KM	4.54
K8D	Sufficient human resources for KM	3.76
K8E	Providing time to employees for KM	3.92
Network and Alliances		
K9A	Dedicating resources to obtain external knowledge	3.06
K9B	Participating in team where external members are also members	2.86
K9C	Membership of industry bodies	4.65
K9D	Processes for customer feedback	4.52
K9E	Processes for exchanging knowledge with business partners and suppliers	4.41
Assessment of Knowledge initiatives		
K10A	Benchmarking	4.05
K10B	Assessment of financial and non-financial matrices	3.98
K10C	measurement of intellectual capital	3.81

Source: Field Study 2019

Table 1 shows the result of the descriptive statistics of KM practices. The findings show that Knowledge process integration ranked the highest with a mean of 4.79, this is followed by integration of T shaped skills with a mean of 4.67 and adoption of HR practices with a mean of 4.62. knowledge process responsiveness ranked the lowest with a mean of 2.34 followed by knowledge process dissemination and sharing with a mean of 2.66.

Table 2: Performance Measures

Code	Performance measure	Mean
P1	Effectiveness of processes and procedure	4.20
P2	Efficiency of processes and procedure	4.28
P3	Quality of finished product	3.92
P4	Timeliness of delivery	4.01
P5	Productivity of manpower	4.10
P6	Safety Measures	4.28

Source: Field Study 2019

Table 2 shows the result of the descriptive statistics of the performance measures identified from literature. The findings show that efficiency and safety measures ranked the highest with mean of 4.28 each followed by effectiveness of processes and procedures with a mean of 4.20 while quality ranked the lowest with a mean of 3.92.

Table 3: Internal Consistency, Convergent Validity, R^2 and Q^2 results

	AVE	Composite Reliability	Cronbachs Alpha	R Square	Q Square
KM Technology	0.6355	0.7155	0.8557		
KM Structure	0.5334	0.7140	0.8306		
KM Culture	0.5828	0.8926	0.8666		
Knowledge processes	0.6211	0.7181	0.8298		
Integration of HRM and KM	0.5522	0.8794	0.8352		
KM Strategies	0.5524	0.8269	0.7776		
KM Leadership	0.5350	0.8153	0.7094		
Resources for KM	0.5660	0.7935	0.6335		
Network and Alliances	0.6768	0.7987	0.7143		
Assessment of Knowledge initiatives	0.5625	0.7100	0.7655		
Performance	0.6498	0.8238	0.7402	0.7239	0.2881

Source: Field Study (2019)

Internal consistency: The results of the internal consistency also referred to as composite reliability for the firms is presented in table 3. Smart Pls prioritizes the indicators according to their individual reliabilities and thus utilize composite reliability as against the traditional criterion of internal consistency (Cronbach's alpha). It is however interpreted in the same way as Cronbach alpha. All the constructs meet the minimum threshold of 0.70. The scores as presented in table 3 are as follows: KM Technology 0.716, KM Structure 0.714, KM Culture 0.892, Knowledge processes 0.718, Integration of HRM and KM 0.874, KM Strategies 0.827, KM Leadership 0.815, Resources for KM 0.794, Network and Alliances 0.799, Assessment of Knowledge initiatives 0.710 and Performance 0.824.

Convergent validity: A common measure used in establishing the convergent validity of constructs is the Average Variance Extracted (AVE). this is referred to as the grand mean of the squared loadings of the indicator associated with each construct. Table 3 shows the AVE of the model. The findings show that the 10 constructs meet the minimum 0.50 threshold. KM Technology 0.636, KM Structure 0.533, KM Culture 0.583, Knowledge processes 0.621, Integration of HRM and KM 0.552, KM Strategies 0.552, KM Leadership 0.535, Resources for KM 0.566, Network and Alliances 0.677, Assessment of Knowledge initiatives 0.563 and performance 0.650.

Coefficient of determination (R^2): Table 3 shows the results of the firms. The findings indicate that the ten KM practices subculture types explain 72.39% of the variance in Performance (Substantial).

Table 4: Path coefficient

CODE	KM PRACTICE	PERFORMANCE
K1	KM Technology	0.0038
K2	KM Structure	0.6452
K3	KM Culture	0.0718
K4	Knowledge processes	0.1172
K5	Integration of HRM and KM	0.1872
K6	KM Strategies	0.0142
K7	KM Leadership	0.7736
K8	Resources for KM.	0.1171
K9	Network and Alliances	0.1572
K10	Assessment of Knowledge initiatives	0.7045

Source: field study (2019)

Path Coefficients: Table 4 shows the results of the path coefficients. The results show that the path coefficient between KM Technology and performance is 0.038, KM Structure and performance is 0.6452, KM Culture and performance is 0.0718, Knowledge processes and performance is 0.1172, Integration of HRM/KM and performance is 0.1872, KM Strategies and performance is 0.0142, KM Leadership and performance is 0.7736, Resources for KM and performance is 0.1171, Network and Alliances and performance is 0.1572, Assessment of Knowledge initiatives and Performance is 0.7045. the results show that KM leadership has the strongest relationship with performance, followed by assessment of Knowledge initiative and KM structure. The weakest relationship exists between KM strategies and performance. The findings show that all the KM practices have positive relationship with performance.

Table 5: Mean, STDEV, T-Values, Sig Level

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)	SIG LEVEL
K1 -> P1	0.287	0.018	0.147	0.147	1.953	*
K2 -> P1	0.592	0.038	0.179	0.179	3.313	***
K3 -> P1	0.452	-0.075	0.102	0.102	4.439	***
K4 -> P1	0.398	-0.140	0.148	0.148	2.693	***
K5 -> P1	0.357	0.213	0.135	0.135	2.650	**
K6 -> P1	0.412	-0.007	0.142	0.142	2.904	***
K7 -> P1	0.215	0.056	0.159	0.159	1.357	NS
K8 -> P1	0.519	-0.033	0.175	0.175	2.969	***
K9 -> P1	0.157	0.135	0.105	0.105	1.501	NS
K10 -> P1	0.305	0.302	0.101	0.101	3.030	***

Source: Field Study (2019) Note: NS = not significant. a. Bootstrap confidence intervals for 10% probability of error (a= 0.10). *p < .10. **p < .05. ***p < .01.

Size and significance of path coefficients:. Table 4 shows the t statistics and p value results associated with each path result for the firms. A total often path relationships exist between the ten KM practices and performance. A total number of eight significant and two non-significant relationships exists between the exogenous and the endogenous variables. The empirical results of the paths significance show that KM practices influence performance.

DISCUSSION

The findings show that the eight (KM Technology, KM structure, KM culture, KM knowledge process, Integration of HRM and KM, KM Strategy, Resources for KM and Assessment of Knowledge Initiatives) of the ten KM practices identifiedin this study have significant relationships with firm performance. While two practices (KM Leadership and Network and Affiliation) have non-significant relationships with performance. KM Technology if properly adopted, can lead to enhanced knowledge sharing in firms. This finding corroborates the earlier findings of Palacio-Marques et al, (2013), Singha et al, (2015) and Kushwa and Rao (2015) that concluded that KM culture, KM Processes and assessment of knowledge initiative practices play a significant role in the performance of firms. The findings are also in line with the findings of Zack et al (2019) whose findings show that KM Technology, KM Strategy, KM Network and affiliation have positive relationship with performance of firms. The findings are however not in line with the findings of Ragab & Arisha (2013), as leadership was found to have a negative relationship with performance of organizations. KM strategy was also established to have a negative relationship with performance, this is not in line with the findings of Lee et al, (2012)

CONCLUSION

This study examined the relationships that exist between KM practices and performance of construction firms in Nigeria. It points out the individual KM practices identified and the specific relationship of each practice with performance of firms. Eight of the ten practices identified have significant relationship with performance of construction firms. KM leadership and KM network and affiliations are not significantly linked with the performance of Construction organizations in Nigeria. The extent of these practices must be improved to improve the performance of Construction organizations in Nigeria.

RECOMMENDATIONS

1. Management of construction firms should ensure Integration of HRM and Km to improve their performance.
2. Efficiency of Processes and procedures should be improved in Construction firms

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