

Assessing Critical Success Factors for Implementing Sustainable Procurement in the Nigerian Construction Industry

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The implementation of sustainable procurement practices has gained significant attention in the construction industry as a means to promote environmental stewardship, social responsibility, and economic development. However, the successful implementation of sustainable procurement initiatives requires a thorough understanding of the critical success factors (CSFs) specific to the context in which they are applied. This study aims to assess the CSFs for implementing sustainable procurement in the Nigerian construction industry. Through an extensive literature review, a comprehensive list of potential CSFs was compiled. Subsequently a sample size of 385 procurement professionals in Nigeria was determined from an infinite population and sampled purposively to obtain their assessments of the identified CSFs. Data from the survey were analysed using descriptive statistics to determine the relative importance of each CSF and factor analysis to identify the underlying constructs. The findings revealed the most important CSFs for successful implementation of sustainable procurement in the Nigerian construction industry to be; “Quality-bidding strategy for sustainable components into tender pre-qualification, selecting materials based on low risks to the environment and Availability of environmentally friendly products”. The study therefore concludes that successful implementation of sustainable procurement in the Nigerian construction industry is contingent upon critical success factors centered on capacity, policy and strategy, environmental performance, and supplier engagement. The study contributes to the existing body of knowledge by providing insights into the specific CSFs that are crucial for the adoption and implementation of sustainable procurement practices in the Nigerian construction industry. The identified CSFs can serve as a framework for construction firms, policymakers, and industry stakeholders to guide their efforts towards sustainable procurement. Further studies can investigate the relationship between the implementation of the identified CSFs and the actual performance outcomes of construction projects in Nigeria.

Keywords: Construction industry, critical success factors, factor analysis, implementation, sustainable procurement, Nigeria

Introduction

The construction industry plays a crucial role in any nation’s economic development as it contributes significantly to the positive growth of their Gross Domestic Product (GDP) (Durdyev & Ismail, 2012; Oyewobi *et al.*, 2017). Nonetheless, it is also a contributor of various negative challenges related to environmental sustainability and social responsibility. It is responsible for nearly 40% of CO₂ emissions and generates around 30% of solid waste, resulting in negative impacts such as climate change, biodiversity loss, damage to the regenerative capacity of the planet as well as provision of clean air and water (Mudashir *et al.*, 2024; United Nations Environment Programme, 2022). To address these negative impacts, the concept of sustainability has been introduced to the construction sector to promote environmentally friendly construction practices such as energy saving, reduction of emissions, re-use, and recycle of materials (Bianchini & Hewage, 2012).

In recent years however, as researches (Kannan, 2017; Shaikh *et al.*, 2022) have noted that provision of sustainability across the entire construction supply chain

is a cornerstone to achieving sustainability in construction, there has been a growing recognition and push for the adoption and implementation of sustainable procurement initiatives/practices in the construction sector. Sustainable procurement refers to procurement which takes into consideration, economic criteria, environmental considerations and social responsibility. It is the adoption and integration of sustainable development principles into the procurement processes and decisions of organisations (Manutan, 2022; Cooper, 2024). Implementing sustainable procurement in the construction sector not only ensures sustainability across the entire construction supply chain, but also offers benefits such as: improved risk management, reduction in costs, promoting innovation and differentiation, increased turnover, waste minimization, efficient resource utilization, recycling, reduced packaging, and optimized transportation (Ojelabi & Okonta, 2023; Basiru *et al.*, 2025).

Globally, several researches have been carried out to boost the adoption and implementation of sustainable procurement in the construction sector. Notably, research efforts have been made to develop a multistage

model for its adoption in the construction industry (Agbesi *et al.*, 2018; Ogunsanya *et al.*, 2021); assess the barriers to its implementation in organisations (Shaikh *et al.*, 2022; Agyekun, *et al.*, 2023; Riadi & Machfudiyanto, 2023; Masoud, 2023); analyse drivers for its implementation in organisations (Ruparathna & Hewage, 2015; Hinrichs & Wettlin, 2019; Shaikh & Channa, 2022; Santos, *et al.*, 2024) and more recently, assess critical success factors for its implementation in construction projects (Al Nuaimi, *et al.*, 2020; Riadi & Machfudiyanto, 2023). These efforts though context specific, are expected to promote and improve the adoption and implementation of sustainable procurement in the construction industry.

In Nigeria, similar to several other countries, the construction industry has historically played a pivotal role in driving economic growth and contributing substantially to the nation's GDP. Furthermore, to mitigate the negative impact of the construction sector, the Nigerian Government established the Nigerian Environmental Standards and Regulatory Enforcement Act (NESREA Act, 2017) aimed to integrate environmental considerations into development planning for public facility construction, including post-construction review audits. More recently, due to growing concerns about the imperative for adoption and implementation of sustainable procurement to facilitate sustainability in the Nigerian construction sector's supply chain, research efforts have been made to assess potential barriers and strategies for its adoption and implementation (Oyewobi *et al.*, 2017; Ogunsanya *et al.*, 2019); assess influence of sustainable procurement practices on project delivery (Mudashir *et al.*, 2024) and also; assess decisive factors for decision making to achieving sustainable procurement in construction projects (Osuizugbo & Adenuga, 2024). However,

several critical success factors underpin effective implementation of sustainable procurement in construction (Al Nuaimi *et al.*, 2020; Riadi & Machfudiyanto, 2023) and no attempt exists to uncover these factors for the Nigerian context.

This study attempts to bridge this knowledge gap by assessing the critical success factors for effective implementation of sustainable procurement in the Nigerian construction context.

Critical Success Factors in Sustainability

The concept of Critical Success Factors (CSFs) has been pivotal in various domains, particularly in management and strategy research. CSFs are defined as those specific conditions, variables, or features that, when effectively managed or nurtured, significantly impact the success of an enterprise or endeavour. They are areas or activities that require constant and meticulous attention from management. In essence, CSFs are the limited number of crucial areas where satisfactory results ensure the successful competitive performance of an organisation (Mulengani, 2010; Satar, 2016).

In the context of sustainable supply chain management (SSCM), CSFs have emerged as enablers for effective implementation. They have been widely utilized in supply chain management (SCM) literature. Notable studies have explored CSFs in areas such as reverse logistics implementation (Luthra *et al.*, 2017), green supply chain management in the mining industry (Luthra *et al.*, 2014), SSCM in the automobile industry (Luthra *et al.*, 2015), SSCM in the manufacturing sector (Dubey *et al.*, 2015a, b), SSCM practices in the textile sector (Diabat *et al.*, 2014), and SSCM practices in the oil and gas sector (Raut *et al.*, 2017). Table 1 presents a summary of CSFs reported in the context of sustainability.

Table 1: Critical Success Factors Reported in the Context of Sustainability

Critical Success Factors	References
Financial support and funding for green projects to drive adoption	Walker and Jones (2012), Talib and Rahman (2010), Luthra <i>et al.</i> (2015a, b)
Dedicated resources, green expertise to facilitate sustainable procurement	Walker and Jones (2012), Talib and Rahman (2010), Luthra <i>et al.</i> (2015a, b)
Top management support	Banihashemi <i>et al.</i> (2017), Ogunsanya <i>et al.</i> (2022)
Clear policies, green guidelines, and commitment by project clients	Banihashemi <i>et al.</i> (2017), Ogunsanya <i>et al.</i> (2022)
Environmental awareness	Banihashemi <i>et al.</i> (2017), Ogunsanya <i>et al.</i> (2022)
Availability of environmentally friendly products	Agyekum <i>et al.</i> (2023), Mohanty & Deshmukh (1998), Riadi & Machfudiyanto (2023)

Trust-building in suppliers, audit monitoring, and compliance	Agyekum <i>et al.</i> (2023), Mohanty & Deshmukh (1998), Riadi & Machfudiyanto (2023)
Availability of suppliers of sustainable goods	Agyekum <i>et al.</i> (2023), Mohanty & Deshmukh (1998), Riadi & Machfudiyanto (2023)
Compliance to environmental standards	Alqadami <i>et al.</i> (2020), Riadi & Machfudiyanto (2023)
Minimizing air and water pollution during the project period	Alqadami <i>et al.</i> (2020), Riadi & Machfudiyanto (2023)
Develop sustainable procurement policies	Alqadami <i>et al.</i> (2020), Riadi & Machfudiyanto (2023)
Green product life cycle costs	Luthra <i>et al.</i> (2015b), Rao and Holt (2005)
Selecting materials based on low risks to the environment	Luthra <i>et al.</i> (2015b), Rao and Holt (2005)
Sustainable procurement regulations and rules	Banihashemi <i>et al.</i> (2017), Ogunsanya <i>et al.</i> (2022)
Strategic partnering approach through contractual arrangements	Banihashemi <i>et al.</i> (2017), Ogunsanya <i>et al.</i> (2022)
Quality-bidding strategy for sustainable components into tender pre-qualification	Banihashemi <i>et al.</i> (2017), Ogunsanya <i>et al.</i> (2022)
Strong commitment to sustainable project delivery from stakeholders	Prasad <i>et al.</i> (2020), Riadi & Machfudiyanto (2023)
Assessment of potential suppliers and tender decisions must incorporate sustainability considerations	Prasad <i>et al.</i> (2020), Riadi & Machfudiyanto (2023)
Using green-labelled materials as a selling point of quality standard	Dubey <i>et al.</i> (2015a), Alqadami <i>et al.</i> (2020)
Provision of incentives and rewards based on sustainability performance	Dubey <i>et al.</i> (2015a), Alqadami <i>et al.</i> (2020)

Research Methodology

This study employed a quantitative research approach wherein a questionnaire survey was used to gather data from respondents. The survey population comprised of professionals and practitioners actively involved in procurement processes within the Nigerian construction industry. The choice of this sample population is underpinned by several key considerations. Firstly, the inclusion of professionals from various roles within the construction industry ensures a holistic perspective on sustainable procurement practices. This diversity encompasses procurement specialists, project managers, architects, quantity surveyors, engineers, sustainability experts, and other relevant professionals. Such inclusivity is essential because sustainable procurement involves multidisciplinary collaboration and requires input from various stakeholders (Sekaran & Bougie, 2016).

Furthermore, the study encompasses participants from a wide array of organisational backgrounds. This includes professionals working in government agencies, private construction companies, non-governmental organisations (NGOs), and academic institutions. The rationale behind this diversity is rooted in the understanding that sustainable procurement is relevant

across different sectors and organisational types. By including a varied sample, the research aims to capture the unique perspectives and practices prevalent in each context (Creswell & Creswell, 2017). The sample population also spanned a spectrum of experience levels. This includes professionals with extensive experience in procurement processes, as well as those who are relatively new to the field. By including individuals at different points in their careers, the research can explore how experience shapes perceptions of critical success factors. Seasoned practitioners may offer insights based on years of practical involvement, while newcomers may provide fresh perspectives and highlight emerging trends (Sekaran & Bougie, 2016).

As the sample population is infinite, the Cochran's formula was used to determine the sample size of the study to be 385. Also, as it was important that only professionals actively involved in sustainable procurement processes within the Nigerian construction industry participate in the survey, purposive sample was used to distribute questionnaires to the study population. Descriptive statistics (including measures of central tendency, variation, and frequency distributions) was initially used to provide a comprehensive overview of the dataset retrieved from respondents. To gain deeper

insight, Exploratory Factor Analysis (EFA) was then employed to reveal latent constructs and group similar factors into dimensions, providing deeper insights into the CSFs underlying sustainable procurement. The R programming software was utilized for data analysis, offering a wide array of statistical techniques essential for conducting factor analysis and deriving meaningful insights.

Results

Respondents’ demographic information

A total of 385 questionnaires were administered to respondents, out of which 145 (38%) were successfully retrieved. This response rate was deemed sufficient as Sekaran and Bougie (2016) opined that a 30% response rate is sufficient for surveys. Table 1 summarises the demographic information of the respondents relating to the nature of organisation, profession, professional qualification, years of experience, and familiarity with sustainable procurement.

The data shows that the majority of the respondents work in private organizations (56.48%), followed by public organizations (34.56%) and non-governmental

organizations (8.96%). The professional background of survey respondents in the Nigerian construction industry is led by Project Managers (43.45%), followed by Quantity Surveyors (28.97%), Architects (15.17%), and Procurement Specialists (12.41%). The professional registration status of respondents depicts that the majority of the respondents are "Members" (51.72%), followed by "Probationers" (29.66%), and "Fellows" (8.28%), while those with no membership constitute 10.34%. The years of experience reveal a broad range of experience levels, with the largest group having over 16 years of experience (37.93%), followed by 11-15 years (31.72%), 6-10 years (15.86%), and 1-5 years (14.49%). A slight majority of respondents (53.80%) are familiar with sustainable procurement, while 46.20% are not, indicating a mix of awareness levels among the respondents. These findings offer a comprehensive understanding of the respondents' backgrounds and perspectives, which are crucial for evaluating sustainable procurement practices in the Nigerian construction industry.

Table 1: Respondents’ Demographic Information

Nature of Organization	Frequency	Percentage (%)
Public	24	34.56%
Private	108	56.48%
Non-governmental	13	8.96%
TOTAL	145	100.00%
Profession	Frequency	Percentage (%)
Architect	22	15.17%
Project Manager	63	43.45%
Quantity Surveyor	42	28.97%
Procurement Specialist	18	12.41%
TOTAL	145	100.00%
Professional Membership Status	Frequency	Percentage (%)
Fellow	12	8.28%
Member	75	51.72%
Probationer	43	29.66%
None	15	10.34%
TOTAL	145	100.00%
Years of Experience	Frequency	Percentage (%)
1-5 years	21	14.49%
6-10 years	23	15.86%
11-15 years	46	31.72%
16-20 years	55	37.93%
TOTAL	145	100.00%
Familiarity with Sustainable Procurement	Frequency	Percentage (%)
No	67	46.20%
Yes	78	53.80%
TOTAL	145	100.00%

Critical success factors in implementing sustainable procurement

Table 2 presents assessment of key critical success factors essential for the successful implementation of sustainable procurement in the Nigerian construction industry by professionals actively involved in procurement processes in Nigeria. These factors were ranked in order of their mean scores, with higher scores reflecting the professionals' perception of greater importance.

As shown, professionals' involved in procurement processes in Nigeria consider the most important CSFs for successful implementation of sustainable procurement in the Nigerian construction industry to be; "Quality-bidding strategy for sustainable components into tender pre-qualification (mean score of 4.41)", "Selecting materials based on low risks to the

environment (mean score of 4.37)", "Availability of environmentally friendly products (mean score of 4.23)" and also, "Clear policies, green guidelines, and commitment by project clients (mean score 4.22)". In contrast, the CSFs considered to be of least importance were "Strategic partnering approach through contractual arrangements (mean score 3.82)", Strong commitment to sustainable project delivery from stakeholders (mean score 3.79)" as well as "Develop sustainable procurement policies (mean score of 3.76)". This ranking offers valuable insights into the most crucial factors for the successful implementation of sustainable procurement in the Nigerian construction industry. However, it is worth noting that the difference between the highest and the least ranked factors is quite small (0.65), indicating that these factors truly are critical as identified from literature.

Table 2: Critical Success Factors in Implementing Procurement

S/N	Critical Success Factors	Mean	Std. Deviation	Rank
1	Quality-bidding strategy for sustainable components into tender pre-qualification	4.41	1.05	1
2	Selecting materials based on low risks to the environment	4.37	1.19	2
3	Availability of environmentally friendly products	4.23	1.31	3
4	Clear policies, green guidelines, and commitment by project clients	4.22	1.06	4
5	Sustainable procurement regulations and rules	4.21	1.01	5
6	Assessment of potential suppliers and tender decisions must incorporate sustainability considerations	4.19	1.94	6
7	Financial support and funding for green projects to drive adoption	4.17	1.04	7
8	Environmental awareness	4.16	1.10	8
9	Compliance to environmental standards	4.13	1.23	9
10	Availability of suppliers of sustainable goods	4.13	1.00	10
11	Using green-labelled materials as a selling point of quality standard	4.11	0.98	11
12	Green product life cycle costs	4.11	0.95	12
13	Minimizing air and water pollution during the project period	4.10	1.05	13
14	Provision of incentives and rewards based on sustainability performance	4.04	1.18	14
15	Top management support	3.99	1.14	15
16	Trust-building in suppliers, audit monitoring, and compliance	3.95	1.05	16
17	Dedicated resources, green expertise to facilitate sustainable procurement	3.86	1.13	17
18	Strategic partnering approach through contractual arrangements	3.82	0.96	18
19	Strong commitment to sustainable project delivery from stakeholders	3.79	1.10	19
20	Develop sustainable procurement policies	3.76	1.00	20

Identifying patterns and clusters in the critical success factors for implementing sustainable procurement

In order to further understand the most important CSFs to consider in implementing sustainable procurement in the Nigerian construction industry, exploratory factor analysis (EFA) was used to identify hidden clusters,

patterns or constructs that define the CSFs presented in Table 4.

Table 3 provides statistical information regarding suitability of the study's dataset for exploratory factor analysis. It includes the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The KMO varies between 0 and 1; values

above 0.5 are barely acceptable, values between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb. Also, the Bartlett's Test of Sphericity is considered significant at a chi-square value of $P < 0.05$ (Kaiser, 1974; Field, 2005; Ahmadu *et al.*, 2019). As shown in Table 3, the KMO value falls within the range considered great, with a value of 0.857. This signifies that the sample size used in this research is reliable for

conducting exploratory factor analysis. Additionally, the Bartlett's Test of Sphericity is highly significant ($0.000 < 0.05$), indicating that the correlation matrix is not an identity matrix. This statistical validation affirms the appropriateness of employing exploratory factor analysis to identify hidden clusters, patterns or constructs that define the CSFs for implementing sustainable procurement in the Nigerian construction industry.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.882
Bartlett's Test of Sphericity	
Approx. Chi-Square	1528.6*
DF	144
Sig. Level	0.0000

Table 4 presents factor loadings and variance explained. It highlights the extraction of clusters/grouping of the success factors based on their factor loadings and the percentage of variance explained by each factor. As shown in the table, four distinct factors were extracted, each representing a cluster of related factors. The variance explained by the four factors aggregated to 55.6% - the first factor explained the highest variance at 36.294%, followed by the second factor at 7.974%. The variance explained by the third and the fourth factors are 5.432% and 4.769% respectively.

The name assigned to an extracted factor should adequately represent the variables contained within each factor (Young & Pearce, 2013). In this study, the factors were interpreted and named according to the variables that loaded significantly within each factor. The names assigned to the factors are as follows:

Factor 1: Capacity

This is the most dominant factor identified as "capacity", which accounts for an impressive 35.654% of the total variance. This factor encompasses the essential elements necessary for the successful implementation of sustainable procurement within the Nigerian construction industry. Its significant variance indicates that it captures a large portion of the underlying complexity in the data. In the context of sustainable procurement, "Capacity" underscores the importance of having adequate resources, both financial and specialized expertise, to effectively facilitate sustainable practices. The cumulative variance of 35.654% underscores the substantial contribution of this factor to understanding the success factors in sustainable procurement.

Factor 2: Policy and Strategy

The second factor named "Policy and Strategy", accounts for an additional 8.856% of the total variance, resulting in a cumulative variance of 44.269%. Although less dominant than "Capacity", this factor is crucial for understanding sustainable procurement. "Policy and Strategy" highlights the essential role of well-structured policies, green guidelines, and strategic approaches in achieving sustainable procurement goals. Its relatively high variance emphasizes the importance of clear policies and strategic alignment in successful sustainable procurement initiatives.

Factor 3: Environmental Performance

The third factor named "Environmental Performance" accounts for 5.432% of the total variance, contributing to a cumulative variance of 49.701%. This factor illuminates the importance of environmental performance metrics within sustainable procurement. It includes factors related to reducing pollution, complying with environmental standards, and considering the entire lifecycle of green products. The explained variance of 5.432% suggests that these environmental aspects are critical in sustainable procurement practices.

Factor 4: Supplier Engagement and Selection

The fourth factor is named "Supplier engagement and selection" accounting for an additional 4.769% of the total variance, contributing to a cumulative variance of 54.470%. This factor emphasizes the vital role of engaging with suppliers who adhere to sustainability principles and selecting environmentally responsible materials. The focus is on building trust with suppliers,

monitoring their compliance, and choosing eco-friendly goods. The explained variance of 4.769% highlights the significant contribution of supplier engagement and material selection to the broader understanding of sustainable procurement.

Table 4: Extraction and Naming of Clusters/Groups

Success factors	Factor loading	Variance explained %	Cumulative variance explained %
<u>Factor 1</u>		35.654	35.645
Dedicated resources, green expertise to facilitate sustainable procurement	0.745		
Financial support and funding for green projects to drive adoption	0.726		
Trust-building in suppliers, audit monitoring, and compliance	0.711		
<u>Factor 2</u>		8.856	42.773
Clear policies, green guidelines, and commitment by project clients	0.737		
Sustainable procurement regulations and rules	0.734		
Strategic partnering approach through contractual arrangements	0.689		
Top management support	0.646		
<u>Factor 3</u>		5.432	51.734
Provision of incentives and rewards based on sustainability performance	0.765		
Minimizing air and water pollution during the project period.	0.751		
Compliance to environmental standards	0.544		
Using green-labelled materials as a selling point of quality standard	0.527		
<u>Factor 4</u>		4.769	55.581
Quality-bidding strategy for sustainable components into tender pre-qualification	0.798		
Selecting materials based on low risks to the environment	0.634		
Availability of suppliers of sustainable goods	0.634		
Availability of environmentally friendly products	0.616		

Discussion

Firstly, the CSFs assessed in Table 2 revealed the highest ranked factor to be “Quality-bidding strategy for sustainable components into tender pre-qualification”, with a mean score of 4.41, underscoring the importance of integrating sustainability early in the procurement

process. While the least ranked CSF is “develop sustainable procurement policies” with a mean score of 3.76 indicating relatively low importance. This result contradicts the findings of Nguyen (2025) who found “strong government commitment and enhancing the market capacity for green building materials”, to be the

most important critical success factors for implementing sustainable procurement in Vietnam construction industry.

Secondly, the exploratory factor analysis carried out, revealed four distinct dimensions/clusters namely; Capacity, Policy and Strategy, Environmental Performance, and Supplier Engagement and Selection. These dimensions are somewhat in agreement with the work of Riadi and Machfudiyanto (2023) who also had four groups that includes “Rules and Strategies, Organisation, Capacity and Financial”. Similarly, the work of Al Nuaimi *et al.* (2020) had six groupings namely; cost, organisation, innovation capability stakeholder, culture and market.

Conclusion

The analysis of the demographic characteristics and CSFs for sustainable procurement within the Nigerian construction industry highlights key insights. Project Managers play a pivotal role, and half of the respondents possess familiarity with sustainable procurement, indicating a foundational understanding of its principles. The ranking of CSFs reveals that integrating sustainability considerations early in procurement, such as through a “Quality-bidding strategy for sustainable components into tender pre-qualification,” is of utmost importance. Factors such as selecting environmentally responsible materials and having clear policies and guidelines are also crucial. The application of Exploratory Factor Analysis (EFA) further identified four distinct dimensions: Capacity, Policy and Strategy, Environmental Performance, and Supplier Engagement and Selection, each contributing uniquely to sustainable procurement success.

This study contributes to theory by providing empirical evidence on the CSFs for sustainable procurement within the Nigerian construction industry. It also contributes to practice by serving as a framework for construction firms, policymakers, and industry stakeholders to guide their efforts towards sustainable procurement.

The fact that this study used purposive sampling implies that the findings cannot be generalised. Also, the study did not compare responses from different professional groups, which may have provided deeper understanding about the concept, but it provides the opportunity for future research.

To effectively promote sustainable procurement in the Nigerian construction industry, the following recommendations are made:

- i. Bridge the Knowledge and Funding Gap: adopt and implement capacity-building trainings for construction professionals, coupled with financial support mechanisms to make sustainable procurement economically viable for firms.

- ii. Create Practical and Enforceable Green Policies: Develop a single set of clear, national-level sustainable procurement guidelines for the construction industry to eliminate confusion and ensure consistent application.
- iii. Focus on Environmental Performance: Integrate specific, measurable environmental performance indicators (e.g., recycled content, energy use, pollution control) into the contract award process to drive practical adoption.

By addressing these areas concurrently, organisations can advance sustainable procurement practices, drive transformative change, and contribute to the broader goal of sustainability within the Nigerian construction sector.

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