

INFLUENCE OF TECHNOLOGY INCUBATION SUPPORT SERVICES ON THE GROWTH AND SUSTAINABILITY OF SMALL-SCALE ENTERPRISES IN KANO STATE, NIGERIA

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Abstract

Technology Incubation Centres (TICs) play a vital role in fostering sustainable entrepreneurship through the promotion and support of Small-Scale Enterprises (SSEs). In Nigeria, the government has established TICs as part of its strategy to enhance the entrepreneurial ecosystem and drive innovation. Despite these efforts, the Small and Medium Scale Enterprises Development Agency (SMEDAN) reported in 2023 that 80% of SSEs fail before their fifth anniversary, primarily due to lack of access to capital and poor business practices. This study investigates the effect of technology incubation support services on the sustainability of small-scale enterprises in Kano State. Anchored on the Resource-Based View (RBV) theory, the study adopts a cross-sectional survey design with a quantitative approach, targeting a population of 107 SSEs selected using a census-based sampling technique. Data were collected using a structured, 5-point Likert scale questionnaire and analyzed using both descriptive and inferential statistics, specifically Structural Equation Modeling - Partial Least Squares (SEM-PLS) Version 4, at a 95% confidence level. Findings revealed that technical support services and business support services had positive but statistically insignificant effects on the sustainability of SSEs, with t -statistics of 1.62 ($p = 0.104$) and 1.13 ($p = 0.256$), respectively. In contrast, network support services showed a positive and statistically significant effect, with a t -statistic of 4.658 and a p -value of 0.000 ($p < 0.05$). These results suggest that while technical and business support services offer some benefit, their current design and delivery are insufficiently aligned with the actual needs of enterprises. The study concludes that enhancing the quality, relevance and accessibility of technical and business support services could significantly improve their impact on enterprise sustainability within the incubation ecosystem.

Keywords: Technology incubation, business support, network opportunities, sustainability, mentorship

1.0 Introduction

Small-scale enterprises (SSEs) play a vital role in the socio-economic development of Nigeria. They are instrumental in fostering entrepreneurship, generating employment, promoting innovation, and stimulating inclusive economic growth. In a commercial hub like Kano State, SSEs represent a significant segment of the informal and formal economy, contributing meaningfully to household income and local industrialization. However, the sustainability of these enterprises remains a major concern, as many struggle to survive beyond their initial years of establishment. In recognition of the pivotal role of small enterprises and the challenges they face, the Federal Government of Nigeria, through the National Board for Technology Incubation (NBTI), established Technology Incubation Centres (TICs) to support early-stage businesses, particularly those with technological or innovative orientations. These incubation programmes are designed to provide technical support, business advisory services, market linkage, and access to innovation ecosystems that enhance the survival and competitiveness of small enterprises. Despite the presence of these initiatives, the actual impact of technology incubation support services on the sustainability of SSEs remains insufficiently examined, particularly within the socio-economic context of Kano State. Sustainability, in this regard,

refers not only to the ability of enterprises to continue operations over time but also to their capacity to grow, adapt, and contribute to broader development goals. There is a growing body of literature on business incubation globally; however, empirical evidence focusing on the effectiveness of incubation services in the Nigerian context, especially in northern Nigeria, is still limited. This gap necessitates a localized investigation into how technology incubation support services influence the sustainability of SSEs in Kano State. The study seeks to evaluate the extent to which technical, business and network support services contribute to the long-term viability of small-scale enterprises.

1.1 Statement of the Research Problem

The persistent mortality rate of small-scale enterprises in Nigeria, despite the establishment of support systems such as Technology Incubation Centres (TICs), raises critical questions about the effectiveness of such interventions. In Kano State, where SSEs are essential to economic development, a considerable number of these enterprises either stagnate or cease operations within a few years of establishment. This trend undermines efforts aimed at industrial development, poverty reduction, and employment creation. Technology incubation programmes are intended to address the core constraints facing small enterprises namely, limited technical expertise, lack of structured business support, weak innovation capacity, and poor access to networks and markets. However, anecdotal evidence and preliminary observations suggest a misalignment between the services provided by incubation centres and the actual needs of the enterprises they serve. Moreover, there is insufficient empirical data on how different dimensions of incubation support technical, business, and network services affect the long-term sustainability of these firms. Without a clear understanding of the effectiveness and responsiveness of these services, policymakers and programme implementers may continue to invest in models that yield limited developmental impact. Therefore, a rigorous inquiry is necessary to assess the influence of technology incubation support services on the sustainability of SSEs in Kano State, identify gaps in service delivery, and propose strategic recommendations for enhancing enterprise resilience and growth.

1.3 Objectives of the Study: The aim of this study is to examine the effect of technology incubation support services on the sustainability of small-scale enterprises in Kano State, Nigeria. The specific objectives are to:

1. Assess the effect of technical support services on the sustainability of small-scale enterprises in Kano State.
2. Evaluate the extent to which business support services influence the sustainability of small-scale enterprises.
3. Determine how access to network support services affects the sustainability of small-scale enterprises.

2.0 Literature Review

2.1 The Technology Incubation: Technology incubations are usually initiated by governments, universities and research institutions to carefully midwife and nurture novel enterprises into maturity (Bergek and Norrman, 2018). In developing countries, the majority of the incubators are funded by government (Akçomak, 2015). There are several definitions and approaches to business and technology incubation. Conceptually 'incubation' is a diligent and planned process of 'co-location' therefore needs careful attention to the problems of entrepreneurs extending well beyond providing infrastructure and office services (Adelowo and Egbetokun, 2016). According to the National Business Incubators Association (NBIA), "Business Incubation catalyses the process of starting and growing companies, providing entrepreneurs with the expertise, networks and tools they need to make their ventures

successful. Incubation programmes diversify economies, commercialise technologies, create jobs and create wealth”. The term incubator is a device for nurturing immature phenomenon to maturity or self-sustenance under a control environment but a business incubator is an initiative that systematizes the process of creating successful new enterprises, by providing entrepreneurs with a comprehensive and integrated range of services, which include floor-space made available on a flexible and affordable, but temporary basis; common services that include secretarial support and shared use of office equipment; hands-on business counselling; access to specialized assistance such as research and development support and venture capital; and networking activities operating as a reference point inside the premises among entrepreneurs and outside to the local community. According to Lalkaka (2019), business incubation is a means by which visions of new businesses are turned into reality with reduced risks. Barbero *et al.* (2021) added that there are five types of incubators which are as follows: regional incubators; university incubators; virtual incubators; independent commercial incubators and company internal-incubators. Barbero *et al.* (2021) also added classifications to these five types of incubators on the basis of whether they are for-profit or not-for-profit. The regional and university incubators are not-for-profit while the virtual, independent commercial incubators and company internal incubators are for-profit. Moreover, some have classified them on the basis of management aspects (Aerts *et al.*, 2017).

Incubators aspire to have a positive impact on a community's economic health, by maximizing the success of emerging companies (Cassim, 2016). Business incubators have proved effective in many parts of the world. According to Lose and Tengah (2015), only 10 business incubators existed in the United States in 1980. There were nearly 500 by 1995, meaning a new incubator has been opening every week. The technology incubators generally focus on nurturing technology intensive enterprises and knowledge-based ventures. The technology incubation system (TIs) is variously represented by entities such as Technopolis, Science Parks, Research Parks, Technology Parks, Technology and/or Business Incubators. These entities operate as separate organisations but are mostly integrated with other players in the innovation system. The terms Science Parks, Research Parks and Technology Parks as well as Technology Incubators (TIs), Technology Innovation Centres (TICs) and Technology Business Incubators (TBIs) are used interchangeably in many countries depending on the level and type of interaction between R&D community, venture funding and industry (Lalkaka, 2019).

2.2 Conceptual Review

2.2.1 Technical Support Services: Technical support services play a critical role in enhancing the operational efficiency and innovative capacity of small-scale enterprises (SSEs). These services include product development, equipment access, quality assurance, and technical training all of which are vital for building competitive advantage in a dynamic business environment. Empirical studies have consistently underscored the importance of technical support to enterprise survival and growth. According to Afolabi and Laseinde (2019), technical training provided through incubation centres in southwestern Nigeria significantly improved product quality, process efficiency, and cost management among small manufacturers. Similarly, Ezenwakwelu *et al.* (2020) found that access to technical infrastructure such as laboratory equipment and fabrication tools within incubation hubs directly influenced the production capacity and innovation readiness of incubated firms. Furthermore, Obaji and Olugu (2014) argued that without sustained technical input, small enterprises are more vulnerable to technological obsolescence, poor product design, and low customer satisfaction. These technical weaknesses reduce their ability to scale and maintain relevance in competitive markets. In Kano State, where many SSEs operate in low-technology environments, the absence or inadequacy of technical support can lead to substandard outputs and high failure

rates. Thus, the provision of appropriate technical support services is not just desirable but essential for ensuring the long-term sustainability of SSEs in the region. *H1. Technical Support Services does not significantly affect the Sustainability of Small-Scale Enterprises in Kano State.*

2.2.2 Business Support Services: Business support services encompassing strategic planning, marketing, financial advisory, and compliance guidance are fundamental to enterprise sustainability. These services help entrepreneurs make informed decisions, access new markets, manage resources efficiently, and navigate complex regulatory frameworks. Empirical evidence from Uzonwanne (2015) highlights that many SSEs fail not due to lack of ideas, but because of poor business planning and inadequate financial literacy. In a study of incubation centres in Nigeria, Adegbite *et al.* (2017) found that enterprises that received structured business development support recorded higher revenue growth and longer business survival compared to non-supported counterparts. Similarly, Ogundele *et al.* (2021) observed that marketing support services such as branding, pricing strategies, and digital promotion significantly improved customer reach and sales volume among incubated small businesses. Moreover, Eniola and Ektebang (2014) emphasized that guidance on regulatory compliance helps small enterprises avoid legal sanctions, obtain operational licenses, and build formal credibility, all of which are prerequisites for accessing financial markets and public contracts. These studies collectively suggest that business support services are a central pillar of enterprise development, and their absence can limit growth potential, especially in resource-constrained environments like Kano State. *H2. Business Support Services does not significantly influence the Sustainability of Small-Scale Enterprises in Kano State.*

2.2.3 Network Support Services: Network support services such as access to partnerships, market linkages, funding connections, and knowledge-sharing platforms serve as enablers for collaboration, innovation diffusion, and resource mobilization. These networks help small enterprises overcome the limitations of isolation, especially in competitive and uncertain markets. According to Ismail and Almajali (2016), network support significantly enhances the market orientation and adaptability of SSEs. Their study in Jordanian industrial clusters showed that firms with access to peer networks and external mentors reported higher survival rates and faster time-to-market for new products. In Nigeria, Okpara and Wynn (2007) found that network alliances formed through technology incubation centres provided small firms with critical exposure to suppliers, distributors, and investors, facilitating their scale-up processes. Furthermore, Akanbi and Ofoegbu (2019) demonstrated that social and professional networks contributed to knowledge acquisition and opportunity recognition, which are vital for strategic growth. They argue that without structured access to such networks, SSEs remain disconnected from value chains and technological ecosystems, which impairs their sustainability. In Kano State, where many small enterprises are located in informal clusters, the strategic provision of network support through incubation platforms can significantly enhance their market presence, collaborative potential, and innovation capability. Across the reviewed literature, it is evident that technical, business, and network support services collectively influence the sustainability trajectory of small-scale enterprises. While each proxy addresses a different facet of enterprise development, their combined effect is synergistic and essential for long-term resilience. As such, this study anchors its investigation on these three empirically grounded dimensions to assess the role of technology incubation in sustaining SSEs in Kano State. *H3. Network Support Services does not significantly affect the Sustainability of Small-Scale Enterprises in Kano State.*

2.4 The Concept of Sustainability

Sustainability is an approach that creates long-term stakeholder value by implementing a business strategy that considers every dimension of how a business operates in the society, environment and economic spheres. According to Shi *et al.* (2019) the theory of Sustainable Development (SD) has gone through three periods. The embryonic period (before 1972), the molding period (1972-1987) and the developing period (1987-Date). The Brundtland Report (1987) provides a well-known broad definition of SD as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (UNESCO, 2021). The concept is concerned with maintaining a balance between economic, social, and environmental considerations (the three pillars of sustainability). It is, in fact, about the long-term survival of the planet earth for continued habitation of living organisms that form its ecosystem (Business Resource Lab, 2021). The growth and sustainability of small-scale enterprises can be defined in terms of profits, sales, cash flow, assets, number of employees, number of patents and copyrights, amount of fund raised, graduation/survivability rate of tenant firms Pompa (2018). Mian *et al.* (2016) reported that there is no universal agreement on which success factors should be measured and this complicates the assessment of TICs and their incubatees. However, this study will focus on growth of employment and product innovation as sustainability measures.

2.5 Nature of small-scale enterprises

There is no single criterion for defining business enterprises as small or medium scale globally. However, evidence from literature shows that in defining small-scale business, reference is usually made to some quantifiable measures such as: number of people employed by the enterprises, investment outlay, the annual turnover (sales) and the asset value of the enterprise or a combination of these measures. At the moment in Nigeria, following the National Council for Industry (NCI, 2021) classification of small-scale business fall within the following categories of enterprises; Small-scale business, if the enterprise has a capital outlay of between N1.5million and N50million including working but excluding cost of land and or workforce of between 11-100 employees, is the adopted working definition of SSE in Kano.

2.6 Theoretical framework - RBV

The Resource-Based View (RBV) theory is well-suited as the theoretical underpinning for the study on the influence of technology incubation support services on the growth and sustainability of small-scale enterprises (SSEs) in Kano State, Nigeria. RBV emphasizes the strategic importance of internal resources and capabilities in achieving competitive advantage and long-term performance. Technology incubation centres provide critical support services such as technical assistance, business advisory, and networking opportunities that constitute valuable, rare, and inimitable resources for SSEs. These services help overcome common challenges faced by Nigerian enterprises, including limited access to skills, finance, and markets. By enabling firms to internalize these resources, TICs enhance their capacity for growth, innovation, and sustainability, aligning closely with RBV's core assumptions. Thus, the RBV offers a robust lens for analyzing how resource acquisition through incubation contributes to enterprise development in emerging economies.

3.0 Methodology

This study adopted a cross sectional survey research design with quantitative approach. The population of the study comprise of 107 graduated incubatees of Kano Technology Incubation Center between 2014 and 2018. The entire size of the element under study was used as the number of respondents was not large. Consequently, census sampling technique was adopted. This study utilized a five point closed ended likert scale structured questionnaire to obtain

response of the sampled elements. The researcher personally administered the instruments with the help of two research assistants. The data collected was analysed with a two-step process that uses Confirmatory Factor Analysis (CFA) and Structural Equation Modeling- Partial Least Square (SEM-PLS), version to test the hypothesized effects at 0.05 level of significance.

4.0 Results and Discussion

4.1 Descriptive analysis

This section discusses the general demographic features of the respondents. In terms of gender, age, education, and area of innovation. This section begins with the analysis of the response rate of administered and collected questionnaire.

Table 4.1: Distribution of questionnaires

Description	Frequency	Percentage (%)
Retuned	83	77.6
Missing	24	22.4
Total	107	100

Source: Author's Field Survey, 2024

Table 4.1 showed a response rate of (77.6%). The study administered a total of 107 questionnaires. A total of 83 respondents responded to the questionnaire representing a response rate of 77.6% as shown in table 4.1. However, this response rate was considered satisfactory to draw an inference for the study which is in accordance with Cooper and Schindler (2021), where it is stated that the response rates above 50% are acceptable for analysis and publishing, 60% is good, 70% is very good while 80% and above is excellent. Therefore, this response rate, 77.6%, is accepted for this analysis.

Table 4.2: Demographic Characteristics of Respondents (N = 83)

Variable	Category	Frequency	Percent (%)	Mean
Gender	Male	51	61.7	1.53
	Female	32	38.3	2.03
	Total	83	100.0	2.71
Age	18–25	21	25.3	
	26–35	50	60.7	
	36–45	7	8.4	
	Above 46	5	5.6	3.06
	Total	83	100.0	
Education Level	Primary	0	0.0	
	Secondary	3	2.8	
	OND/NCE	25	30.0	
	Degree/HND	46	55.7	
	Master's Degree	7	8.3	
	Other	2	2.2	2.17
Total	83	100.0		
Year of Graduation	2014 (10 years)	9	10.3	
	2015 (9 years)	13	15.7	
	2016 (8 years)	12	13.7	
	2017 (7 years)	26	31.3	

2018 (6 years)	24	29.1	2.74
Total	83	100.0	

4.2 Respondents' Demographic Characteristics

Gender: With 61.7% male and 38.3% female, the sample is male-dominated. This may reflect gender disparities in access or participation in the studied sector, possibly indicating a need for more inclusive policy or intervention. **Age:** A significant portion (60.7%) of the respondents fall within the 26–35 age group, suggesting that the majority are in their early working or entrepreneurial years. This age composition implies high energy, openness to innovation, and potential for long-term impact if well supported. **Educational Background:** Most respondents possess post-secondary qualifications, particularly Degree/HND (55.7%) and OND/NCE (30%). The absence of respondents with only primary education and the high percentage with tertiary education suggest a skilled and knowledgeable population favorable for tasks requiring technical understanding and innovation. **Year of Graduation:** The distribution leans toward more recent graduates, with over 60% graduating between 2017 and 2018. This suggests that most participants are relatively new in the workforce and may still be navigating early career challenges, with implications for training needs and targeted support interventions.

4.2.3 SEM path coefficient

In Structural Equation Modeling (SEM) with Partial Least Squares (PLS), model path coefficients are essential for interpreting the relationships between latent variables (constructs) within the model. Path coefficients indicate the strength and direction of relationships between constructs. They are similar to standardized regression coefficients, with values typically ranging between -1 and +1. Positive coefficients imply a positive relationship, meaning that as one construct increases, the associated construct also increases. Negative coefficients indicate an inverse relationship, meaning that an increase in the predictor variable corresponds to a reduction in the outcome variable, highlighting an inverse linkage between the predictor and outcome variables. The closer the path coefficient is to +1 or -1, the stronger the relationship. Path coefficients closer to 0 suggest weaker relationships between constructs.

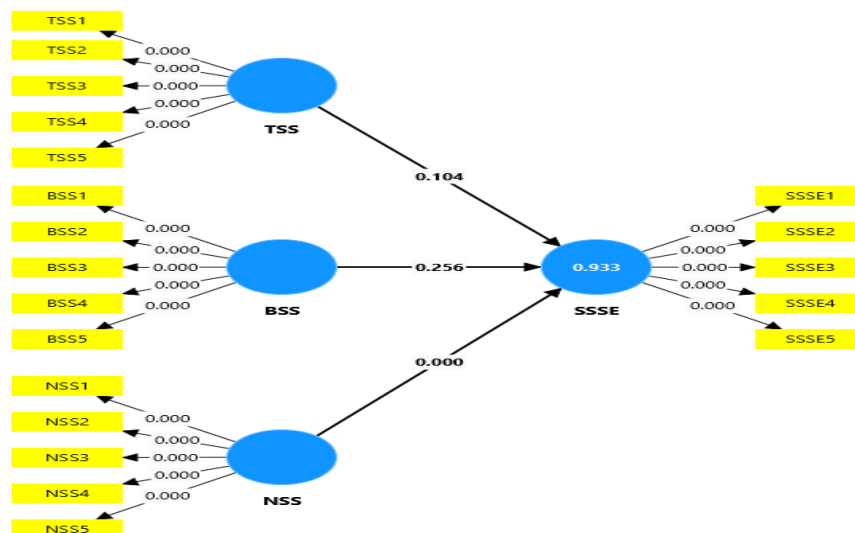


Figure. 4.1: SEM schematic output for significance (p-value)

4.2 Hypotheses Testing

Table 4.3: Table of R-square and R-square Adjusted

Dependent Variable	R-square	R-square adjusted
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SSSE	0.933	0.931
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Source: Author (2025)

The R-square value of 0.933 indicates that 93.3% of the variation in the sustainability of small-scale enterprises (SSSE) is explained by technical, business, and network support services. The adjusted R-square of 0.931 confirms the model's strength while accounting for the number of predictors. This shows the model has a very high explanatory power and is statistically reliable, highlighting the significant role these support services—especially network support—play in influencing enterprise sustainability.

Table 4.4: Results of hypotheses testing

Hypotheses	Path Coefficient	T Statistics	P Values	Decision
TSS → SSSE	0.167	1.628	0.104	Insignificant
BSS → SSSE	0.191	1.137	0.256	Insignificant
NSS → SSSE	0.932	4.658	0.000	Significant

Discussion of Results

H1: *Technical support services have no significant effect on the sustainability of small-scale enterprises' (SSSEs) in Kano State.* The structural model results reveal varying levels of influence among the three support service constructs technical support services (TSS), business support services (BSS), and network support services (NSS) on the sustainability of small-scale enterprises (SSSE) in the study area. The path coefficient for TSS to SSSE was positive ($\beta = 0.167$), indicating a weak positive relationship. However, the relationship was statistically insignificant ($T = 1.628$; $p = 0.104$), leading to the retention of the null hypothesis (H_{01}). This implies that technical support services such as training, product development, equipment access, and quality control do not significantly influence the sustainability of small-scale enterprises within the context of this study. A possible explanation for this could be the inadequate quality, delivery, or relevance of the technical support services being provided. It is also plausible that entrepreneurs are either unaware of these services or find them inaccessible or misaligned with their specific operational needs.

H2: *Business support services have no significant effect on the sustainability of small-scale enterprises' (SSEs) in Kano State.* Similarly, the relationship between business support services and enterprise sustainability was also found to be positive but statistically insignificant ($\beta = 0.191$; $T = 1.137$; $p = 0.256$), resulting in the acceptance of the second null hypothesis (H_{02}). This suggests that services such as business planning, marketing advisory, financial management, and regulatory compliance support have not made a statistically meaningful impact on enterprise sustainability in this case. The insignificance of this path could indicate systemic issues in the design or delivery of business support services, or a disconnect between the support offered and the actual business challenges faced by small-scale enterprises.

H3: *Network support services have no significant effect on the sustainability of small-scale enterprises' (SSEs) in Kano State* Conversely, the path from network support services to sustainability of small-scale enterprises was highly significant and exhibited a strong positive relationship ($\beta = 0.932$; $T = 4.658$; $p = 0.000$). The null hypothesis (H_{03}) was therefore rejected. This finding underscores the critical role of network-based interventions such as market linkages, strategic partnerships, access to incubation networks, and information sharing platforms in enhancing the long-term viability and growth of SSEs. It suggests that when enterprises are effectively integrated into broader innovation and business ecosystems, they are more likely to survive, scale, and remain sustainable.

5.0 Conclusion and Recommendations

5.1 Conclusion

The study examined the influence of technology incubation support services specifically Technical Support Services (TSS), Business Support Services (BSS), and Network Support Services (NSS) on the sustainability of small-scale enterprises (SSSE). The findings from the structural model indicate that network support services (NSS) have a strong and statistically significant positive effect on the sustainability of small-scale enterprises, leading to the rejection of the third null hypothesis (H_{03}). This implies that access to networks, institutional linkages, and collaborative ecosystems is a critical driver of enterprise sustainability in the study context. In contrast, the effects of technical support services (TSS) and business support services (BSS) on SSSE were both positive but statistically insignificant, resulting in the acceptance of the first two null hypotheses (H_{01} and H_{02}). This suggests that while these services may contribute marginally to enterprise growth, they do not significantly influence sustainability in a measurable way within the current operational framework. Overall, the findings emphasize the critical importance of network-based interventions in ensuring the long-term viability of small-scale enterprises, while also highlighting the need to reassess and improve the delivery and relevance of technical and business support services.

5.2 Recommendations

1. Strengthen Networking Platforms and Linkages

Policy-makers and incubation centres should prioritize the development of structured networking opportunities, market linkages, strategic alliances and mentorship platforms. Facilitating collaboration among entrepreneurs, investors, industry actors, and institutions can significantly enhance enterprise resilience and growth.

2. Reform Technical Support Delivery

Technical support services should be re-evaluated and redesigned to meet the evolving needs of small-scale enterprises. This includes upgrading the quality of training, product development assistance, and access to technology or equipment, ensuring they are both accessible and tailored to specific industry demands.

3. Enhance the Relevance of Business Support Services

The content and method of delivering business support such as financial literacy, marketing advisory, and regulatory compliance should be made more practical, sector-specific, and context-driven. Feedback from entrepreneurs should inform program design to ensure greater impact on sustainability.

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