ESI Preprints **Not Peer-reviewed**

The Organizational Contribution of the PMO: An Assessment Using Structural Equation Modeling

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Doi: 10.19044/esipreprint.9.2024.p134

Approved: 05 September 2024
Posted: 08 September 2024

Cite As:
El Yacoubi Z. & Jahidi R. (2024). *The Organizational Contribution of the PMO: An Assessment Using Structural Equation Modeling*. ESI Preprints.
https://doi.org/10.19044/esipreprint.9.2024.p134

Abstract

This research is part of a thesis project that includes two main phases, and it aims to develop and examine a conceptual model to understand and verify the contribution of the PMO to the performance of Moroccan organizations as well as to their level of project management maturity in terms of organization and practices. Thus, the main objectives of this research are: (1) examine the PMO contribution to organizational performance and project management maturity, but also (2) contribute to the solidification of the theoretical basis of the project management school. For this, a quantitative approach was adopted, where a questionnaire was administrated online for three consecutive months. Firstly, the president of the PMI Moroccan chapter was contacted to request their collaboration. Secondly, a direct interaction was carried out with people evolving in project management within organizations that have a Project Management Office (PMO) and who could answer the questionnaire through the professional network "LinkedIn". Two hundred and five (205) responses were received, of which seventy-six (76) were discarded because the respondents declared the non-existence of a PMO within their organizations or it exist for less than three years. Finally, one hundred and twenty-nine (129) responses were considered usable and represent our final database from which we proceeded to a set of analyzes and tests. Two-stage data analysis was followed. First, a descriptive and exploratory analysis of the data collected was performed using SPSS. Next, a confirmatory analysis using structural equation

modeling was carried out with the help of SmartPLS to examine the validity of the constructs of the model and to test the hypotheses. The results of this study provide a solid basis for linking PMO functions to organizational contributions. The study concluded that the PMO through its functions contributes to organizational performance and project management maturity. It also highlights the mediating effect of project management maturity. However, the possible moderating effect of PMO type on structural relationships could not be verified.

Keywords: Project Management Office, Organizational performance, Project management maturity, Structural equation modeling

Introduction

There are several reasons that can lead organizations to implement a PMO. Reasons that consider the organizational context and market expectations (Alghadeer & Mohamed, 2016).

The PMO implementation is far from being standardized to a single approach (Andersen et al., 2007). Instead, it is guided by several factors that must be considered (Zouheir el al., 2020; Desouza & Evaristo, 2006; Andersen et al., 2007; Hobbs & Aubry, 2007), in addition to a multitude of barriers and challenges that must be addressed (Desta et al., 2006; Singh et al., 2009; Hubbard & Bolles, 2012; Oliveira et al., 2017).

Today, the true value of the PMO is perceived through its contribution to performance and the degree of achievement of objectives (Pellegrinelli & Garagna, 2009). Thus, the creation of a PMO contributes primarily to the improvement of project management maturity (Hobbs & Aubry, 2007; Andersen et al., 2007; Al Ahmad, 2015), but also plays a key role in the success of projects within organizations (Kiani et al., 2015; Shalal et al., 2016; Aubry & Brunet, 2016; Lavoie-Tremblay et al., 2017; Szalay et al., 2017). Furthermore, the establishment of such an entity within the organization participates in the improvement of organizational performance and the development of project management by providing a range of management tools as well as strengthening communication within the organization (Zouheir et al., 2019; Rachid, 2019; Lavoie-Tremblay et al., 2012; Spalek, 2012).

According to Aubry et al (2010) the PMO is subject to events from its external and internal environment, just like the organization, which prevents it from following a clear life cycle. For this reason, the establishment of a sustainable PMO should be based on the reality of the organization's environment and the recognition of the need to adapt to the changing users' expectations and not necessarily the performance of the project (Kutsch et al., 2015).

Indeed, the major obstacle to the PMO implementation remains the diversification of existing models in addition to the absence of a consensus on its added value within the organization (Ferreira et al., 2016). This is in line with the conclusions of Hobbs et al. (2008) who say that when setting up the PMO, organizations should perceive the real value that this one will bring, by identifying in advance its mission and functions according to the organizational expectations, and not trying to imitate existing models that can lead to a total failure. In fact, the real value perceived through the PMO implementation lies primarily in the synergy between its functions and roles (Van der Linde & Steyn, 2016).

At this stage, the PMO as an organizational structure, is still attracting the interest of researchers and practitioners around the world, increasingly focusing on fields not yet explored or reinforcing and supporting the initial conclusions drawn.

In Morocco, despite the numerous projects, programs and portfolios launched every day, the role of the PMO is not very visible within organizations. Today, only some large organizations have embarked on the adventure of setting up a PMO. This implementation does not follow the same path and certainly does not have the same goals, since the framework in which it was carried out remains influenced by many factors.

This lack of visibility has aroused our interest in conducting an initial research project that closely relates to this issue, and more specifically to the contribution of the PMO to organizational performance and project management maturity.

Indeed, this research is part of a thesis project that includes two main phases; the first, which focused on the problem of setting up the PMO, and the second, which is the subject of this research work, and which aims to develop and examine a conceptual model in order to understand and verify the contribution of the PMO to the performance of Moroccan organizations as well as to their level of project management maturity in terms of organization and practices.

According to this, the main objectives of this research phase are as follows:

1) To examine the contribution of PMO to organizational performance and project management maturity, but also
2) To contribute to the solidification of the theoretical basis of the project management school.

Literature review

In recent years, the concept of the PMO has been increasingly associated with the success of projects, programs, and portfolios (Aubry &

Brunet, 2016; Lavoie-Tremblay et al., 2017; Szalay et al., 2017), and is a leading lever for performance improvement (Aubry et al., 2010).

Today, the PMO is under pressure all the time (Aubry & Richer, 2011), due to numerous organizational expectations (Desouza & Evaristo, 2006; Hobbs et al., 2008; Alghadeer & Mohamed, 2016). It acts as a guarantor of improvement and expansion of best practices in project management (Hubbard & Bolles, 2012), but also as a catalyst for excellent project management (Hill, 2004), which makes the success of projects closely related to the ability that an organization has to succeed in achieving these objectives (Martin & Martin, 2012).

Effect on organizational performance

According to Aubry and Hobbs (2011), the PMO's contribution to organizational performance is the result of multiple values that exist within the organization. To measure this contribution, the two researchers drew attention to the fact that it is necessary to consider the possible changes that the PMO undergoes to get closer to reality. Based on an analysis of four case studies, Aubry et al. (2011) provided an initial examination of the contribution of the PMO to organizational performance using the competing values framework. They concluded that a paradox existed, since the results obtained showed that there were oppositions between the two groups of respondents regarding the value of the PMO's contribution to organizational performance. The same approach was applied one year later where the PMO seemed to be an interesting transition towards supporting changes and contributing to organizational performance (Lavoie-Tremblay et al., 2012). This can be explained probably by the changes found in the context of the PMO that make the assessment of its contribution to organizational performance also change over time (Cunha & Moura, 2014).

By using the transition process model, Aubry (2015) attempted to explore the relationship that may exist between the factors promoting PMO change and performance improvement. The model adopted in this research was able to explain between 33% and 47% of the observed performance improvement within organizations. Aubry (2015) also provided strong arguments, justifying the need for consideration and implementation of a change management plan to ensure better project performance and consequently better organizational performance.

For their part Kutsch et al. (2015) used the BSC approach to assess the PMO's contribution to improving organizational performance. They used four main perspectives in their assessment approach: (1) The project value perspective, (2) The "user" perspective, (3) The internal process perspective, and (4) The learning and innovation perspective. The BSC approach has allowed researchers to have a contextual view of the PMO through the

application of the strategic map, which provides a synthetic view of the different implications and contributions of the PMO within the organization. Indeed, Kutsch et al. (2015) concluded that the PMO through its services actively participates in the generation of value within any organization, especially regarding the actors benefiting from its services. These conclusions were also validated by Van der Linde and Steyn (2016) by evaluating the effect of the PMO's functions in the creation of value, both within projects and within the organization. To do so, both researchers assumed the existence of a set of effects created by the PMO and adding value to the organization, a value that can be positive or negative and that influences the organization's performance. The two researchers made a comparison before and after the implementation of the PMO and found that there was a clear improvement in project management that impact the overall performance of the organization.

On the other hand, perfect management of the PMO should be guaranteed to reach an improvement in organizational performance (Spalek, 2013), especially in terms of knowledge management and communication (Müller et al., 2013). Also, the operationalization of the PMO and its direct involvement in the resolution of issues can lead to the improvement of initiatives management and thus the improvement of organizational performance (Spalek, 2013; Sandhu et al., 2019).

However, we can clearly observe that the examination of the relationship between PMO and organizational performance has received little attention and is still generating more research due to the lack of a consensus on whether PMO contributes to the improvement of organizational performance or not. Indeed, the attempts to provide evidence supporting this relationship have yielded little empirical validation (Unger et al., 2012).

Effect on project management maturity

One of the reasons behind implementing or changing the PMO remains the improvement of project management maturity (Hubbard & Bolles, 2012). The relationship between project management maturity and PMO can be characterized as circular and self-reinforcing (Hobbs & Aubry, 2007). Indeed, several studies have concluded that PMO contributes to the improvement of the level of project management maturity within organizations (Hobbs & Aubry, 2007; Andersen et al., 2007; Al Ahmad, 2015), but also that the success of its implementation remains under the influence of the organizational maturity level (Martins & Martins, 2012; Salamah & Alnaji, 2014).

According to Khaksefidi and Miri (2015), any attempt to implement the PMO within an organization without taking into consideration the organizational project management maturity level will fail. The positioning

of the PMO within the organization is largely dependent on the level of project management maturity and its success will be enhanced if the latter is high (Salamah & Alnaji, 2014). By using correlation and regression statistical models, Khalema et al. (2015) confirmed the existence of a positive relationship between PMO maturity and organizational project management maturity. Indeed, PMO maturity and project management maturity are highly interdependent (Khaksefidi & Miri, 2015).

Through the results of their research program, Hobbs and Aubry (2007) concluded that the level of project management maturity can improve with the presence of an effective PMO. Indeed, over the course of its life, the PMO is likely to progress and become more mature, and thus participate in improving organizational project management maturity (Andersen et al., 2007). Hobbs and Aubry (2008) demonstrated a significant relationship between PMO maturity and its age. They concluded that over time the PMO contributes to the improvement of project management maturity within the organization through the implementation of numerous processes and tools.

Similarly, Blažević et al. (2014) confirmed the remarkable involvement of the PMO in improving the level of project management maturity. Most of the interviewees in their study emphasized the role of the PMO in this process through different initiatives. This ranges from standardizing data collection and processing to decision support (do Valle & Soares, 2014).

Aubry (2015) for her part, and by studying the evolutionary process of the PMO, showed that this one is also capable of improving the level of project management maturity within organizations. She even pointed out the need to rely on effective change management to achieve the desired objectives. Van der Linde and Steyn (2016), based on an analysis of maturity assessments conducted before and after the implementation of the PMO, found an impressive improvement in project management maturity within the organizations they studied. They found no other explanation except that the PMO was responsible for this improvement, primarily through the acquisition of knowledge from lessons learned in previous projects and by providing a range of project support and facilitation services.

Finally, although the current trend argues for the idea that with an empowered PMO organizations move to the next stages of maturity (Al Ahmad, 2015), some research has highlighted contradictory results. Indeed, according to (Martins & Martins, 2012), there is no dependency between the existence of the PMO through its functions and competencies and the degree of project management maturity within organizations.

Methodology

Data Collection

The data collection for this research phase was characterized by the administration online of our questionnaire for 3 consecutive months. Indeed, two main ways were adopted. Firstly, we contacted the president of the PMI Moroccan chapter to request their collaboration. Secondly, we interacted directly with people who could answer our questionnaire through the professional network "LinkedIn".

Sample

Our questionnaire was sent to people evolving in project management within organizations that have a Project Management Office (PMO). We received two hundred and five (205) responses, of which fifty-five (55) were discarded because the respondents declared the non-existence of a PMO within their organizations. Of the remaining one hundred and fifty (150) responses, we decided to retain the responses stating that the PMO has existed for at least three years. Finally, one hundred and twenty-nine (129) responses were considered usable and represent our final database from which we proceeded to a set of analyzes and tests to measure the organizational contribution of the PMO in terms of performance and project management maturity.

Data analysis

We conducted a two-step data analysis. First, we conducted a descriptive and exploratory analysis of the data collected on SPSS (Version 25.0). Then, we proceeded with a confirmatory analysis using structural equation modeling, an analysis technique that uses both regression and factor analysis (Roussel et al., 2002), with the help of SmartPLS (Version 3.2.9) to examine the validity of the constructs of our model (Figure 1) and to test our hypotheses:

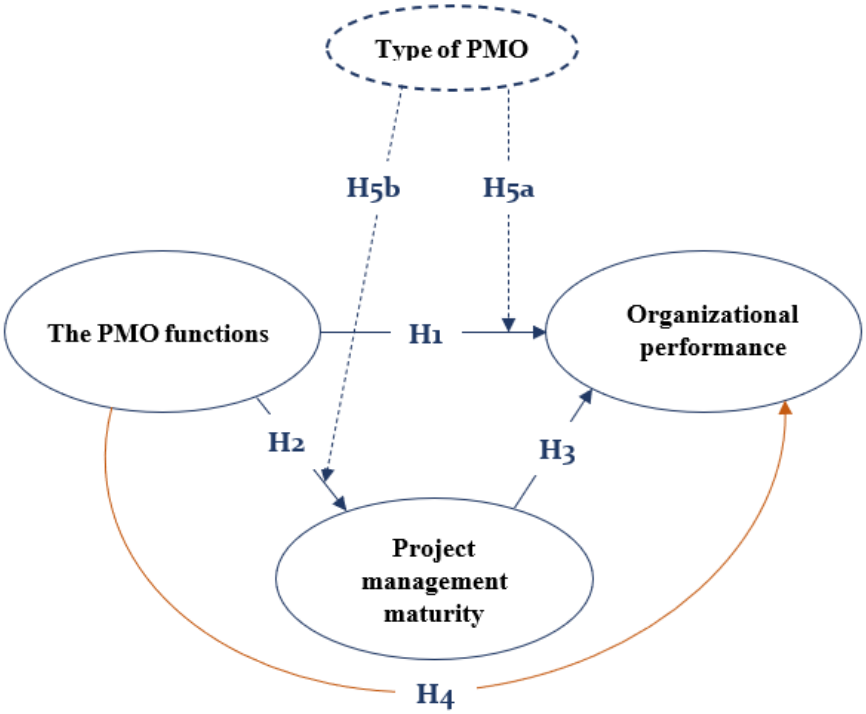

Figure 1: Conceptual model

H1: The PMO through its functions contributes to organizational performance
H2: The PMO through its functions contributes to project management maturity
H3: Project management maturity contributes to organizational performance
H4: Project management maturity has a mediating role between the functions performed by the PMO and the organizational performance
H5a: The type of PMO has a moderating role on the relationship between the functions performed by the PMO and the organizational performance
H5b: The type of PMO has a moderating role on the relationship between the functions performed by the PMO and the project management maturity

Results and discussion

Exploratory analysis

At the end of this exploratory analysis, we can conclude that the results obtained are promising (Table 1). The KMO value clearly exceeds the threshold of 0.5 and Bartlett's sphericity test yielded sufficiently high values at a significance level of $p < 0.000$, which fulfills the criteria of sample adequacy for factor analysis. On the other hand, Cronbach's α is well above

0.8 for all indicators. The unidimensionality is confirmed for all the dimensions of each construct.

Table 1: Reliability and dimensionality analysis

Dimensions	KMO	Bartlett's sphericity	Eigenvalue	Percentage of variance explained	Communality	Factor weight	Cronbach's Alpha
PRO	0.817	0,000	2.796	69.907	0.582 > 0.756	0.763 > 0.869	0.855
NOR	0.727	0,000	2.474	82.468	0.759 > 0.864	0.871 > 0.930	0.893
SPP	0.740	0,000	2.546	84.856	0.826 > 0.888	0.909 > 0.943	0.909
GMP	0.781	0,000	2.681	67.032	0.503 > 0.760	0.709 > 0.872	0.834
GS	0.762	0,000	2.617	87.247	0.854 > 0.883	0.924 > 0.940	0.925
GC	0.744	0,000	2.496	83.198	0.801 > 0.859	0.895 > 0.927	0.898
PF	0.839	0,000	3.099	77.466	0.741 > 0.822	0.861 > 0.906	0.903
PNF	0.870	0,000	4.554	65.059	0.551 > 0.759	0.742 > 0.871	0.909
PGP	0.914	0,000	6.052	60.516	0.520 > 0.743	0.721 > 0.862	0.927
OGP	0.911	0,000	5.889	73.613	0.609 > 0.820	0.781 > 0.905	0.948
Recommended value	> 0.5	Close to 0	≥ 1	≥ 0.6	≥ 0.5	≥ 0.5	≥ 0.7
Reference	Jolibert & Jourdan (2006)	Evrard et al., 2009	Hair et al. (2006)	Hair et al. (2006)	Jolibert & Jourdan (2006)	Evrard et al. (2009)	Thiétart (2007)

Confirmatory analysis

To examine our research hypotheses and to validate the results obtained at this stage, we conducted a confirmatory analysis, using structural equation modeling performed on the SmartPLS.

Evaluation of the measurement model

The evaluation of the measurement model provided a ruling on the reliability and validity of the constructs (Table 2). The recovered loadings exceed the threshold of 0.7, with a Cronbach's α above 0.8 for all dimensions and a composite reliability that ranges between 0.889 and 0.967. On the other hand, the convergent validity is confirmed since the AVE displays values above 0.6. Discriminant validity is also verified through the two indices HTMT and Fornell-Larcker.

Table 2: Reliability and validity analysis of constructs

Dimensions	Loading	Cronbach's Alpha	Composite reliability	AVE	Fornell-Larcker criterion	HTMT
PRO	0.769 > 0.866	0.855	0.903	0.699	Verified	Verified
NOR	0.872 > 0.928	0.893	0.934	0.825		
SPP	0.907 > 0.937	0.911	0.944	0.848		
GMP	0.751 > 0.867	0.834	0.889	0.668		
GS	0.920 > 0.942	0.927	0.954	0.872		
GC	0.892 > 0.928	0.899	0.937	0.832		

PF & PNF	0.720 > 0.844	0.942	0.950	0.633		
PGP OGP	0.721 > 0.856	0.964	0.967	0.621		
Recommended value	> 0.7	> 0.7	> 0.7	> 0.5	AVE > Square of correlations between latent variables	< 0.9
Reference	Hair et al. (2011)	Hair et al. (2011)	Hair et al. (2011)	Hair et al. (2011)	Fornell & Larcker (1981)	Gold et al. (2001)

Evaluation of the structural model

Overall, the model has a high level of quality and a very good predictive capacity. Indeed, the evaluation indices of the structural model are of a satisfactory level (Table 3), with coefficients of determination "R²" that exceed 0.6 and a GoF of about 0.643.

Table 3: Overall analysis of the structural model

	R^2	Q^2		GoF
		Comm.	Red.	
OP	0.685	0.528	0.398	0.643
PMM	0.632	0.539	0.358	
Criterion	< 0.19 « not acceptable » between 0.19 and 0.33 « low » between 0.33 et 0.67 « moderate » > 0.67 « high »	> 0	> 0	< 0.1 « nothing » between 0.1 et 0.25 « small » between 0.25 et 0.36 « medium » > 0.36 « large »
Reference	Chin (1998)	Tenenhaus et al. (2005)		Wetzels et al. (2009)

Regarding the significance of the structural relationships, hypotheses H1, H2 and H3 were confirmed at a level of 1% (Table 4), which ruling the contribution of the PMO to organizational performance and project management maturity, but also the non-negligible impact of the latter on performance.

Table 4: Significance of structural relationship

	Regression coefficient	t-value	p-value	Decision
PMO functions -> OP	0.335	4.133	0.000	Confirmed**
PMO functions -> PMM	0.795	15.616	0.000	Confirmed**
PMM -> OP	0.536	6.707	0.000	Confirmed**

* p< .05 ; ** p< .01

Indeed, we arrived at the same conclusions made it by Kutsch et al. (2015) and Van der Linde and Steyn (2016), and which stipulate that the PMO through its functions and services actively participate in the generation and creation of value within the organization. This contribution to organizational performance can be seen in different components and at

distinct levels. The implementation of the PMO seems to be an interesting step towards contributing to organizational performance.

These results also come to contradict the findings of Martins and Martins (2012), and consequently confirm those exposed by Blažević et al. (2014), do Valle and Soares (2014), Al Ahmad (2015) as well as Van der Linde and Steyn (2016) and which argue for the remarkable participation of the PMO in the improvement of the project management maturity level. A contribution that is conditioned according to Hobbs and Aubry (2007) by the effective implementation of the PMO, as well as its maturity level (Andersen et al., 2007).

The analysis of the mediator effect (H4) that the construct "Project Management Maturity" presents in the model was confirmed as the value zero does not exist between the two calculated levels LL and HL (Table 5). This analysis was based on Preacher and Hayes (2008) approach.

Indeed, the result of the data analysis demonstrated a significant relationship between the two constructs, such that a presence of a high level of maturity generally translates into positive impacts on performance (Lockamy & McCormack, 2004). And considering that the PMO is supposed to promote project management practices (Hubbard & Bolles, 2012), this can only lead to efficiency gains and better performance as was suggested by Lavoie-Tremblay et al. (2017).

Table 5: Analysis of the mediator effect

					Confidence interval	
IV -> Mediator	Mediator -> DV	Indirect effect	SD	t-value	95% LL	95% HL
0.795	0.536	0.426	0.073	5.837	0.283	0.569

Based on the analysis technique proposed by (Lacroux, 2009), the moderating effect of the PMO type could not be confirmed (rejection of H5a and H5b). According to the results obtained, the type of PMO does not play a moderating role in the relationship between "Project Management Office (PMO) Functions" and the two constructs "Organizational Performance" and "Project Management Maturity" (Table 6 and 7).

Table 6: Moderator effect analysis (OP)

	Regression coefficient	t-value	R^2	Decision
(1) Y = a + b1 X + b2 Z	b1 = 0.350 b2 = -0.065	4.227 1.310	0.689	Rejection of the moderator effect hypothesis
(2) Y = a + b1 X + b2 Z + b3 XZ	b1 = 0.370 b2 = -0.069 b3 = 0.058	3.945 1.263 0.523	0.693	

t must be > 2.58 for a significance level $\alpha = 1\%$ and > 1.96 for an $\alpha = 5\%$

Table 7: Moderator effect analysis (PMM)

	Regression coefficient	t-value	R^2	Decision
(1) Y = a + b1 X + b2 Z	b1 = 0.777 b2 = -0.163	14.163 2.857	0.658	Rejection of the moderator effect hypothesis
(2) Y = a + b1 X + b2 Z + b3 XZ	b1 = 0.781 b2 = -0.165 b3 = 0.161	15.004 2.990 1.519	0.684	

t must be > 2.58 for a significance level α = 1% and > 1.96 for an α = 5%

This result is surprising, since the support type PMO generally refers to the improvement of project performance and the development of increased project management skills, while the control type PMO is mainly concerned with practices and governance modes compliance (Aubry et al., 2010). This implies that the implementation of one or the other should have an impact on the performance and project management maturity within the organization. Therefore, this result suggests that perhaps the lack of a moderating effect of the PMO type in the context of the relationships studied is due to a confusion about the functions supposed to be performed by each type, if not because of the host organizations' lack of mastery of the notion of typology.

Conclusion

The results of this study provide a solid basis for linking PMO functions to organizational contributions. The study concluded that the PMO through its functions contributes to organizational performance and project management maturity. It also highlights the mediating effect of project management maturity. However, the possible moderating effect of PMO type on structural relationships could not be verified.

To this end, the results of this research phase may represent an opportunity for organizations that have implemented a PMO or are considering implementing one, to reflect further on the expectations behind this implementation and the resulting implications, to ensure alignment with the vision and strategic/operational objectives.

However, it should be noted that this study has some limitations. First, given the difficulty in identifying our target sample, we used convenience sampling, which to some extent constrains the representativeness and generalizability of the results.

In consequence, we believe that it would also be interesting to examine this issue in greater depth through the implementation of longitudinal studies of cases characterized by similarities or evolving in similar or almost similar contexts. This would provide more visibility on this contribution and its implications.

Declaration for Human Participants: This study has been approved by Ecole Nationale de Commerce et de Gestion – ENCG Settat University Hassan 1st and the principles of the Helsinki Declaration were followed.

Conflict of Interest: The authors reported no conflict of interest.

Data Availability: All data are included in the content of the paper.

Funding Statement: The authors did not obtain any funding for this research.

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