
Operational Challenges, from PMO to EPMO Execution and Operation Case Study Within Electricity Producing Companies (Four Selected Companies Within EU28)

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Abstract: During the European unification process, they stated the need for drawing up a common energy strategic plan that will affect electricity production system in terms of infrastructure, production and generation. The EU strategic action plans included; reduction in emissions, an increase in renewable energies, energy efficiency. In this light therefore the energy efficiency was booked for researching. This article presents an in-depth study of the challenges in transforming a functioning PMO model to an EPMO model within four electricity companies from different countries within the EU and how those challenges can be addressed within companies implementing same methodology to bring about electricity production efficiency. Will these identified challenges make it impossible for the companies to achieve electricity production efficiency in the transformation from PMO to EPMO? PMO has been the major methodology used by these companies. To achieve production efficiency, the need for a heavyweight methodology was identified (EPMO) and implemented in four mega electricity producing companies with cross border distributions, one from France; Germany; Spain and UK.

Keywords: Project Management Office, PMO, Enterprise Project Management Office (EPMO), EPMO Challenges, ANOVA, Efficiency

1. Introduction

Contemporary project management control system within global organisations with multi projects (Hobday, 2000) [1] like mega electricity producing companies typically does so with a form of a project office (Hill, 2014; Hobbs and Aubry, 2010). [2, 3]. Initially Project Management Offices (PMOs) works were described as rudimentary units supporting activities within the organisation, such as purely archiving and administrative (Powell and Young, 2007) [4]. But this is being updated and upgraded by recent works, stating that projects are becoming sophisticated that there is a need for a more complex control system to be put in place for coordination (Arto et al., 2011; Aubry et al., 2008; Aubry and Hobbs, 2011) [5-7]. Because of the sophistication and expanding need for projects across companies, researchers are confirming the need for a project management

methodology that can handle these multiple complex projects (Hobbs and Aubry, 2010) [3]. A closer scrutiny of the research is revealing the EPMO as a methodology that can support operations across the companies by coordinating functional business that are not linked through portfolio management priorities (Unger et al., 2012) [8].

There is not much work done by researchers in investigating the role of EPMO in the management of complex project implementation during their product lifecycle (Stark, 2015) [9]. Accordingly by (Brown and Eisenhardt 1995) [10], "Product development has become complex and inherently challenges with the PMOs". To address these challenges, the implementation of EPMO methodology will be better, than the PMO because of lack of connectivity, strategic alignment and knowledge management within it (Dekkers et al., 2013) [11].

A reason for enterprise approach is because of the

increasingly complex and competitive market for business and consumers, faced by chief executive officers both within the public and private services. Operating at a strategic level within organisation, and in collaboration with other executives, it ensures that projects and portfolio activities are benefiting the overall organisational business. Because of the demand for quality and efficiency, both private and public sectors are under much pressure to deliver the needed change (Kassel 2010; Wirick 2009) [12, 13].

Mainstream attentions were brought to the surface for the EPMO implementation due to its application by project management team of some mega electricity producing companies within the EU28 as a new methodology.

However, in the implementation and application process, some challenges were faced, that this paper tries to address them by examining each challenge and by using a T-test to find out whether to accept or reject this new methodology, and if we do, seek ways to fix these challenges.

Because of the challenges faced, it is difficult for these electricity producing companies to achieve efficiency in production.

Implementing any new system or changes in a work place is always met with challenges, either by the tools in place or by project members. Most of these challenges are encountered during project implementation or execution processes or phases (Burnes, 2004; De Wit and Meyer, 2005) [14, 15].

In trying to identify these challenges, four organisation/companies producing electricity were surveyed in four different countries within the European Union (EU28). These companies were chosen from; Great Britain, Germany, France and Spain.

Projects and programmes fail for numerous reasons during implementation or execution. Reasons for these failures may include organisational management that maybe outside project management control. This article examines the challenges that were associated with the implementation and execution of the project management methodology, "Enterprise Project Management Office EP MO" during its implementation and execution with a few selected organisations.

The success of projects depends on the methodology used and at the initial phases, the success with regards to budget, time and scope or technical specification is always low plus or minus 25% (Crawford 2001) [16].

To be able to achieve success, an enhanced project management methodology procedure has to be implemented for use. Organisations are having a jump from PMO to EP MO for project success. (PMI 2012) [17], saw organisations jumping from 36% to 83% to implement PMO are now jumping to EP MO. This jumping from PMO to EP MO is being met with challenges that this article is trying to examine.

Many established organisations that have running Project Management Offices (PMO) are now turning to Enterprise Project Management Office, so as to better insure successful organisational management for project efficiency. Enterprise Project Management Office EP MO provides a wide range

of strategic project designing procedures that helps them align their organisational aims, objectives and vision (PMI, 2008; Kerzner, 2009) [18, 19].

This research aims to raise awareness with mega companies of the challenges, face in implementation of new methodologies and benefits of such "From PMO to EP MO". The results gotten from this research will be made available to all companies involved in this research.

This research was being conducted through seminars workshops in the different companies in the four different countries and the systematic review of papers in order to be able to distinguish from the traditional literature (Kitchenham and Charters, 2007) [33]. During the seminar workshops, challenges identified have been used for analysis.

2. The EP MO Critical Success Factors and Importance to Achieve Production Efficiency

The importance of EP MO has been written and stated in many journals and text books, (Amulya Gurtu, 2010; and Arvind Rathore 2010). [20, 21]. Just a few of these will be stated here. Establishments, be them profit or non-profit organisations, must have to commit themselves in knowing and choosing the best project management methodology for their organisation for any particular project (EP MO Vermont (2013)) [22]. These selected organisations studied in the research all had as a methodology, the Project Management Office (PMO), but transformed into Enterprise Project Management Office (EP MO). In most or all the companies, PMO and EP MO are all allowed to work and support one another. In this case, EP MO determines which of the projects the company should be implementing, based on their core values, and while the PMO is meant to assure these projects are successfully managed (Terry Courtney, 2020) [23].

Their Project Management Office (PMO) is mostly focuses on making sure individual projects are delivered just in time, within Scope, budget and schedule) and also in the formulation of project documentation (Dai CX, 2002) [24]; while EP MO, plays the role of coordinator, ensuring alignments of these projects to avoiding conflicts, maintaining a top-down company's view of project portfolio.

For any successful EP MO, there are some critical factors to be considered.

2.1. EP MO Position

EP MO position; in the organisation is a critical factor for project success. Some organisations EP MO are not strategically well positioned to deliver required outcomes. When the organisational EP MO is not well positioned, it will therefore leak the authority to command organisational departmental PMO's.

Examining the Electricity Producing Company, the EP MO becomes visible and coordinates business units and aligning these to avoid conflicts among the various departments. (PMO Business unit, PMO Cross border electricity

connection, PMO Supply Chain, Resource planning, PMO for Solar energy, etc).

2.2. Organisational Change Management

Organisational change management; is important, to managers. Better understand that EPMO introduction is not to suppress the activities of PMO, but that EPMO is coming to complement their project activities. Placed at the centre of the organisation to monitor and follow up other projects. It should be seen as a that function supporting organisational leadership and putting in place a mechanism to enable change within the organisation.

EPMO at the centre assist organisation with demand management, forecasting, driving long term business values (An Oracle White Paper July, 2010) [25] and resource planning in all their projects. Enabling these teams to be able to evaluate Internal Rate of Return (IRR) and return of investment (ROI) for all their proposed projects for execution.

2.3. Defining a Clear Path of Communication

Defining a clear path of communication; should always be stated to avoiding bottlenecks in a way that departmental PMO’s are reporting directly to the central EPMO in a standardised manner within the organisation and putting in pace a centralised reporting process, that communicates projects, during and after the project is done “communication of key performance indicators for measuring project performance”. (Moira Alexander, 2018) [26]. The EPMO methodology as a centre for excellence helps in defining and coordinating various areas such as managing of shared project resources, establishment of best practices and communication management within projects (PMI 2008) [27].

2.4. EPMO Implemented Methodology

EPMO implemented methodology helps organisations to report projects on budget, time and how these are meeting their business objectives (PMI, 2012) [17]. The EPMO monitoring and collaborating departmental PMO’s helps in reducing project failure by improving productivity and also by helping to deliver projects on time or even ahead of schedule.

Another critical factor for an effective EPMO is having the right staffs; people with project management expertise. Understanding the business requirement and also being able to providing some coaching and training to project team

members.

3. Research Study

During the implementation and execution of the EPMO methodology for electricity production efficiency within the EU28, a group of project management professionals were identified by each electricity company and a training need analysis seminar workshop carried out and later trained within the implementation and running process; have been questioned on the challenges they had faced moving from the initial PMO to the new EPMO. At this time it has been one year since the transformation.

There is a possibility that an organisation may adopt a methodology in use without any clear purposes. There might be a need for a PMO methodology, but the organisational vision and mission not well explored (M. Aubry, B. Hobbs, R. Müller, T. Blomquist 2011) [28].

This study is supporting the hypothesis of extreme PMO’s variety in both forms and functions, as indicated by some researchers (B. Hobbs, M. Aubry, 2007) [29].

It should be noted that these organisations operate a matrix system, collaboration across the organisation whereby a project manager pulls resources from other functional departments. The noted EPMO challenges noted during this study survey are as in the two tables below. Before is the PMO methodology in use and later is the application of the EPMO.

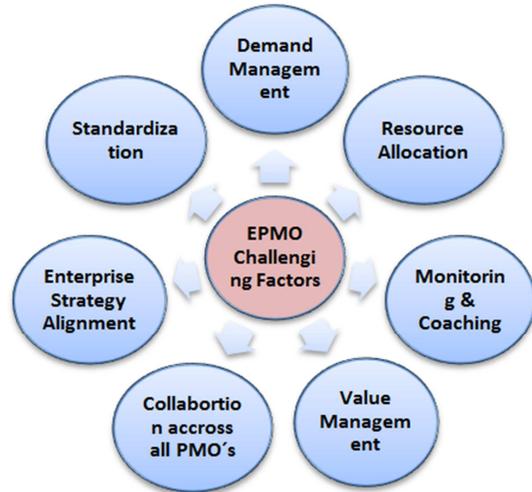


Figure 1. EPMO identified critical challenging Success factors.

Table 1. PMO Critical Success Challenges factors analysis.

PMO	Spain (W)	Germany (X)	France (Y)	UK (Z)	AVER%
No. of PARTICIPANTS	5	5	5	5	
Value Management	20	30	25	25	25
Enterprise Strategic Alignment	30	30	25	35	30
Monitoring and Coaching	30	40	30	35	35
Collaboration Across PMOs	30	30	30	30	30
Resource Allocation	30	40	30	35	35
Demand Management	20	30	20	30	25
Standardisation	20	30	20	30	25

Five project managers (Participants) selected from each of the country electricity producing company for the survey and the averages computed as in “table 1” above. This computation was done during the PMO application.

Table 2. EPMO Critical Success Challenges factors analysis.

EPMO	Spain (W)	Germany (X)	France (Y)	UK (Z)	AVER%
No. of PARTICIPANTS	5	5	5	5	
Value Management	80	82	78	80	80
Enterprise Strategic Alignment	85	86	84	85	85
Monitoring and Coaching	85	85	84	86	85
Collaboration Across PMOs	80	80	80	80	80
Resource Allocation	85	87	83	85	85
Demand Management	78	82	78	82	80
Standardisation	80	80	80	80	80

Figure in table 2 above shows the results two years later after the implementation of the EPMO in these selected countries companies producing electricity. Just as in table, five participants were selected from each country producing electricity. The average for each factor is on the right hand green row. They indicate an increase in success rate factor.

Summary of all the average results are tabulated in table 3 below, to be used for analysis in the later section to test the Hypotheses of rejecting or accepting the EPMO methodology using a T-test.

Table 3. Critical Success challenges factors.

Critical challenges Success Factors	% (Before) PMOs	% (After) EPMO
1 Value Management	25	80
2 Enterprise Strategy Alignment	30	85
3 Monitoring & Coaching	35	85
4 Collaboration Across PMO's	30	80
5 Resource Allocation	35	85
6 Demand Management	25	80
7 Standardization	25	80

The above table 1 of critical challenging success factors shows percentage of critical factors before the implementation of EPMO. Before indicates PMO and after indicates EPMO.

During the PMO methodology application, the rate of make the project success or achieving better results was ranging between 25% to 35%, while after the EPMO implementation, the success rate for projects went up to between 80% to 85%. Environmental and government policies might have cause of the missing 15% to 20%.

5. Analysis of Results

Examining the list of the EPMO critical challenges in the study from feedback by participants.

Before going into details analysis explanation of the survey results, we try to test the Hypotheses of accepting the EPMO methodology using a T-test to find out whether we have to accept or reject this new methodology, and in doing this we use the application of P-value approach in determining the likely or unlikely acceptance.

T-Test calculation for the two Independent Means, PMO and the EPMO.

4. Study Results

The study results of the survey to examine the challenges faced during the PMO, before the EPMO implementation and after the implementation as seen below. All along the life cycle of this survey studies, are the companies' degree of commitment which acted as a key performance indicator (KPI).

Sum of sample data equal $(x_1, x_2 \dots x_n)$.

Mean of critical factors sample data calculation.

$$\frac{1}{n} \sum_{i=1}^n x_i$$

Computing the Standard Deviation of these critical factors.

$$\sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2}$$

\bar{x} =Mean of the given data

x =values of the given data

N =Total number of values

M =Mean calculated of critical factors

s^2 =Standard deviation

df =Difference

Therefore for us computing t-value and the hypothesis P, we arrived at the formula below.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\left(\frac{(N_1 - 1)s_1^2 + (N_2 - 1)s_2^2}{N_1 + N_2 - 2}\right) \left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

T-test calculation includes sample mean of the critical

factors variables, their sum of squares and standard deviation.

Table 4. Significance Level: 0.05: two-tailed test.

Diff (X - M) PMO	Sq. Diff (X - M) ²
-4.29	18.37
0.71	0.51
5.71	32.65
0.71	0.51
5.71	32.65
-4.29	18.37
-4.29	18.37
M: 29.29	SS: 121.43

Table 5. PMO t-test.

Diff (X - M) EPMO	Sq. Diff (X - M) ²
-2.14	4.59
2.86	8.16
2.86	8.16
-2.14	4.59
2.86	8.16
-2.14	4.59
-2.14	4.59
M: 82.14	SS: 42.86

EPMO t-test

Difference critical factors scores calculations

PMO - Treatment 1

N₁: 7

df₁=N - 1=7 - 1=6

M₁: 29.29

SS₁: 121.43

$$s^2_1=SS_1/(N - 1)=121.43/(7-1)=20.24$$

EPMO - Treatment 2

N₂: 7

df₂=N - 1=7 - 1=6

M₂: 82.14

SS₂: 42.86

$$s^2_2=SS_2/(N - 1)=42.86/(7-1)=7.14$$

T-value Calculation

$$s^2_p=((df_1/(df_1 + df_2)) * s^2_1) + ((df_2/(df_1 + df_2)) * s^2_2)=((6/12) * 20.24) + ((6/12) * 7.14)=13.69$$

$$s^2_{M1}=s^2_p/N_1=13.69/7=1.96$$

$$s^2_{M2}=s^2_p/N_2=13.69/7=1.96$$

$$t=(M_1 - M_2)/\sqrt{(s^2_{M1} + s^2_{M2})}=-52.86/\sqrt{3.91}=-26.73$$

The t-value is -26.72566. The p-value is <.00001. The result is significant at p <.05.

6. Critical Factors Analysis

6.1. Enterprise Strategy Alignment

Projects undertaken at different departments and at various levels within the organisation are supposed to be aligned to a long term organisation business objective. A 100% of the participants who reported on this factor stated negatively on this aspect during PMO implementation, stating that, there was a lack of a well-defined management methodology within their PMO. With the implementation of the heavy-weight EPMO methodology, a well-defined strategy was defined, that aligned projects across the various PMO's. Thus the increase in percentage from 30% to 85%.

6.2. Value Management

Measuring projects business value with the traditional PMO is difficult, than the EPMO with large organisational

phases which can be broken into many projects. The EPMO positions itself in evaluating the tangible and intangible benefit of their organisations and can use techniques such as NPV, IRR and ROI to measure organisational benefits. It is therefore evident that value management methodology are necessary for the achievement of value resources, that accelerate communication, teamwork, alignment and better project management understanding objectives.

6.3. Monitoring and Coaching

The failure in tracking project resources just-in-time and controlling the lapses within the implementation process and within the organisation; a 100% participant all reported this challenge in meeting objectives before the implementation of the EPMO. With the implementation of the EPMO, expertise within provides monitoring and coaching to it staff and project managers operating at different project phases. The central EPMO foster and promote periodic training and need analysis for continues monitoring and control in all related projects.

6.4. Demand Management

The process of demand creation and demand fulfilment takes us to demand management [30, 31]. The demand management concept and implementation during the PMO process has not been on standard in the creation of synergies between operations and marketing in achieving company strategy as seen on table 1. With the implementation of EPMO, it made it easy for market analysis, constraints, and opportunities of internal and external market to be better understood. In achieving best practice within the companies, some of the following steps were taken:

1. A consensus and collaborative mechanism was implemented.
2. The frequency of timing, and forecasting process put in place.
3. Implementation of a reporting procedure and results forecast.

6.5. Resource Allocation

During the survey, 100% participants reported the lack of tracking resources during working hours was a challenge in trying to meet the objectives of their organisational PMO. For their organisations to be able to provide a better and a mature metrics resources analysis, their organisations should implement a methodology that will be able to track resource allocation. Without such a methodology like EPMO, it will be hard and difficult to track resources working for any project. With this, organisations will be unable to estimate cost and schedule time of projects.

Within the organisational matrix structure, the EPMO align both functional managers and their project managers to be in constant communication in ensuring project objectives in resources allocation.

6.6. Collaboration Across PMO's

Easy said than done; Survey conducted showed that almost 90 per cent of their companies are conducting cross boarder distributions and global projects. Less than a quarter of these companies have had effective practices helping their teams and project offices collaborating resources over distance or project offices. No central structure in place to collaborate these cross boarder project offices, thus resources and cost turns to ill planned. With the implementation of the EPMO, the methodology puts in place a monitoring and collaborating channel linking project management offices across their various companies, leading to improved performance. This methodology also helped describe for these organisations, how they can adapt to thrive in their immediate environment.

Different PMO structures in different companies without a centre command. These companies presented different PMO frameworks that needed a centre control is why the application of the EPMO for collaboration and communicating across those PMOs (Organisational unit PMO, Business unit PMO, Divisional unit and IT unit PMO). Therefore the EPMO played the role of knowledge sharing

and integrating behaviours across PMOs as in the figure below.

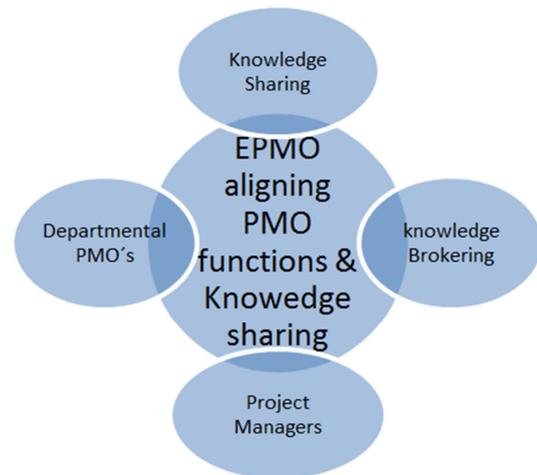


Figure 2. EPMO aligning.

6.7. Standardisation

Resistance to change across the EPMO- within the EPMO implementation process, there was a need to have a methodology for processes standardisation. This process makes sure all project management departments are speaking the same English or whatever language. This process helped the EPMO in the continuous improvement process during project implementation. A 100% participant reported lack of a defined methodology as a negative factor impacting performance. Lack of a standardised and defined project management methodology across the various departments, contributes to project failure and inconsistency in controlling their projects.

6.8. Accepting or Rejection EPMO

From the analysis of the results obtained from section 5 (Analysis of Results), the standard deviation for achieving production efficiency using the PMO and EPMO indicates to us that the results from the application of PMO is far off from the mean ($s^2_1 = SS_1 / (N - 1) = 121.43 / (7 - 1) = 20.24$).

In the application of the EPMO, the standard deviation for achieving production efficiency indicates to us that it is closer to the mean. ($s^2_2 = SS_2 / (N - 1) = 42.86 / (7 - 1) = 7.14$).

7. Discussion

Selection of these countries and companies was based on the following:

1. These countries mega electricity are having cross border supply to at least two or more European Union countries.
2. They market integration helps and contributes much in boosting European Union integration networks.
3. These companies enhance supply and offers alternative for consumers.

The economic environment of each company is to develop

strategic mechanism, and tools to manage talented individuals as they continue expanding into new markets. Development of these talented individuals is of no issues in this case, same as no discussion on communication.

Project managers are advised to embrace changes if they are to innovate and looking forward establishing agility in their companies to keep up with any digital disruptions. Traditional PMOs and their structures are changing and giving ways to proactive project managers and leaders are now finding out that their organisations are turning to and focusing on what matters most, to accomplishing efficiency within and without - resource management, value management, demand management, and dependency management.

There isn't yet a standard set for EPMO features in theory or practice, this review led us to identify some of the challenges that give room for more findings.

The rise of EPMO might have been as a result of organisations wanting to benefit from both distributed PMO and centralised PMO. EPMOs are helping to evolving changes in organisations by integrating the different types of PMOs, thus predicting increase in organisation by 2021 to begin the implementation of EPMO (Robert Handler, at el Gartner 2020) [32].

In aligning those distributive PMOs to the EPMO, the Project managers and their organisations should focus on a better way of identifying and establishing required and appropriate reporting structures around the departments. Rationalisation of tools and techniques should be made a priority.

In a close examination from our table 1, the identified methods to achieving production efficiency during the application of PMO, these companies in the various countries all had different averages of their strength, "Value Management, Enterprise Strategic Alignment, Monitoring and Coaching, Collaboration Across PMOs, Resource Allocation, Demand Management, and Standardisation", with company W in Spain 25.71%, company X in Germany 32.86%, company Y in France 25.71% and company Z in the UK 31.43%.

After the implementation and application of the EPMO, it was discovered that those Identified challenges methods to achieving production efficiency had increased as seen in table 2 with, company W in Spain 81.8%, company X in Germany 82.1%, company Y in France 81.1% and company Z in the UK 82.5%.

Carrying out a Training Need Analysis (TNA) made this finding possible and therefore it's recommended conducting a TNA before the introduction of any form of changes in any company or organisation.

8. Conclusion

Switching from PMO to EPMO by organisations continues to be of great importance and interest to project practitioners. Some organisations are still struggling to define the role of their EPMO for a long term support in achieving their

organisational objectives.

The challenges surveyed during the establishment and running the EPMO within those four electricity producing companies needed to be examined. These surveys were carried out a year after the establishing the EPMO. The EPMO was set up to better manage and in the organisational development of their companies in the production of electricity. All those management practitioners surveyed reported their EPMO was partially successful because of challenges encountered.

A 100% participant reported lack of a defined methodology as a negative factor impacting performance. Lack of a standardised and defined project management methodology across the various departments, contributes to project failure and inconsistency in controlling their projects

From the study conducted, some of the challenges met with while implementing and managing the EPMO were lack of a standard management methodology that could handle not only the identified challenges but also issues like, change management in moving from a lightweight to a heavyweight methodology. Departmental PMO's were still not collaborating with the central EPMO, thus lack of resource management and top management support was lacking.

Observations After EPMO Implementation

Typically the EPMO's were outside of their operational business unit, and reported directly into the CEO or CFO. As the name suggests, the EPMO was responsible for all programs and projects across the enterprise. It maintains a top-down view of an organization's portfolio of projects.

The EPMO assisted the executives for selecting what programmes and projects to undertake after identifying the various challenges, giving more rooms for these companies to defining their clear visions, near and long term

The EPMO made way for visibility across these organisations for coordinated efforts to ensuring alignments of projects and assisting with demand forecasting.

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