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The impact of the project management office on scientific research

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This article aims to demonstrate that the project management office, an organizational unit recognized by PMBOK®, can support scientists in research project management, so they can engage in other activities. In order to test the hypothesis, the theoretical framework and data collection of projects funded by the Research Support Foundation in the State of São Paulo (Fapesp) and executed at the Medical School of Ribeirão Preto (FMRP) from 2009 to 2015 were investigated. The study showed that scientists would have met the requirements of the funding agency without this support. However, the office impacted the financial management of the project, an initiative aligned with the practices of foreign universities, in which support to scientists has already become a routine part of institutional support.

Keywords: project management; scientific research; success.

O impacto do escritório de gestão de projetos na pesquisa científica

O objetivo deste artigo é demonstrar que o escritório de gestão de projetos, uma unidade organizacional reconhecida pelo guia Project Management Body of Knowledge (PMBOK®), pode apoiar o cientista na gestão de projetos de pesquisa, de modo que ele se dedique a outras atividades. Para testar a hipótese, detalha-se o marco teórico e a coleta de dados de projetos financiados pela Fundação de Apoio à Pesquisa no Estado de São Paulo (Fapesp) e executados na Faculdade de Medicina de Ribeirão Preto da Universidade de São Paulo (FMRP-USP) no período de 2009 a 2015. O estudo mostrou que os cientistas teriam cumprido os requisitos exigidos pela agência de financiamento sem esse apoio; porém, o escritório impactou a gestão financeira do projeto, uma iniciativa alinhada às práticas de universidades estrangeiras, nas quais o suporte a cientistas já se tornou parte rotineira do apoio institucional.

Palavras-chave: gestão de projetos; pesquisa científica; sucesso.

El impacto de la oficina de gestión de proyectos en la investigación científica

El objetivo de este artículo fue demostrar que la oficina de gestión de proyectos, una unidad organizativa reconocida por PMBOK®, puede apoyar al científico en la gestión de proyectos de investigación, de modo que participe en otras actividades. Con el fin de probar la hipótesis, se han detallado el marco teórico y la recopilación de datos de los proyectos financiados por la Fundación de Apoyo a la Investigación en el Estado de São Paulo (Fapesp) y ejecutados en la Facultad de Medicina de Ribeirão Preto (FMRP) de 2009 hasta 2015. El estudio mostró que los científicos habrían cumplido los requisitos exigidos por la agencia de financiación sin ese apoyo; sin embargo, la oficina influenció en la administración financiera del proyecto, una iniciativa alineada con las prácticas de universidades extranjeras, en las cuales el apoyo a los científicos ya se ha convertido en una parte rutinaria del apoyo institucional.

Palabras clave: gestión de proyectos; investigación científica; éxito.

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1. INTRODUTION

One type of project is scientific research. In Brazil, this type of project relies heavily on funding from sources outside research institutions or universities (which usually pay for basic infrastructure and salaries), with relevant public sector participation.

On January 27, 2017, Jornal da Ciência, a communication channel of the *"Sociedade Brasileira para o Progresso da Ciência" (SBPC)* - "Brazilian Society for the Advancement of Science" (SBPC), released the results of a study carried out by the *"Conselho Nacional das Fundações de Apoio às Instituições de Ensino Superior e de Pesquisa Científica e Tecnológica"* (*CONFIES*) -"National Council of Foundations to Support Higher Education Institutions and Scientific and Technological Research" (CONFIES) - between November and December of 2016, in which 301 Brazilian researchers were interviewed who coordinate research projects in 34 federal universities, distributed in 23 states and in the (Distrito Federal) - Federal District, capital of Brazil. This study revealed that a researcher spends on average 33% of his/her time to solve bureaucratic problems that mainly concern the purchase of materials, goods and inputs used in laboratories of Higher Education Institutions and Scientific and Technological Research. For CONFIES leader Fernando Peregrino, this result is "worrisome", since 75% of the projects are financed by the public sector, that is, they are guided by the rules of bureaucratic management of the government itself (Monteiro, 2017).

These managerial challenges found by scientists, however, have not been the focus of empirical studies (Cunningham, O'Reilly, O'Kane, & Mangematin, 2012). To fill this gap, it is proposed that the project management office, an organizational unit recognized by PMBOK®, could support the scientific management of these projects, so that it engages in other activities.

In this context, the objective of this article is to identify if this type of organizational unit (the office) impacts the management of scientific research projects. Mainly, the objective is to identify specific variables for the management of scientific research projects; to identify how scientific research projects can be carried out if they contribute to the literature on project management, adding concepts from the applied literature to other contexts.

Five hypotheses were developed that tested the influence of the office on the traditional literature variables related to project success (time, cost and quality). These hypotheses were tested a review of the theoretical framework and the data collection of scientific research projects funded by the Foundation for Research Support in the State of São Paulo (FAPESP) and carried out in the Faculty of Medicine of Ribeirão Preto (FMRP), which office supports the financial management of these projects. This article depended on the data collection provided by the FMRP, which, in turn, also depended on the data collection by FAPESP, as there is no database available to the university's top management on public and private funding of all scientific research projects.

2. THEORETICAL FRAMEWORK

Despite its importance, there is no consensus in the literature regarding the criteria that should be used to measure the project success (Berssaneti & Carvalho, 2015; Jha & Iyer, 2006; Liu & Cross, 2016). The main concept is the one that considers the possibility of assisting the constraints of cost, time and quality, called "iron triangle" (Atkinson, 1999; Berssaneti & Carvalho, 2015; Cserháti & Szabó, 2014; Ika, 2009; Joslin & Müller, 2016; Kloppenborg, Tesch, & Manolis, 2014; Koops, Bosch-Rekveldt, Coman, Hertogh, & Bakker, 2016; Laursen & Svejvig, 2016; Liu & Cross, 2016; Milosevic

& Patanakul, 2005; Papke-Shields, Beise, & Quan, 2010; Turner & Zolin, 2012; Williams, Ashill, Naumann, & Jackson, 2015). According to this view, if the project met the schedule, it came close to budget and was executed as expected, so it is considered a success.

Another concept involved is project management. It is designed to ensure the success of a project (Berssaneti & Carvalho, 2015), which in turn depends on the perspective of the individual evaluating success (Jha & Iyer, 2006; Turner & Zolin, 2012).

There is also the concept of critical success factors. They are basically related to characteristics, conditions or variables that can have a significant impact on the project success when properly sustained, maintained and managed (Milosevic & Patanakul, 2005).

Pinto and Slevin (1987) were the first researchers to publish critical success factors. Its ten success factors include: project mission, senior management support, project timeline, customer consultation, staffing, technical tasks, customer acceptance, monitoring and feedback, problem solving and communication.

Research into criteria and critical success factors has shown that it is impossible to develop a list that fits the needs of all projects because of the criteria and factors may be very different from one project to another.

For Creasy and Anantatmula (2013), *Project Management Institute* (PMI) believes that the project management office is one of the ways to achieve project success and project management maturity. According to this point of view, a more mature office tends to use tools, techniques and practices more often, more consistently and with better management.

Known in the literature as Project Management Office (PMO) has been created as a new organizational entity as part of the response to the new challenge of more numerous and strategically important projects.

Set up with the mission of taking responsibility and coordinating project-related activities, the project management office can be formed under different organizational structures. There seems to be an academic effort to list what their characteristics, responsibilities, and similar tasks are (Aubry, Müller, Hobbs, & Blomquist, 2010). It has been suggested that this type of office facilitates knowledge transfer (Andersen, Henriksen, & Aarseth, 2007) and the comparability among the managed projects (Andersen, Henriksen, & Aarseth, 2007).

The PMO is used for many decades in some sectors, such as engineering, construction, oil and gas (Pellegrinelli & Garagna, 2009), telecommunications, aerospace and defense (Desouza & Evaristo, 2006), becoming more widespread in the middle of the 90. They were originally conceived as a means of capturing and disseminating good project management practices (Desouza & Evaristo, 2006) and are being conceptualized as the main method to effect changes in large companies (Pellegrinelli & Garagna, 2009). However, according to Alves, Costa, Quelhas, Silva, and Pimentel (2013), "the implementation of a project management office is still very susceptible to failure".

In addition, project management offices can present various roles and functions (Pellegrinelli & Garagna, 2009), sizes, structures and accounts rendering (Desouza & Evaristo, 2006). There are researches focused on the role of the project management office as a facilitator of the project manager and the organization, in the sense of understanding to apply professional practices of project management, as well as adapting and integrating business interests into project management efforts (Hill, 2004). Another line of research studies the relation between the functions and the project performance (Dai & Wells, 2004).

3. METHODOLOGY

The sample was collected in three stages. The first step consisted in signing the Term of Consent and Confidentiality. The data collection was carried out with the FMRP, which made available the variables referring to the scientific research projects granted by FAPESP in the period from 2009 to 2015. The second step was done through a query to the electronic address <http://www.fapesp.br>. The third step was done according to the parameters of the theoretical framework and practical knowledge.

Whereas: a) FMRP's project management office began operations on September 1, 2010; b) there were aids granted from 2015 and still in progress at the time of writing the article and therefore were not included in the analysis; c) the office does not help the fellows, so these aids were not analyzed, 309 cases remain. All these data were organized and analyzed.

The success of the project is the dependent variable and the critical success factors are the independent variables. There are five dependent variables and one independent variable, all separately analyzed.

The chi-square independence test was applied using the Minitab® software version 17. The objective was to verify if the observed value of one variable depends on the observed value of another variable, i.e, which variables could contribute to the success of a research project scientific basis. The five dependent variables (INDTEMPO, INDPC, INDRC, INDQ and INDVALOR) were inserted into the rows and the columns EGP independent variable.

4. RESULTS

In this section, we present the search results.

- **Hypothesis 1:** Fulfillment of original project schedule (INDTEMPO = Time Indicator)

This test revealed that office support impacted the time variable. In the expected count of projects supported by (EGP = Public Management) and without of term, 92.41 projects could have increased deadlines but in fact, 79 had not.

TABLE 1 TEST RESULT FOR THE TIME INDICATOR

Chi-square test				
Lines: INDTEMPO Rows: EGP		0	**1**	All
Score	0	157	**79**	236
Expected Score		143.59	**92.41**	
Chi-square Contribution		1.253	1.947	
Score	1	31	42	73
Expected Score		44.41	28.59	
Chi-square Contribution		4.051	6.295	
	All	188	121	309

	Chi-Square	gl	p-value
Lines: INDTEMPO Rows: EGP			
Alls			
Pearson	13.547	1	0.000
Likelihood ratio	13.291	1	0.000

Source: Elaborated by the authors.

- **Hypothesis 2:** Requirements of the funding agency (Indicator of Accounts)

This test revealed that office support impacts the accountability variable, INDPC = Indicator of Accounts). Note that when the scientist has the support of the project management office, accountability has less value than when it does not have such support, highlighting the impact of team knowledge in compliance with the standard of the financing agency.

TABLE 2 TEST RESULT FOR THE INDICATOR OF ACCOUNTS

Chi-square test						Chi-Square	gl	p-value
Lines: INDPC Rows: EGP		0	**1**	All	Lines: INDPC Rows: EGP			
Score	0	57	**71**	128	Alls			
Expected Score		77.88	**50.12**		Pearson	24.399	1	0.000
Chi-square Contribution		5.597	8.696		Likelihood ratio	24.458	1	0.000
Score	1	131	**50**	181				
Expected Score		110.12	**70.88**					
Chi-square Contribution		3.958	6.149					
	All	188	121	309				

Source: Elaborated by the authors.

- **Hypothesis 3:** Requirements of the funding agency (Scientific Report Indicator)

This test revealed that office support does not impact the variable INDRC=Scientific Report. Note that when the scientist has the support of the office, the scientific report should have fewer reservations compared to when it does not have such support. It is interesting to note that when the scientist has the support of the office the number of reservations is equivalent to when he does not have the support, emphasizing that it depends on the scientist the attendance of the required standard knowledge in the area.

TABLE 3 TEST RESULT FOR THE SCIENTIFIC REPORT INDICATOR

Chi-square test						Chi-Square	gl	p-value
Lines: INDRC Rows: EGP		0	1	All	Lines: INDRC Rows: EGP			
Score	0	163	105	268	Alls			

Continue

Chi-square test						Chi-Square	gl	p-value
Expected Score		163.06	104.94		Pearson	0.000	1	0.985
Chi-square Contribution		0.000	0.000		Likelihood ratio	0.000	1	0.985
Score	1	25	16	41				
Expected Score		24.94	16.06					
Chi-square Contribution		0.019	-0.019					
	All	188	121	309				

Source: Elaborated by the authors.

- **Hypothesis 4:** Compliance with Quality (Indicator of Accounts and Scientific Report)

This test revealed that office support impacts the quality variable (INDQ= Quality). Note that when the scientist has the support of the office, these requirements of the funding agency have fewer reservations compared to when they do not have such support. It is interesting to point out once again that when the scientist has the support of the project management office, the number of reservations is also lower, a fact expected from a practical point of view due to the team's knowledge in attending of the financing agency standard.

TABLE 4 RESULT OF THE TEST FOR THE INDICATOR OF ACCOUNTS AND SCIENTIFIC REPORT

Chi-square test						Chi-Square	gl	p-value
Linhas: INDQ Colunas: EGP		0	1	All	Lines: INDQ Rows: EGP			
Score	0	53	59	112	Alls			
Score esperada		68.14	43.86		Pearson	13.478	1	0.000
Contribuição para Qui-Quadrado		3.365	5.228		Likelihood ratio	13.385	1	0.000
Score	1	135	62	197				
Score esperada		119.86	77.14					
Contribuição para Qui-Quadrado		1.913	2.972					
	All	188	121	309				

Source: Elaborated by the authors.

- **Hypothesis 5:** Compliance with the budget planned for the project (Value Indicator)

This test revealed that office support impacts the variable, INDVALOR=Value. Note that when the scientist has the support of the office, the value of the project tends to be different from three

hundred thousand reais (R$ 300,000.00). In another analysis, the scientist would tend to delegate financial management of the project to the management office depending on the amount awarded by the funding agency.

TABLE 5 TEST RESULT FOR THE VALUE INDICATOR

Chi-square test				
Lines: INDVALOR Rows: EGP		0	1	All
Score	0	168	89	257
Expected Score		156.36	100.64	
Chi-square Contribution		0.866	1.346	
Score	1	20	32	52
Expected Score		31.64	20.36	
Chi-square Contribution		4.281	6.651	
	All	188	121	309

	Chi-Square	gl	p-value
Lines: INDVALOR Rows: EGP			
Alls			
Pearson	13.144	1	0.000
Likelihood ratio	12.833	1	0.000

Source: Elaborated by the authors.

When assessing the significance of the chi-square statistic, the p-value (0.000) is lower than the significance level of 0.05. Therefore, at a significance level of 0.05, we reject the null hypothesis and conclude that there is a statistically significant association among the variables, except for the scientific report variable, as expected.

5. CONCLUSION

This article provided evidence that the Project Management Office, an organizational unit recognized by PMBOK®, could support the scientist in the management of research projects. To achieve the objective, five hypotheses were developed, which tested the influence of the office about traditional variables of the literature on project success (time, cost and quality), using the theoretical framework and data collection of scientific research projects financed by FAPESP and executed in the FMRP from 2009 to 2015. The hypotheses were tested using the chi-square test of independence.

The study showed that the office can contribute to the success of a scientific research project. Scientists would have fulfilled the standards required by the funding agency without such support; however, it has been shown that the office impacts the financial management of the project. Either the scientist is spared bureaucratic tasks or he can dedicate time to other tasks, an expected result from the point of view of the theoretical framework. This type of initiative is aligned with the practices of foreign universities, where support for scientists has already become a routine part of institutional support (Grants Management Office).

In addition to supporting scientists in project management, the office assists funding agencies in fulfilling their institutional mission of maintaining accountability within legal requirements and in pattern which answer to that required by government control agencies.

The study was limited to the sample and the period chosen. Besides the office reviewed focuses only on the financial management of the project. Therefore, there must be other variables that could contribute to success when other tasks are evaluated.

In the case of requirements of this type of public funding, accountability and the scientific report were considered a quality measure for the success of the scientific research project. However, there must be other variables that could contribute to success when this type of financing is evaluated.

As suggestions for future research, list:

- Application of the tests to projects financed by other agencies, opening the discussion, for example, on financing rules (public and private).
- Application of a survey to the scientists who count and who do not count on the support of the project management office of FMRP, to make sure the perception of success of the project.
- Implementation of a shared project management center at USP's Campus in Ribeirão Preto. This point of view is supported by the argument that this center could attend to the managerial demands of funding agencies more efficiently, assuming that the standard is the same for all project types.

Hoping that the article contributes to the discussion of the variables that could impact the research project success, especially in the sights of the current scenario of competition for resources from funding agencies and search for the relevance and impact of the science produced in Brazil.

Not only can this article contribute to open the decision-makers mind (university administrators and business school leaders, including scientists), as to the importance of training people to administer scientific research projects, but also it is suggested to include specificity to the coverages of PMBOK®.

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