Best Management Practices and Performance of Information Quality in Information Technology Projects under the Moderator Effect of Restrictions: A Survey of the Brazilian Experience

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Abstract

This work aims to support managers in their decision processes in IT projects in dynamic and contingently contexts. To do so, it discusses the influence that best management practices exercise in the performance of information quality in Information Technology (IT) projects, considering restricting conditions. The study is based on the Brazilian reality. Thus, we interviewed 303 specialists with knowledge and experience about the object of study. These specialists were selected by technical and scientifically criteria. The data was collected through a scale questionnaire (Likert), with some open questions. To reduce subjectivity in the results we applied statistical techniques like the Duncan test, to compare the averages, and the Spearman's correlation, to analyze the influence investigated. The results we found are satisfactory and show that in restricting conditions, best management practices influence the performance of information quality in IT projects.

Key-words: Information Management; Information Technology Projects; Best Project Management Practices; Information Quality; Evaluation Criteria of Information Quality.

1. Introduction

The instability of global market, the fast changes in business, bigger complexity in operations and the need to maximize the integration between internal and external activates have been presented as indispensable factors so the organizations evolve their management models, becoming increasingly sustained by information technology – IT, as said Guimarães, Mello, Andrade, Figueiredo and Mota (2008) and Rabechini and Carvalho (2003). In this context, IT arises as a differential factor to the business success because, if it is well applied, in a strategic way in consonance to the business needs, it helps on defining and achieving goals and objectives, allowing the increase of efficiency and quality of products and services offered, and also reduces costs and optimizes resources (Ferreira, Tereso, Ribeiro, Fernandes & Loureiro, 2013; Kerzner, 2007). Although Information Technology is an extremely important resource to organizations, IT projects are characterized by high taxes of flaws and failure (Arias et al., 2012; Marques, Varajão, Sousa, & Peres, 2013; Wateridge, 1995). This can be verified by a research published by the Standish Group (2014), which shows that only 16,2% of the projects are successful in a global scenario. The others are finalized with adjustments in Schedule, budget or functionalities (flaws), or are canceled (failures).

Due to the high level of flaws and failures in projects, many studious have tried to identify best management practices, which allow increasing efficiency and effectiveness and, consequently, their success (Alias, Ahmad@Baharum & Idris, 2012; Papke-Shields, Beise & Quan, 2010). The results of these studies indicate that there is no consensus about the best practices to be adopted – they can vary according to the organization, team and client, among other factors (Arias et al., 2012; Ramos & Mota, 2014 ;).

Studies also indicate that best practices go beyond the ones associated to the well known iron triangle (cost, time and quality) (Papke-Shields, Beise & Quan, 2010; Serrador & Turner, 2014). Another important factor for the projects to be successfully executed is the management of information quality. This happens because information is essential to the maintenance of the organization and must be treated as a product which needs to be defined, measured, analyzed and constantly improved, allowing it to be used and made available with more efficiency and effectiveness (Borek, Parlikad, Woodall& Tomasella, 2014; Calazans, 2008). Moreover, information is fundamental for understanding the problem to be dealt with and to describe the solution to be adopted. If the information quality is low, it can generate many risks to the project and, consequently, for the organization (Borek et al., 2014). Information is also an elementary factor to innovation, more success in decision making and in project management, according to Calazans (2008).

Wang and Strong (1996) state that although quality information is indispensable in project management processes, it is considered a subjective concept and, therefore, hard to measure. Because of that, many other researchers realized studies with the objective to identify the perspectives and criteria appropriated to evaluate information quality, as defined by Olaisen (1989 apud Calazans, 2008) and Wang, Ziad and Lee (2000). Though there are researches about the relation among information technology, project management and information quality (Machado, 2013; Molina, 2010; Nasution & Albarda, 2013), we notice a gap in literature of works which analyze the influence of best project management practices in performance of information quality.

So, this contribution gains emphasis once it is believed to be important to realize a study which evaluates the influence of best management practices of information quality in projects in restricting conditions, i. e., evaluation criteria of information quality. From this study we aim to make clear how the adoption of best management practices influence the performance of information quality, which transits during the execution of IT projects. It will, at its turn, allow managers and, consequently, the organization, to make more substantiate decisions, as well as assemble more value to business and reach better performance in the market.

2. Conceptual model

This section describes the conceptual model (Picture 1) which basis this study. It is composed by independent variables, dependent variables and moderator variables. According to Picture 1, the independent variables in this study correspond to the best management practices in IT projects, represented by eight groups: (i) Accomplish objective, scope, schedule, budget, requirements and quality; (ii) Manage the project considering aspects like documentation, environment, policies, support software's and success criteria; (iii) Satisfy the team's, clients' and other actors' needs; (iv) Plan the project appropriately; (v) Control and monitor the project; (vi) Adopt portfolio practices; (vii) Manage risks; e (viii) Having a qualified project manager. It is important to highlight that these groups of best practices were identified though analysis of published scientific researches, and through application of a statistic technique called cluster analysis. The dependent variables in this study are directly related to the performance of information quality, taking into consideration aspects like the information consumer satisfaction and quality of the product generated, which is the information. These aspects were identified taking into consideration the researches published by Machado (2013) and Oleto (2006), based on the Marchland's study (1990).

Finally, in the context of this study, the moderator variables are represented by evaluation criteria of information quality. We take into consideration restrictions which condition the relation between best management practices and the performance of information quality in IT projects. It is important to highlight that the criteria of information quality, which represent the moderator variable, follow the classification presented in the research published by Wang and Strong (1996). As we can verify in Picture 1, the conceptual model of this research is aligned to the objective purposed: evaluate the influence of best management practices (independent variables) in performance of information quality in IT projects (dependent variables) in restricting conditions (moderator variables). Based on that, the following hypothesis was elaborated: in restricting conditions, best management practices influence (in greater or lesser extent) the performance of information quality in IT projects. The next section discusses the procedures used to collect and treat data.

3. Methodology: Steps and Implementation

This section describes the research method applied in this study. Here we present each of the phases and steps which compose the method, exploring the tools and techniques adopted to collect, treat and analyze data, to serve as a support material to further studies.

To answer to the research problem and accomplish the objective purposed, the research process was divided into two phases and nine steps. The Phase 1 of this research is related to the comprehension of the problem and deepening on the purposed subject, through a bibliographic research, aiming to understand the key concepts about IT project management (Step 1); best project management practices (Step 2); information quality and evaluation criteria of information quality (Step 3).

Step 1: the research is composed by a preliminary study about IT project management, which is based in a bibliographic review about the projects' base, as well as project management. We used classic references about the subject, as well as books and relevant scientific publications which discuss the topic and are available in research bases (Emerald, Google Scholar e Science Direct). From this study we found that the use of IT in organizations is indispensable to their surviving in the market, making them more competitive, helping to optimize the management processes of information, collaboration and communication (Basu & Muylle, 2007; Bowden, Dorr, Thorpe, & Anumba, 2006). Nevertheless, many organizations do not realize or cannot enjoy the benefits brought by the IT, which generates dissatisfaction with the investments made (Love & Irani, 2004). To justify the dissatisfaction, Jeffery and Leliveld (2004), Stewart and Mohamed (2003), state that many projects are not finished, others are but without the appropriate IT strategic planning or, yet, the results generated by the project are not measured accordingly. Based on this information we can see that project management is essential so that organizations are able to enjoy the competitive advantages desired through the adoption of information technology. We can also state that appropriate project management increases the probability of obtaining success on using IT in organizations and, consequently, the organization's success in the market.

Step 2: we listed best management practices in IT projects. After that we made a wide bibliographic research in scientific articles published in research bases (Emerald, Google Scholar e Science Direct). From this study we could find that even after decades of researches and the increasing use of automated methodology and tools for management and execution of projects, most of them keeps failing. This can be observed by analyzing a research published by the Standish Group (2014), which shows that only 16,2% of IT projects are successful, which means that 83,8% failure, because they are finished with some kind of modification or are canceled during their execution. Many studious have researched aiming to identify critical success factors and best management practices to increase the success level in IT project management. To achieve the objective of this work we tried to investigate and identify which are the best practices usually adopted in project management. To do so, we analyzed many studies, where we could identify three hundred and twenty-two (302) best practices, in researches published by Alias, Ahmad @ Baharum and Idris (2012), Arias et al. (2012), Bryde and Robinson (2005), Cooke-Davies (2002), Ferreira et al. (2013), Marques et al. (2013), Papke-Shields, Beise and Quan (2010), Ramos and Mota (2014), Sanjuan and Froese (2013), Serrador and Turner (2014), Wateridge (1995), Wateridge (1998) and Wit (1988).

Step 3: we made a wide bibliographic research about the concepts of information, quality and information quality, with the making goal to identify the main criteria used to evaluate information quality. This process was realized by researches in books and relevant scientific publications available in research bases (ACM, Emerald, Google Scholar, IEEE e Science Direct). The previous studies point that information is the indispensable raw material for project management, because it is elementary to understand the problem to be solved, is used as the basis for decision making along the whole project, as well to describe the solution adopted (Calazans, 2008; Porter, 1991). So, if information is misinterpreted, bad decisions are made and the solution for the problem is incoherent, which can generate many kinds of losses (Machado, 2013). Thus, in an attempt to organize the analysis in information quality, Machado (2013) and Oleto (2006), based on Marchand's (1990) and other authors' studies, indicate that there are two (2) dominant perspectives: one based on the product and the other based on the user (consumer). The perspective which is based on the product emphasizes information as an object (or thing), and the perspective based on the user analyzes the relation between user and information. Beyond that, there is a wide range of criteria which are adopted to evaluate information quality in both perspectives, however there is not an only set and pattern of these criteria. So, considering that there are different classifications of criteria for information quality and that none of them is considered a standard, this work will follow the classification realized by Wang and Strong (1996), which organizes the criteria in four categories, each one composed by dimensions of information quality, named as: intrinsic (precision, credibility, objectivity, reputation), contextual (aggregated value, relevance, punctuality, completeness, appropriate quantity), representational (interpretability, ease of understanding, consistent representation, concise representation) and accessibility (accessibility, safe access).

Phase 2 culminates in the achievement of the objective purposed for this work. To do so, it is composed by six steps, which are based on the execution of exploratory research, which is also quantitative, descriptive and survey, to analyze techniques and statistic methods, elaboration and application of questionnaire and final analysis of results.

Step 4: This step's objective is to select a statistic method of multivariate analysis which is appropriate to reduce the number of best practices in project management and enable the creation of a data collection tool in a consistent and objective way. This is an important process, once best project management practices correspond to the independent variables of the conceptual model adopted in this research. So, it is indispensable that the 302 practices are summarized. However, it is also important that we do not lose information. Based on a conceptual study, the technique of multivariate analysis presented as the most appropriate for solving the problem was the cluster analysis. Beyond that, it is economic, simple and efficient. Amongst the existing grouping methods, we realized practical evaluation of the methods Ward and K-means. At the end of a diverse set of tests, the Ward method presented more consistent results. It is important to highlight that, to group the practices with the Ward method was necessary to previously apply techniques of text mining (we adopted the "tm" pack, for text mining in R), to identify terms present in each practice and their frequency. To do so, we adopted the bag-of-words approach.

Step 5: The specialists chosen to contribute to this study were selected according to criteria of technical and scientific knowledge, aligned to the research context. To do so, the main source for profile analysis of possible respondents was Plataforma Lattes. When checking the specialists' curriculum we were looking for academic education, experience time and professional engagement to Project management and information quality. During this process we analyzed more than 1500 curriculums/profiles and, from these, we selected 303 specialists. It is important to highlight that the specialists' profile is very specific, once it must reunite knowledge related to project management and information quality.

Step 6: This step was realized simultaneously to Steps 5 and 7 and has as it goal to elaborate a complete, objective and simple research tool. For this work we used a semi-opened questionnaire, composed mostly by objective questions. The questionnaire is composed by three parts, preceded by general orientations about the research objective and scope. The first part is responsible for collecting information about the specialists' contact. The second aims to characterize the specialists, getting to know their academic education, experience time and area. Finally, the third part is composed by two judgment matrixes, being the first where the respondent indicates the degree of influence of each of the eight groups of best project management practices (independent variables) about each of the two performance aspects of information quality (dependent variables), through Likert scale from 1 to 5 (greater or lesser influence, respectively). In the second judgment matrix, the respondent indicates the degree of influence of each of the four groups of criteria for information quality evaluation (moderator variables) about each of the two performance aspects of information quality (dependent variables), through Liker scale from 1 to 5 (greater to lesser influence, respectively). After that, the third part of the questionnaire was built aiming to collect information which would base the answer to the research problem.

Step 7: This step was executed at the same time as steps 5 and 6 and aimed to select the statistic method to determine the research objective. In a first moment we realized experiments with three statistical tests to compare sets of means: Duncan, Fisher and Tukey. We chose the Duncan method, because it is considered a less conservative method when compared to Fisher and Turkey. After that we studied correlation statistical methods, using the Spearman correlation, once the data analyzed are ordinal (values from 1 to 5 which indicate greater or lesser degree of influence), which we found the most appropriate method for this kind of application. It is important to highlight that the Spearman method was chosen especially because it allows identifying an influence relation (once it establishes correlation in greater or lesser degree) amongst the variables analyzed.

Step 8: After choosing the specialists (Step 5) and elaborating the questionnaire (Step 6) it was possible to apply the research tool. To do so we elaborate an invitation letter which was sent through the contact tool available at Plataforma Lattes? It is worth mentioning that the letter was sent until three times to specialists which did not offer any kind of feedback. By adopting this strategy, 33, 3%, which means, 101 of 303 specialists invited answered to the questionnaire. Beyond that, 3, 9% said that they were not available to contribute to the research and others 62, 7% did not offer any kind of feedback.

Step 9: After applying the questionnaire (Step 8) we started analyzing the answers collected using Duncan test and Spearman correlation.

So, considering the 3rd Part of the questionnaire we gave special attention on trying to identify the correlation between x and y – being x represented by the influence degree of the independent variables (best project management practices) over the dependent variables performance of information quality) and y represented by the influence degree of the moderator variables (evaluation criteria of information quality) over the dependent variables, which meets the research objective. Before calculating the correlation, we tried to identify the means (in a scalar format from 1 to 5) of the answers given by the specialists to the questions about the direct relations between: "best management practices" x "performance of information quality" and "evaluation criteria of information quality" x "performance of information quality". After obtaining the means we applied the Duncan test to verify if they were statistically different. Then we calculated the correction investigated. It is important to highlight that all the procedures used for the Duncan test and to verify the correlation were made by using the statistical tool R.

4. Results and Analysis

4.1. Grouping of Best Practices in IT Project Management

After identifying 322 best practices in IT project management by a bibliographic research we passed to the process of grouping them. This procedure is relevant once, in the context of this work, best practices correspond to the independent variables so, to reach consistent final results it is indispensable to summarize them without losing information. To make the grouping mentioned above we adopted the agglomerative hierarchical method known as Ward, which was chosen from a wide set of tests realized with this method and with the k-means method. We also made tests with different kinds of formats for describing best practices and tests to generate different quantities of groups. At the end we obtained better results when organizing the practices in eight groups. After generating the groups it was necessary to characterize them. So, we generated term clouds (Picture 2) to evidence the strongest terms in each group.

Based on the descriptions of best practices contained in each group and helped by the term clouds the eight groups of best project management practices were characterized as follows:

- Group 1: is the one with more quantity and variety of best practices (one hundred fifty-one). Because of that it embodies more areas in project management, like: objectives and scope, schedule and budget, requirements and quality. The description formulated by this group was: "Accomplish objective, scope, schedule, budget, requirements and quality";
- Group 2: was named as "Manage the project considering aspects like: documentation, environment, policies, and support software's and success criteria". It is the second group with more practices – fifty-six;
- Group 3: is formed by twenty-six best practices. It is one of the best characterized, once their practices are very similar. This group was named as "Satisfy the team's, clients' and other actors' needs";
- Group 4: is also a well characterized group. This group was named: "Plan the project appropriately", and it is formed by twenty-nine best practices;
- Group 5: is composed by best practices which are strongly related to controlling and monitoring the project execution and, because of that, was named as "Control and monitor the project". It is one of the groups with less best practices;
- Group 6: is the smaller group – ten best practices – which are strongly related to portfolio management. Because of that the group was characterized as "Adopt portfolio practices";
- Group 7: is one of the groups which reunite most similar practices, being all related to risk management during the project execution. So, the group was named as "Manage risks". This group is formed by nineteen best practices;
- Group 8: is composed by eighteen practices and it is one of the groups with very similar elements. All of them are related to the importance of having a well qualified and prepared project manager. It was characterized as "Having a qualified project manager".

After understanding how the independent variables (best project management practices) were grouped, the next sections discuss the results about the evaluation of best practices influence on the performance of information quality in projects, considering that these relations are affected by the evaluation criteria of information quality.

4.2. Direct Influence of Best Management Practices in Performance of Information Quality

This section presents the results of questions directed to the specialists about the direct influence degree that best management practices exercise over the performance of information quality in IT projects. The results of this influence were measured by a Liker scale with values from 1, which represent "reduced degree of influence", to 5, which represent "elevated degree of influence". At the end we also verified is the influence means found were statistically different by the application of the Duncan test at 5%. The first aspect about the performance of information quality analyzed was "Information consumer satisfaction". The Table 1 illustrates that the specialists interviewed consider that adopting best management practices influences moderately to strongly the costumers' satisfaction. By calculating the standard error it is possible to see that the means found vary between ± 0,044563 a point, which indicates a small variability in the values found. The Table 1 classify the groups of best practices according to the influence degree (from greater to lesser), as well as identifies which means are statistically different. With that, despite of the fact that four groups of best practices have means which are not different statistically it is still possible to say that from the statistic point of view there are five groups of different influence means ('a', 'b', 'c', 'd' e 'e') of best management practices on the consumer satisfaction.

When questioned about the influence degree that best practices exercise over the aspect "Quality of the product generated (information)", the specialists interviewed also considered this influence from moderate to strong, which can be verified on Table 2. By calculating the standard error it is possible to see that the means found vary ± 0,035782 point, which indicates small variability in the results. After these results we can say that, although there are eight means, from the statistic point of view there are only three groups of different influence means ('a-ab', 'bc-c' e 'd') of best management practices on the information quality. As we understand the influence degree exercised by the best practices over the performance of information quality, we go to the next section, which present the results found to the direct relation between the evaluation criteria of information quality and the performance of information quality.

4.3. Direct Influence of Evaluation Criteria of Information Quality on Performance of Information Quality

This section exposes the specialists' opinion about the direct influence that evaluation criteria of information quality exercise over the performance of information quality in IT projects. As well as the previous analysis, the results were measured by Liker scales, with values from 1 (which represents reduced degree of influence) to 5 (which represent elevated degree of influence). Besides, we applied the Ducan test at 5% to verify if the influence means are statistically different. The first aspect analyzed was the "Information consumer satisfaction". The interviewed consider that the evaluation criteria in information quality strongly influence the consumer satisfaction (Table 3). After calculating the standard error we could see that the means found vary ± 0, 014971 point, which indicates a small variability in the values found. Through the analysis of these results (Table 3) it is possible to say that, from the statistic point of view there are two different groups of influence means ('a' e 'b') de of evaluation criteria of information quality on the consumer satisfaction. When questioned about the influence exercised by the evaluation criteria of information quality about the "Quality of the product generated (information)" the specialists' answers also signal to a high influence degree. By calculating the standard error it is possible to see that the means found vary ± 0,015418 points, which indicates small variability in the values found.

Table 4 classifies the evaluation criteria of information quality according to the influence degree exercised over the quality of the product generated (information), as well as identifies which means are statistically different. We can see a similar result to the previous one once, from the statistic point of view, we identifies two groups of distinct influence means ('a' e 'b') of evaluation criteria of information quality. After analyzing the specialists' answers, considering each of the relations investigated in isolation ("best management practices" x "performance of information quality" and "evaluation criteria of information quality" x "performance of information quality") we pass to the analysis of the correlation existent amongst them, so we can answer the problem purposed. This procedure is explained on the next section.

4.4. Influence of Best Practices in Performance of Information Quality Moderated by Evaluation Criteria

This section aims to explore the relation between best project management practices (independent variables) and the performance of information quality (dependent variables), influenced by evaluation criteria of information quality (moderate variables), which will allow us to answer the research problem. Initially we analyzed the answers and calculated the correlation coefficient to each relation established between independent and dependent variables, as well as with between dependent and moderate variables.

In a first moment we present the results related to the aspect "Information consumer satisfaction", which corresponds to the first dependent variable. So, the Size a on Picture 3 presents the correlation coefficient identified between consumer satisfaction with all the groups of best practices took into consideration and under the influence of the evaluation criteria of information quality.

By analyzing the Size A of Picture 3 it is possible to infer that, generally, best management practices have a positive but weak relation with information consumer satisfaction when influenced by evaluation criteria of information quality. This conclusion is sustained by the analysis of the correlation coefficient presented. All coefficients have values above 0,0 and the biggest ones were 0,43 (Having a qualified project manager influences on information consumer satisfaction when the information presented is precise and objective and has credibility and reputation (IV8xDV1 correlated with DV1xMV1)), and 0,38 (Having a qualified project manager influences on information consumer satisfaction when it is well represented (IV8xDV1) correlated with DV1xMV3)). This signals that although best practices exercise positive influence on the information consumer satisfaction, this influence is considered weak. Still taking into consideration the correlation coefficients, we tried to provide a better illustration of the influence exercised by each best practice group on the information consumer satisfaction, considering the moderate action of evaluation criteria.

The results illustrated on Size B of Picture 3 only reinforce the ones previously presented, making clear that the set of practices which higher influence the consumer satisfaction is "Having a qualified manager" (IV8) combined with information of intrinsic quality (MV1). Analyzing the Size B of Picture 3, it is also possible to say that best management practices influence the information consumer satisfaction with a predominant intensity from 0,20 to 0,30, which is very close to the desirable level (desirable: 0,5 – ideal: 1). Besides, it proves that best management practices influence in greater or lesser degree the consumer satisfaction when conditioned to the action of evaluation criteria of information quality. The results related to the aspect "Quality of the product generated (information)", which corresponds to the second dependent variable, are exposed on the Side A of Picture 4. Therefore, the Size A of Picture 4 presents the correlation coefficients identified among the information quality and all the groups of best practices considered, and under the influence of evaluation criteria of information quality. Analyzing the Size A of Picture 4 it is possible to understand that, as the previous case, best management practices present positive but weak relation with the information quality as a product, when influenced by evaluation criteria of information quality. However, although the correlation is still weak, the coefficients presented are lightly bigger if compared to the ones found in the relation with information consumer satisfaction.
In this case, the maximum coefficient found was 0,4, which indicates that the group of practices "Manage project risks" influences the information quality (product) when it is well represented (IV7xDV2 correlated to DV2xMV3). The second biggest coefficient found was 0,38 in the correlation between IV7xDV2 and DV2xMV4, which indicates that the practice "Manage project risks" influences the information quality (product) when it is accessible. These coefficients signal a positive, but weak relation. Aiming to provide a better illustration of the influence exercised by each groups of best practices on the quality of the product generated (information), considering the action of the evaluation criteria of information quality, we elaborated the surface contour diagram presented on the Size B of Picture 4, based on the correlation coefficients already identified. The results evidence that the set of practices which higher influence the quality of the product generated (information) is "Manage project risks" (IV7) combined with well represented (MV3) and accessible (MV4) information. It is also possible to say that, as well as in the consumer's satisfaction, best management practices influence the quality of the product generated with a predominant intensity of 0, 20 to 0, 30, which is very close to the desirable level. Besides, we can prove that best management practices influence in greater or lesser degree the quality of the product generated (information), when conditioned to the action of the evaluation criteria of information quality.

4.5. Comparison of results considering presence and absence of evaluation criteria

After presenting the several analysis realized it is relevant to explore a comparison of the results about the influence of best management practices on the performance of information quality, considering the scenarios of presence and absence of evaluation criteria. This investigation aims to evidence the action of evaluation criteria on the relation studied, indicating which the best practices in each scenario are. Picture 5 presents the comparison of two scenarios for each group of best practices. It is important to explain that the results presented were consolidated through the direct influence means of best management practices over the performance of information quality and the means of correlation coefficients between the best management practices and the performance of information quality, considering the action of evaluation criteria of information quality.

So, to each practice we present its classification in decreasing order of influence on the performance of information quality so, the bigger the classification order, the bigger the influence of that practice in a certain scenario.

By analyzing the Picture 5 it is possible to verify that the group of practices "Accomplish objective, scope, schedule, budget, requirements and quality" (IV1) is the one which exercise bigger influence on the performance of information quality when there is no action of evaluation criteria. However, when there is action of evaluation criteria in the relation, the influence of this group of practices is much lower. The strong influence identified evidences the importance of executing correctly the areas considered as key points for project management, which help on the performance of information quality and on the project performance as a whole (Cooke-Davies, 2002; Ferreira et al, 2013; Marques et al, 2013; Papke-Shields, Beise & Quan, 2010). In contrast we believe that the lower influence verified when the evaluation criteria are applied is a result of the low cohesion amongst the practices which compose the group. About the influence of the group "Plan the project appropriately" (IV4), we can also see that when there is no action of the evaluation criteria, it exercises great influence on the performance of information quality. On the other hand, when there is moderate action of the evaluation criteria, this group of practices has lower influence. We believe that this group of practices helps on generating quality information because, with planning activities the individuals will have full knowledge about the project development (Ferreira et al, 2013; Marques et al, 2013; Papke-Shields, Beise & Quan, 2010; Sanjuan & Froese, 2013), which allows the generation of information with more quality.

By analyzing the influence of the group "Having a qualified project manager" (IV8), we can see that with the action of evaluation criteria, this group of practices has the biggest influence amongst all the others. On the other hand, when there is no action of evaluation criteria, the influence of this group is much lower. This result evidences that when evaluating the quality of manipulated information the project manager has a decisive role, once he or she is responsible for the decisions, managing resources and people involved and determining the project performance, being able to stimulate the production of quality information, which corroborates to the discussions present on the works of Alias, Ahmad @ Baharum and Idris (2012) and Arias et al. (2012). It is also important to highlight that the decision making process is a very important activity for project managers because when they have access quality information it is expected that they make the best decisions possible, and these decisions will result in better global performance for the project.

When we observe the influence of the group "Manage risks" (IV7) we see that it is the second highest when there is action of evaluation criteria. However, this same group of practices exercises lower influence on the performance of information quality when there is no action of evaluation criteria. The influence strength exercised by this group of practices may be justified because the risks of a project are directly related to the decisions made, whose success depends on having quality information. This fact meets the study of Borek et al. (2014), who says that when the information quality is low, the project takes a series of risks which also affect the organization. Another interesting finding is that, by observing the influence of the other groups of practices (IV2, IV3, IV5 e IV6), we can see that they have the same classification with or without the action of evaluation criteria of information quality.

By now it is interesting to see if the results presented allow the identification of any evaluation criteria of information quality which is determinant in the relations investigated. Picture 6 shows the comparison of the influence exercised by the evaluation criteria. The results presented were consolidated by the direct influence means of the criteria on the performance of information quality and by the means of the coefficients found considering the action of evaluation criteria in the relation between best management practices and the performance of information quality. So, to each criterion we present their classification in decreasing order of influence in the scenario analyzed and, thus, the bigger the classification order, the bigger the influence of the evaluation criteria.

Although all the evaluation criteria are considered relevant, by examining the Picture 6 it is interesting to observe that the intrinsic criteria have higher influence when we take into consideration their direct action on the performance of information quality. This signals that, in this scenario, is elementary that the manipulated information is correct, complete, objective and derives from trustable sources. However, when we consider the influence exercised by the evaluation criteria in relation to the best management practices and the performance of information quality, the category of criteria which stands out is the accessibility, demonstrating that, in this scenario, it is necessary to the information to be easy and safe to access.

After these results it is irrefutable that all categories of criteria exercise strong influence on consumer satisfaction and on the quality of the product, because quality information is considered a strategic resource to the organization to survive in dynamic and contingently environments, pushing the innovativeness and competitiveness (Molina, 2010; Porter, 1991). Therefore, it is important to take care on generating the execution of the project information of intrinsic quality, which is contextualized, well represented and accessible during.

After that, this work highlights the importance of adopting best management practices in IT projects, once it was demonstrated that they influence positively the performance of information quality and consequently favor the global performance of the project. Therefore, we expect this work to have practical use for managers in information technology, once the results presented contribute for a better and practical understanding of a strategic point of the management, which is the use of best practices.

5. Final Words

The main objective of this work is to evaluate the influence of best management practices on the performance of information quality in IT projects in restricting conditions (evaluation criteria of information quality), based on the Brazilian experience. The researches realized so far show that there is a lack of studies which analyze the approach adopted in this work, which deals with the relation "IT" x "management" x "information quality". So, its importance is evident, because it presents a new point of view for IT managers. The results found show that the methodology used allowed the resolution of the problem purposed and the validation of the hypothesis. In other words, at the end of this study, we proved that, in restricting conditions best management practices influence the performance of information quality in IT projects. By analyzing the results found we can say that there is a positive but weak relation between best project management practices and the performance of information quality in restricting conditions. It means that the adoption of best management practices influence in the increasing of the performance of information quality in IT projects, when this relation is conditioned to the action of evaluation criteria of information quality. So, the adoption of best management practices is desirable, once they contribute for generating quality information during the execution of projects and, consequently, collaborate for increasing the probability of global success.

By the results found we can understand that this study is relevant, once it discusses a gap in the literature, showing the degree of influence exercised by best management practices on the performance of information quality in IT projects in restricting conditions. With that, it presents significant implications to the management practice, because it subsidizes increment of value to business and enterprises. It is worth mentioning that despite of the fact that this is a wide study of the art, as well as a practical study based on statistical techniques and on specialists' experiences, this research is subject to criticism. Once all the variables involved are qualitative, they have a high degree of subjectivity, which gives space to uncertainties and questions about the results. As future works we suggest to replicate the research expanding the sample and including foreign specialists; to apply the study based on the experiences of other countries; to adopt different research methodologies, statistical methods and methods for selecting the specialists to confront the results found; to evaluate the influence exercised by best management practices over the performance of information quality in specific steps of an IT project; to realize case studies to assess in real environment the relations of influence identified in this work.

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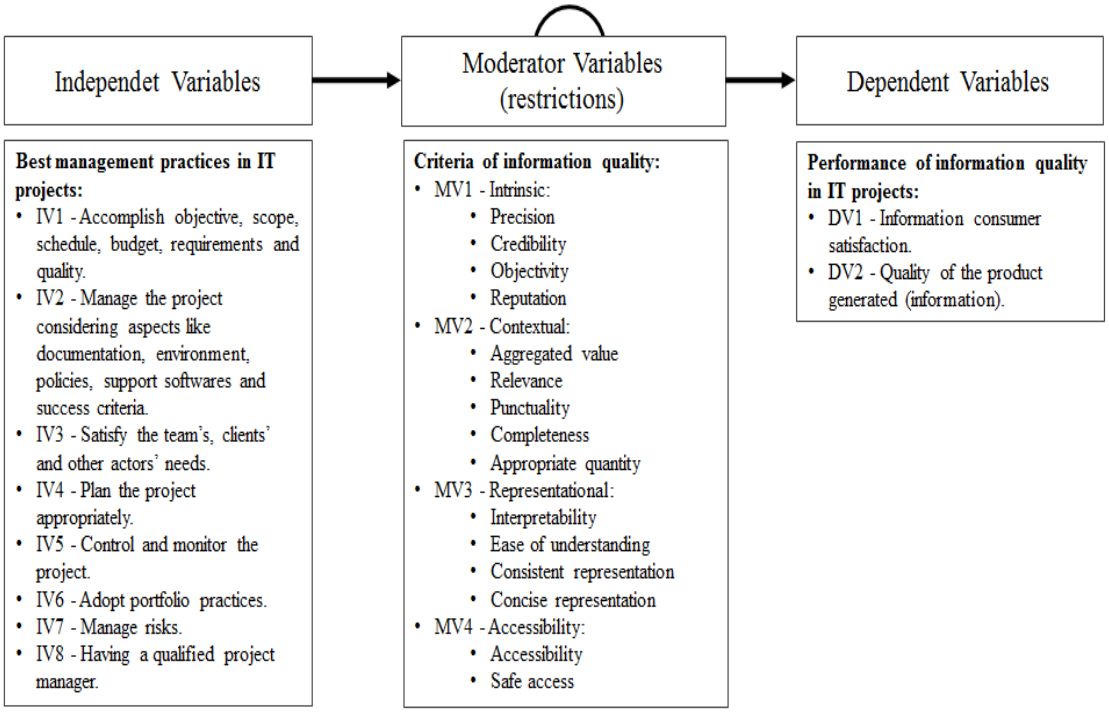
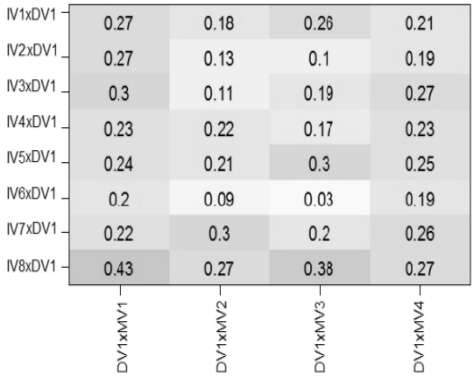
Appendix

Picture 1: Conceptual Model – Independent, Moderator and Dependent Variables.

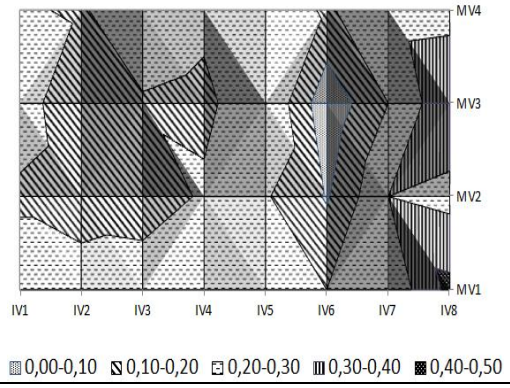


Picture 2: Clouds with terms in evidence in the 8 groups of best practices

Picture 3: Correlation coefficient and intensity of influence of best management practices on for information consumer satisfaction, considering the action of evaluation criteria.

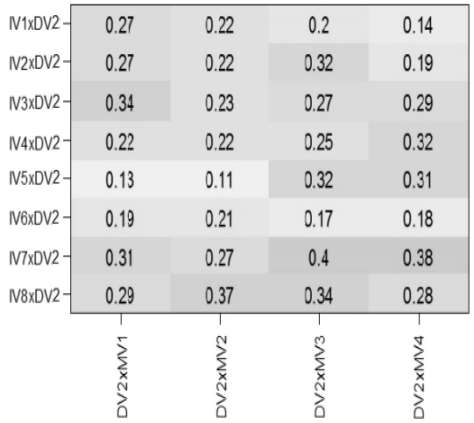


Size A – Matrix with positive, null and negative indicative correlation of the aspect consumer satisfaction.

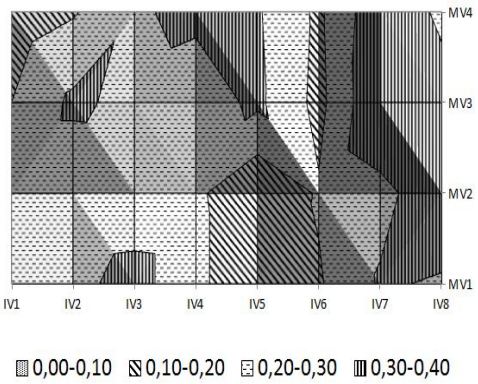


Size B – Intensity of the influence of best management practices for information consumer satisfaction, considering the action of evaluation criteria.

Picture 4: Correlation coefficients and influence intensity of best practices on the quality of the product generated (information), considering the action of evaluation criteria.

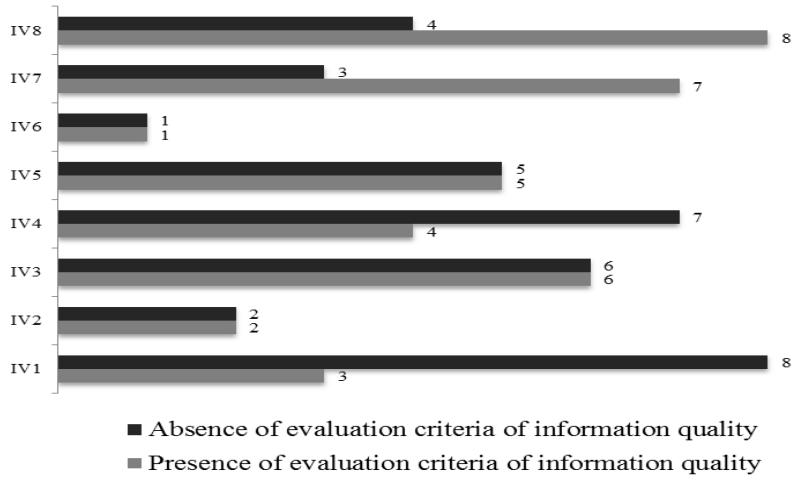


Size A – Matrix with indicatives of positive, null and negative correlation of the aspect quality of the product generated (information).



Size B – Intensity of the influence of best practices on the quality of the product generated (information) considering the action of evaluation criteria.

Picture 5: Comparing the influence of best management practices on the performance of information quality, considering the presence or absence of evaluation criteria of information quality



Picture 6: Comparison of the influence exercised by evaluation criteria on the performance of information quality

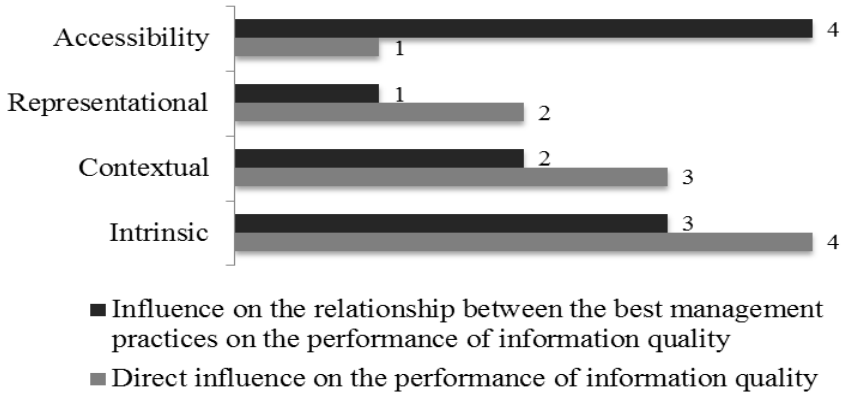


Table 1: Statistical differentiation with Ducan Test about the mean influence in project management practices over the information costumers' satisfaction – specialists' judgment

Order	Groups of Best Practices	Averages
1st	Accomplish objective, scope, schedule, budget, requirements and quality.	4,623762 a
2sd	Satisfy the team's, clients' and other actors' needs.	4,396040 b
3rd	Plan the project appropriately.	4,108911 c
4th	Having a qualified project manager.	4,089109 c
5th	Manage risks.	4,019802 c
6th	Control and monitor the project.	3,970297 c
7th	Manage the project considering aspects like documentation, environment, policies, and support software's and success criteria.	3,752475 d
8th	Adopt portfolio practices.	3,118812 e
* Means followed by the same letter in the column do not differ by Duncan test ($p < 0.05$).		

Table 2: Statistical differentiation with Ducan Test about the mean influence of best project management practices over the quality of the product generated (information) – specialists' judgment.

Order	Groups of Best Practices	Averages
1st	Accomplish objective, scope, schedule, budget, requirements and quality.	4,495050 a
2sd	Plan the project appropriately.	4,485149 a
3rd	Control and monitor the project.	4,386139 ab
4th	Having a qualified project manager.	4,247525 bc
5th	Manage the project considering aspects like documentation, environment, policies, and support software's and success criteria.	4,237624 bc
6th	Manage risks.	4,188119 bc
7th	Satisfy the team's, clients' and other actors' needs.	4,138614 c
8th	Adopt portfolio practices.	3,366337 d
* Means followed by the same letter in the column do not differ by Duncan test (p <0.05).		

Table 3: Statistical differentiation with the Duncan Test about the mean influence of evaluation criteria of information quality over the information consumer satisfaction – specialists' judgment

Order	Categories of Criteria for Information Quality Evaluation	Averages
1st	Contextual	4,435644 a
2sd	Intrinsic	4,435644 a
3rd	Representational	4,415842 a
4th	Accessibility	4,128713 b
* Means followed by the same letter in the column do not differ by Duncan test (p <0.05).		

Table 4: Statistical differentiation with Duncan Test about the mean influence of evaluation criteria of information quality over the quality of the product generated (information) specialists' judgment

Order	Categories of Criteria for Information Quality Evaluation	Averages
1st	Intrinsic	4,534653 a
2sd	Contextual	4,495050 a
3rd	Representational	4,396040 a
4th	Accessibility	4,188119 b
* Means followed by the same letter in the column do not differ by Duncan test (p <0.05).		