

Request for Information (RFI) Management: a Case Study

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The Request for Information (RFI) process is one of the critical communication tools between the project owner or the architect and the contractor in construction projects. The adverse impacts of poorly managed RFIs include cost overrun, delay and possibly lawsuit. Therefore, how to reduce number of RFIs and how to manage RFIs effectively have been the topics for research. This paper is focused on how to manage or track RFIs more effectively. Out of many suggestions for more effective RFI management and tracking, two policies are selected and their effectiveness in terms of number of days taken for response was examined in this research: 1) how early RFIs are created, and 2) RFI tracking with regard to a degree of importance. This study in this paper uses a case study method: RFI related data (1,484 RFIs) from a building construction project in the case study were collected and analyzed. The results show that the amount of time spent to respond RFIs is not affected by when RFIs are created and that tracking RFIs with regard to degree of importance may be effective, but needs a further study.

Key Words: Request for Information (RFI), Case Study, Delay in Response to RFI

Introduction

In construction projects, construction documents (drawings and specifications) may not address all aspects, or may include gaps, or conflicts of the facilities to be built and these gaps, or conflicts need to be clarified. Clarification in construction projects is sought through the project's RFI process. An RFI is defined as "*a formal written procedure initiated by the contractor seeking additional information or clarification for issues related to design, construction, and other contract documents* (Hanna et al., 2012)".

It is not uncommon that many RFI's are submitted and responded to during construction projects. One study shows that an average of 887 RFIs per construction project were submitted in Americas (Hughes et al., 2013). Resolution of issues through RFI process may be needed due to many different factors: such as unclear project documents (drawings and specifications), inconsistency between construction documents, or unforeseen site conditions. The number of RFIs in a construction project affects performance of the construction project. The adverse impacts of a large amount of RFIs and inefficient management of RFIs in construction projects are several fold: 1) more time needed for review and response, 2) more cost from more time spent for review and response, 3) overall project delay caused by delay in response to RFIs, and 4) potential for claims (Hughes et al., 2013). Thus, it is critical to manage RFIs efficiently and on time for construction project success.

Issues related to the RFI management in construction project include 1) how to reduce number of RFIs and 2) how to manage RFIs. If number of RFIs issued in a construction project is reduced, then the project is more likely to be finished in a more favorable way in terms of time and cost. One suggestion to this issue is to get contractor involvement during the design stage of the project (Song et al., 2009). Several approaches have been suggested, adopted, and used in construction projects for more efficient management of RFIs. For example, it is recommended that a standard form for RFI submittal includes key information such as estimated cost and schedule impact, and priority determined by contractors. Also, usage of an electronic RFI submittal and response system is recommended.

However, there is little research to show how effective the suggested approach or method is in real construction project. Therefore, as an effort to improve RFI management procedures, this paper aims to evaluate effectiveness of two RFI management policies through a case study. The first RFI management policy investigates if early detection of issues in construction documents and issuance of RFIs helps reduce the response time. The second policy to be

evaluated in this research is effectiveness of RFI management with regard to importance of RFI determined by contractor.

Literature Review on Request for Information Management

While there are many research and articles on how to reduce number of RFI's in construction projects, this paper limits the work scope into how to manage RFIs for better project performance. Three sub-issues under the topic are selected in this research as followings.

Time of RFI Creation

One of key factors to successful RFI management is when potential problems or issues are detected and RFIs are created and submitted. Since it takes time until the issues or problems in RFIs are solved and responded by owner, or architect/engineer, late creation of an RFI (for example, a few days before the date scheduled for related construction process) may cause delay in construction process. The earlier issues or problems are detected and the related RFIs are submitted, the less chance there is to delay the construction process. Hanna et al's study (2012) shows that 85% or more of the total number of RFIs were issued by 50% completion of project in highway construction projects. However, if facilities to be constructed involve more complexity, then RFIs may be created and submitted later (Hughes et al. 2013). These studies and many suggestions for timing of RFI creation are focused on impact of RFI creation timing on delay in construction processes. However, there is no research on how RFI creation timing affects effectiveness of RFI management.

Best Practice for RFI Management

Several suggestions have been made for better management of RFIs (Delaware ABC-AIA Partnering Committee, 2006; Hess et al., 2008; Hanna et al., 2012; Hughes et al., 2013; Bottari, 2014; Brazee, 2014). The common suggested items for better management of RFIs are summarized as followings.

- Establishment of RFI process and hierarchy which informs the contractor how RFIs are to be submitted and where the RFIs should be directed.
- Inclusion of the detailed information in a standard format for RFI submittal:
  - Unique tracking number for each RFI
  - Category of the RFI with regard to reasons for RFI
  - Importance (or priority) of the RFI determined by the contractor
  - Date when the owner, architect or engineer should respond to the RFI by
  - Possible solution to the issue or problem
  - Estimate of impacts of the RFI on cost and schedule (including potential change order)
  - Detailed description of issue or problem along with reference to the applicable drawing and/or specification number
- Use of electronic RFI tracking and monitoring system including RFI log
- Discussion of and tracking RFIs submitted at the progress meeting

All of the suggested items/ policies can enhance effectiveness of RFI management and tracking and lead to better project performance in terms of cost and time. However, there has been no research or empirical studies of how effective these suggested items/ polices are on RFI management in real construction projects.

Number of Days Taken for Response to RFI

One of the key issues regarding RFI management is if project or construction processes is (or are) delayed by RFIs. However, when considering the average cost per each RFI review and response of $1,080 (Hughes et al., 2013), management of RFI only by either delay caused by RFIs or no-delay caused by RFIs is not sufficient for more efficient management of RFIs. Therefore, existing research used a key metric in regard to efficiency of RFI processing: number of days that it takes to respond to an RFI (Hanna et al., 2012; Hughes et al. 2013). This metric is typically suggested to be included in RFI submittal format. Average number of days for response to RFI in

construction projects in America was 12.2 days (Hughes et al. 2013), and average days for response to RFI from Wisconsin highway construction projects was 7.7 days (Hanna et al., 2012). Number of days for response to RFI is affected by project size and project duration: as project size increases, average number of days for response to RFI increases (Hughes et al., 2013). While analysis of number of days for RFI response was performed in existing literature, no research on impact of RFI management policy on time for RFI response has been conducted. Time for RFI response can be affected by the effectiveness of RFI management policy.

Research Questions and Method

This paper aimed to search for the answer to the question, how can the RFI management/tracking process be improved in construction projects? Specifically, this paper is more interested in how effective the suggested items/policies for RFI management are. Out of the several items/policies suggested for efficient management of RFIs, two topics are selected for this research. The two specific questions answered through this research are:

1) **How effective is early RFI creation in terms of number of days for response?**
   While early RFI creation/submittal is recommended to reduce chance of delay in general, it is not clear if early RFI creation enhances effectiveness of RFI management/tracking process. The answer to this question can provide an insight about how early an RFI should be issued: is it recommended to detect issues or problems as early as possible to improve effectiveness in RFI management?
2) **How effective is RFI tracking with regard to importance?**
   One of the items suggested to be included in RFI submittal format is importance (or priority) of each RFI. The answer to this question can prove the effectiveness of managing/tracking RFI with regard to priority.

The method for this research is a case study. One building construction project was selected and the data with regard to RFIs from the project were analyzed to answer the two questions.

The Case Study Project

The project for the case study is a major renovation and construction project for a college building in the Midwest. The project work scope includes 1) major renovation of an existing 5 story building (100,779 gross square feet) including addition of underground classroom and mechanical equipment and 2) construction of a new 3 story building (48,920 gross square feet) which is connected to the existing building. This project was awarded as a Construction Manager at Risk contract with a guaranteed maximum price. The project was executed in multiple phases and design for each phase was completed prior to start of construction. The preconstruction service was started on February 2011 and the expected finish date of the project was February 2015.

RFI Processing & Management

The case study project used many of the suggested RFI system or policies. The RFI management system used in the case project is summarized as followings:

- The project owner required the use of an electronic RFI tracking and monitoring system (E-builder) and the construction manager at risk used the electronic RFI tracking and monitoring system (Prolog) along with the RFI tracking and monitoring system requested by the project owner.
- Required number of days for response was set as 5 business work days.
- The RFI submittal format includes the following items:
  - Date created, date required, and date answered
  - Discipline
  - Category
  - Importance (486 RFIs were given with a degree of importance.)
  - RFI tracking number
  - Detailed questions
  - Suggested solution
  - Photo/related drawings or specification number

- Expected impacts on cost and duration
- The issues identified in the RFIs were explained with description, photo, and/or reference to the plan.
- RFIs were tracked and discussed in weekly meetings with the owner and architect

Analysis of the RFIs in the Case Study Project

RFIs collected and analyzed for this paper were issued from February 2011 to June 2014. The total number of RFIs in the data set is 1,484. Out of the 1,484 RFIs, 915 RFIs (61.66%) were delayed (responded to later than 5 business days) and 12 RFIs were not responded to until June 18, 2014. Figure 1 shows the distribution of RFIs in the case study project by category. The project owner set up 5 categories for RFI: Confirmation only, Document discrepancies, Drawing clarification, Plan/spec discrepancies, Specs clarification, and Others as shown in Figure 1. The most common category for the RFIs is 'Confirmation only' (42.86%) followed by 'Drawing clarification' (35.65%).

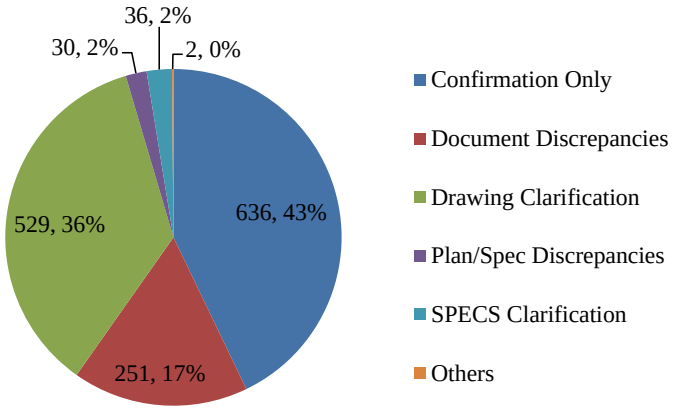

Figure 1: Distribution of RFIs with regard to its category.

Figure 2 shows number of days for response according to the categories for RFIs. The average number of days for response is 11.5 business days (represented by the last column in Figure 2). Compared to the required number of days for response of 5 days, 915 RFIs (61.66%) responds were late. The RFIs under the category of 'Plan/Spec Discrepancies' took longest time (an average of 14.3 business days), followed by the category of 'Drawing Clarification' (13.9 business days).

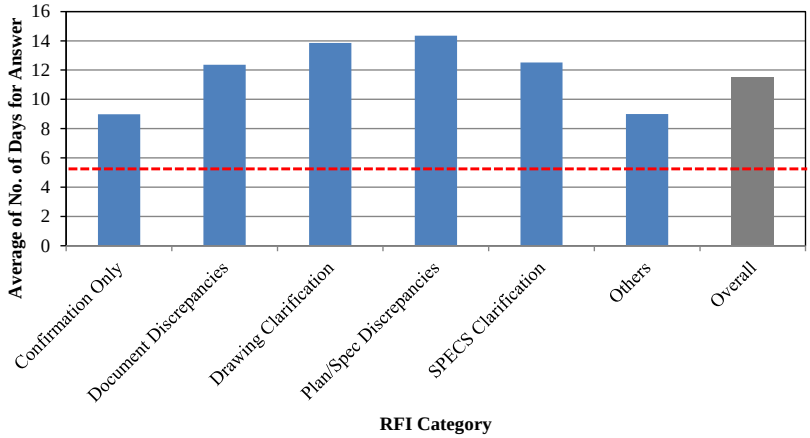

Figure 2: Average number of days for response with regard to RFI category.

Figure 3 shows the frequency of RFIs created with respect to timing. Timing in this research is measured by the difference (number of business days) between start date of construction and creation date of a RFI. It should be noted that the construction manager for this project provided preconstruction service and 10 RFIs were created and submitted prior to start of construction phase.

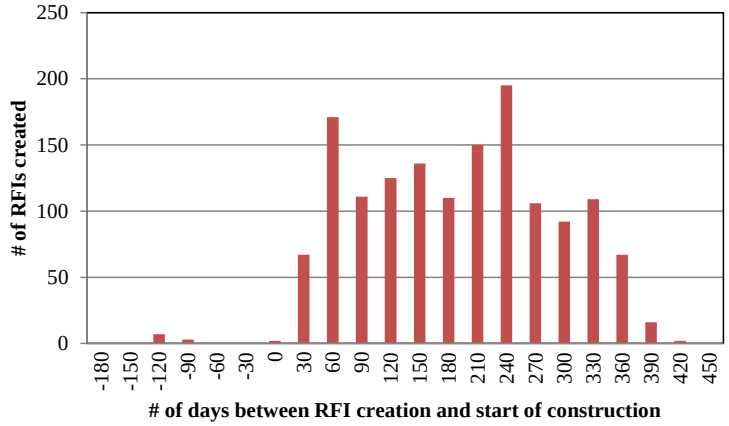

Figure 3: Distribution of RFIs with regard to how early RFIs were created.

This case study project has more RFIs than the average number of RFIs per project compared to two previous empirical studies (Hanna et al., 2012; Hughes et al., 2013) and the timing of RFI creation for this case study project is later. The authors believe that this variance is caused by the complexity of the project. This case study project includes a renovation of an existing building. When you have a renovation project, it is more likely to encounter differing conditions in the existing building plans.

RFI Creation Time and Response Time

The first question for this research is how effective early RFI creation is. The effectiveness is measured in terms of number of days taken for response. In this case project, 61.66% of RFIs were delayed (took more than 5 business days until response) and the issue is how to reduce the time (number of days) for response. If number of days for response is reduced, then it can lead to decrease in chance of delay in overall project and reduction in cost both for architect and contractor.

Figure 4 shows the scattered plot for RFIs with regard to number of days between start date of construction and RFI creation date and number of days taken for response. As shown in the figure, the R-square value (coefficient of determination) between the two factors from regression analysis is around 10%. Therefore, it is concluded that there is no statistically significant relationship (at 95% confidence level) between how early an RFI is made and number of days taken for response.

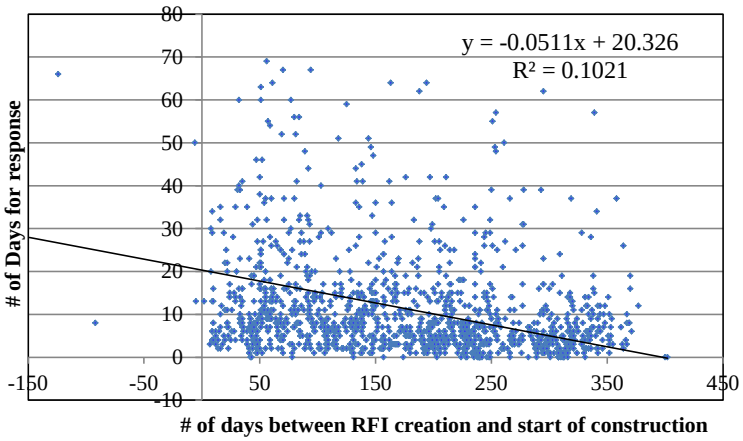

Figure 4: Relationship between number of days for response and how early RFIs were created

Effectiveness of RFI Tracking with Regard to Importance

The second question to be answered through our investigation is if an RFI's importance level affects RFI response time. In the case study project, the construction manager determined a degree of importance for each RFI of importance and input the degree of importance in the electronic RFI tracking and control system: Four categories of importance are Urgent, High, Normal, and Low. Once each RFI with a degree of importance is submitted through the electronic RFI tracking system, the information becomes available to the project owner, and the architect/engineer. Also, list of RIFs submitted was reported and status of RFIs which were determined to be 'urgent' were discussed in weekly Owner-Architect-Contractor (OAC) meeting. Out of 1,484 RFIs, only 486 RFIs were given a degree of importance. RFIs were created by several different employees in the construction manager company and some of them forgot to select a degree of importance.

Figure 5 shows the average number of days taken for response per each degree of importance. As shown in Figure 5, the average number of days for response increases from Urgent to Low degree.

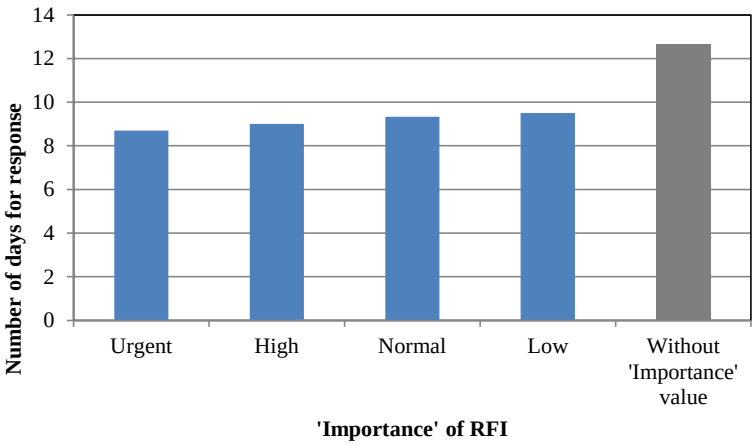

Figure 5: Number of days for response with regard to importance of RFI

However, the difference in average number of days among different degrees of importance was not statistically significant from a student t-test performed (at 95% confidence level). Table 1 shows the results of t-tests for number of day for response between two different degrees of importance.

Table 1

T-test result for different degrees of importance

Number of days for response	**Urgent**	**High**	**Normal**	**Low**
Mean	8.70	8.94	9.33	9.50
Variance	102.64	78.06	95.33	160.50
Observations	118	138	211	19
Degree of freedom	234	311.00	19.00	
t-Stat	-0.20	-0.38	-0.06	
P(T<=t) two-tail	0.84	0.70	0.96	
t Critical two-tail	1.97	1.97	2.09	

However, when these average values (number of days taken for response) from 486 RFIs are compared to the average value from the other group (998 RFIs without a degree of importance), the difference is statistically significant. The average number of days taken for response for the 998 RFIs without a degree of importance (as represented by the last column in Figure 5) is 12.6 days and this value is determined to be significantly different from the average values from RFIs in each degree of importance from a student t-test. The result of the t-test is summarized in Table 2. Also, the average value from the RFIs without a degree of importance is determined to be statistically different from overall average value from the 486 RFIs with a degree of importance (9.13 days).

Table 2
T-test result between without and with 'Importance'

Number of days for response	***Without 'Importance' value***	***With 'Importance' value***
Mean	12.48	9.02
Variance	297.84	92.80
Observations	998	486
Degree of freedom	1443	
t-Stat	4.92	
P(T<=t) two-tail	0.00	
t Critical two-tail	1.96	

Discussion

The result from the first question in this paper is that early creation of RFI does not affect amount of time taken for response: early creation of RFI does not reduce amount of time for response and does not increase amount of time for response. The number of days for architect to find a solution to a RFI is not affected by when a RFI is created. This conclusion should be differentiated from a case in which a RFI is created only a few days before a scheduled date for the construction process/installation. For example, if a RFI is submitted just 5 days prior to scheduled date for a related construction process, the architect and/or the project owner can understand urgency of the RFI. Then, the architect and/or the owner (or owner's representative) may set the highest priority on the solution to the RFI and short amount of time may be taken until the response. However, on the other hand, in the same example case, it is more likely the related construction process will be delayed and leading to higher risk to the contractor. The conclusion for the question and result of the data analysis should be interpreted that early creation of RFI does not affect amount of time for response. However, response times for RFIs created just in advance of a scheduled date for the related construction process are improved.

Another possible issue related to this result is about risk to contractors. If a question in a RFI is related to other multiple issues, the chance of delay related to the RFI can be decreased by creating the RFI early. The result in this paper is based on mean value; relations among RFIs were not taken into consideration. This topic regarding related RFIs and associated risk will be for future research.

While RFI management with regard to priority can affect RFI response time, determination of priority (or importance) of each RFI will need a future research. In the case project, the construction manager company's employees determined priorities of RFIs, and the determination may be subjective. Research on detailed guideline or criteria will help contractors manage RFI more efficiently.

Conclusions

RFI systems are a communication tool in construction projects. Poor management of RFIs may degrade project performance in terms of time and cost. As an approach to improved RFI management and tracking, this paper poses two questions on effective RFI management policies: 1) how effective early creation of RFI is and 2) how effective RFI tracking with regard to degree of importance is. The answers to the questions are determined from a case study project which includes major renovation of an existing building and construction of a new building in a college in Midwest. Total 1,484 RFIs from the case study project were analyzed and the results for the questions are as followings.

1) **How effective is early creation of RFI in terms of number of days for response?**
   How early RFIs are created does not affect number of days taken for response, if RFIs are created in advance by a reasonable amount of time prior to the scheduled date for a related construction process.

2) **How effective is RFI tracking with regard to importance?**
   When the data were compared between RFIs with a degree of importance and RFIs without a degree of importance, tracking RFIs with regard to degree of importance needs less amount of response time. However, when only the RFIs with a degree of importance are analyzed, no significant benefit from tracking RFIs through degree of importance is found. It is concluded that tracking and managing RFI with regard to degree of importance has a potential benefit, but it may need further study with a larger size of data.

While poor and inefficient management of RFIs affect project performance, there is few existing research on how RFIs can be more effectively and efficiently managed, specifically with regard to detailed guideline. The conclusions from this paper provide insight on detailed RFI management guideline/policies. Also, the findings from this research requires expansion to overcome the limitations of this research: 1) RFI data from a single project (limited amount of data and data from single type of job), and 2) limited number of research questions on RFI management.

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