The Impacts of Requirements Relationships Knowledge on Requirements Quality and Software Development Project Success

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Abstract

Requirements quality is one of the factors that may determine the success or failure of a software project. Thus, maintaining requirements quality is important but also a challenge as an individual requirement does not stand alone and they are related to one another in several ways. The problem may become more challenging as the requirements and their interrelationships are not static and will continually change. However, current research largely focusing on the assessment of the impact of requirements quality on success. There is lack of research assessing the impact of the interrelationships between requirements on success. Therefore, this research aims to investigate how the interrelationships between requirements impact requirements quality as well as the success of software development project. An empirical study to examine further the impacts was conducted from the perspective of business analyst. Using Structural Equation Modelling (SEM) and especially Partial Least Square (PLS), we found that there are significant impacts of requirements relationships towards requirements quality as well as success. The outcome from this research can be used as a guide to working with requirements relationships, knowledge useful for business analysts and research community.

Keywords

Requirements Relationships Knowledge, Requirements Quality, Software Development Project Success, Partial Least Square (PLS), CEUR-WS

1. Introduction

Requirements quality is defined as a set of requirements or software requirements specification (SRS) that having all the good characteristics that listed as proposed by IEEE-830-1998 recommended practices for SRS [1]. According to the practice; attribute of requirements quality are including correct, unambiguous, complete, consistent, ranked for importance and/ or stability, verifiable, modifiable and traceable. Thus, an SRS developed for a particular software project should fulfill all the characteristics listed to ensure the requirements quality. Consequently, to produce quality requirements specification; the comprehensive understanding of requirements is needed.

Moreover, to fulfil the necessity of comprehensively understanding requirements, it is important to acknowledge how each requirement is related to one another. Knowledge on how each requirement is related to one another may assist stakeholders to make informed decision in accomplishing many things that involve in managing requirements [2]. In this paper, the information of the relationships between requirements is defined as requirements relationships knowledge (RRK). RRK is concerns on how requirements are related to one another and other artefacts during the software development project. Accordingly, requirements relationships knowledge may provide guide in organising and structuring the requirements documentation and specification. Karlson et al. [3] indicated that one of the main contributions of requirements relationships knowledge is in the bundling structure of requirements. A good structure and organised requirements specification can facilitate better management of requirements, whether it is done manually or by any automatic tool. It will also provide a good basis for any manipulation and maintenance activities for the later phases. This will increase the possibility of achieving project success. Diev [4] ascertained that requirements structuring is an essential activities in requirements engineering as requirements structure and representation will directly impact requirements development process and the requirements quality. The importance of requirements quality is also advocated by agile practitioners [5, 6].

In relation to this, previous researchers asserted that requirements quality especially Software Requirements Specification quality has strong impact on the success or failure of a software development project [7, 8]. They have made thorough investigation into how requirements quality impacts project success. There are also some re-

searchers that suggest the contribution of RRK [3, 4, 9]. However, there are lacks of study that examine how RRK impacts requirements quality as well as software development project success. Therefore, this research will extend the previous works to examine further the three main issues: 1) the impacts of RRK on requirements quality; 2) the impacts of requirements quality on project success; 3) the impacts of RRK on project success. This research has been conducted empirically using survey method and the analysis of the data has been performed using Structural Equation Modelling (SEM) and specifically Partial Least Square (PLS).

The rest of this paper will be organized into 4 sections. First, the research context and research model is discussed in Section 2. Second, the research method, which mainly concerns on the development and the validation of the requirements relationships instrumentation design, will be discussed in Section 3. Next, section 4 of this paper will present the discussion of the result. Finally, section 5 will present the concluding remark, including the future work in both research and practice.

2. Research Context

The success of a software development project (SDP) is a concern for any related stakeholders. Success in SDP is described based on several criteria including: 1) quality of product [10, 11, 12], 2) Timeline of the delivery (schedule) [11, 12, 13, 14], 3) Cost [11,12] , 4) Satisfaction of stakeholder [11], 5) met requirements [11], 6) met business objective [11] 7) met scope [12] and 8) learning [14]. Other than that, study in software project management will also involve the factors that may impact the success.

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Accordingly, quality in requirements specification will always depends on how requirements are determined in the process of requirements determination, which is known as Requirements Engineering (RE). Not enough

RE or badly performed RE activities may result in incorrect and incomplete requirements, besides the possibility of high rate of changing in the requirements, which could be the reason for the software project to be challenged. Badly performed RE process has been claimed as positively associated with software failure [16, 17, 18]. Therefore, by improving RE practices, there would be an economic as well as software quality payoff [16, 17]. Clearly, literature indicates the importance of requirements quality and requirements engineering as the critical success factor of a particular software development project. In relation to this, Verner et al. [19] argue that the most important correlation in achieving project success is to have good requirements and to manage those requirements effectively. However, to get the correlations of both factors, we need to know how requirements are related to one another which a concern of RRK.

Although requirements relationships in any software development project are not problematic, they would affect other aspects of software development project and the project as a whole. RRK is asserted as essential when making decisions in the subsequence phases of any software development project including designing [20], requirements prioritisation [21] and testing [22]. In addition, failure to consider RRK during requirements activities is argued could lead to costly mistakes [23]. Hence, RRK needs to be carefully identified, analysed, and managed to avoid any ripple effects.

Moreover, the success of requirements engineering in producing requirements quality as one of the success factors of software project has been discussed in many studies (e.g. [16, 17, 23]) but the studies that particularly discuss how RRK impacts project success are limited. Hence, the questions to be asked are, 1) is this knowledge (RRK) really significant in software development project? 2) If yes, how can RRK impact requirements quality as well as the success of software development project? 3) Other than that, in what way can this knowledge be fully utilised for that purpose? In order to answer these questions, this paper aims to discuss these issues further and extend the literature on the interrelationships between RRK, requirements quality and the related issues that have impacts on project success. The related research model are proposed and illustrated in Figure 1. The model was developed based on software project success factors that are related to RRK as discussed in literature. However, this paper will be focusing only on a part of the model in which consists of the three constructs: 1) RRK, 2) Requirements Quality, 3) success. Thus, the related hypotheses are as follows:

H1: RRK has significant impact on requirements quality.

H2: Requirements quality has significant impact on the success of software development project.

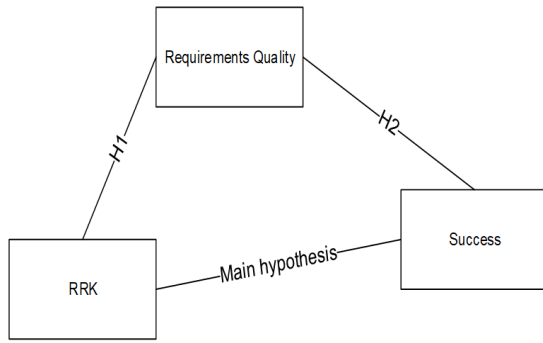H3: Requirements relationships knowledge (RRK) has

Figure 1: Research Model

The overview of the initial indicators for every construct in the model is shown in figure 2.
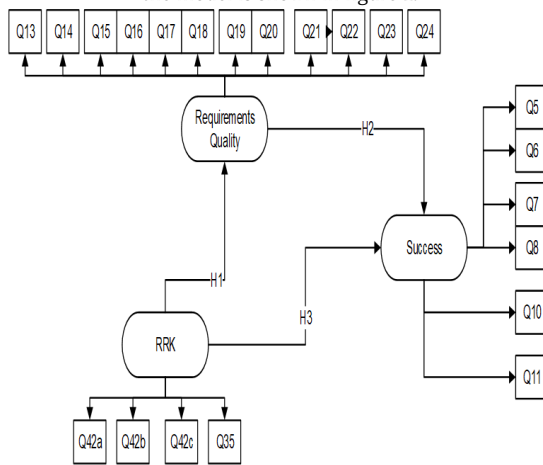

Figure 2: Initial Indicators of the Model

Item	Frequency	Percentage
Less Than 10	15	9
11-100	84	49
101-500	32	18
More than 500	41	24

Table 2
Industry domain of the respondents

Item	Frequency	Percentage
Factory automation	3	2
Financial	10	6
Infrastructure and Government	52	30
Medical	4	2
IT and Communication	72	41
Transportation	2	1
Others	32	18

Table 3
Work Designation of the respondents

Item	Frequency	Percentage
Business Analyst	18	11
Business Analyst Manager	6	4
System Analyst	80	47
System Designer	20	12
Tester	4	2
Others	43	25

significant impact on requirements quality as well as on the success of a software development project.

Accordingly, to validate the hypotheses, empirical research analysis using Structural Equation Modelling (SEM) was performed. This paper will continue to discuss about the research method used to examine the interrelationships between RRK, requirements quality and success of Software development project (SDP) in the next section.

3. Methodology

3.1. Participant

In this study, the sample was chosen using non-probability sampling specifically purposive sampling. In this regard, any stakeholders involved in managing re-quirements in their software development project were chosen whereas those not were excluded from the sample. About 173 business analyst and related stakeholders were recruited. The inclusion criteria were including the respondents were stakeholders involved in the management of requirements in their software development project. Approximately, 60 percent of the participants were business analysts and system analysts. Most of the respondents are practitioners in Malaysia Industry and only 10-20 percent of the respondents are from Australia. The findings show that most of the respondents are from medium and large organization (refer to Table 1) and Australian Bureau of statistics classification of business framework (office of small business, 1999). In addition, in Table 2, the findings show that the industry domain of most of the organization is from Information Technology and Telecommunication (41 percent) and, infrastructure and Government (30 percent). Moreover, the respondents largely have about 2-5 years (37 percent), and about 6-9 years (25 percent) experience in requirements writing which represent approximately 62 percent of all the respondents (Table 4).

Table 4
Experience in Requirements Writing

Item	Frequency	Percentage
Within one Year	32	19
2-5 Years	63	37
6-9 Years	43	25
10-15 Years	23	13
More than 15 years	72	41

3.2. Data Collection

There were approximately 380 self-administered questionnaires used for collecting the data from the respondents. Several methods of questionnaire distribution were employed: 1) a number of questionnaires were mailed to the respondents; 2) a number of questionnaires were emailed (on-line survey); 3) a number of questionnaires were completed using drop-off survey method. A total of 210 questionnaires were received but only about 173 questionnaires were usable for analysis. This translates to about 55.3 'percent response rate and only 45.5 percent were considered effective response rate.

Accordingly, missing values or data are asserted as part of almost all research [24]. One of the ways is to omit the subjects that have missing data. If there are missing data at about more than 20 percent from the items in a questionnaire, the subjects related are advised to be deleted from the analysis [25]. Hence, in this study we used the usable questionnaire only in the analysis. The technique used is also known as Listwise. Listwise is the technique where subjects are discarded from the analysis because of there are some questions unanswered in the survey. Even though, this technique will decrease the subjects for the analysis but this technique is used to ensure that the analysis will be done with complete data for all the subjects.

3.3. Structural Equation Modeling (SEM) and Partial Least Square (PLS)

This study is a part of a research that investigated the impacts of requirements relationships on the other factors and tasks in any software development project that possibly will also impact success. The factors and tasks may have direct and indirect relationship; they might impact one another and thus the success or failure of a particular software development project as a whole. Hence, Structural Equation Modelling (SEM) was used to validate and examine the interrelationships and the impacts that they have to one another. SEM is a statistical technique for the validation and estimation of causal relationships using a mix of qualitative causal assumption and statistical data. This method is usually used more for confirmatory rather than exploratory. Thus, SEM is more appropriate for theory testing than theory development. SEM is a generic and powerful multivariate analysis technique that includes specialised versions of several other analysis approaches as special cases. SEM is not intended for a single statistical technique but it is a family of related procedures [26]. Other related terms used are Covariance Structure Analysis, Covariance Structure Modelling, and Analysis of Covariance Structures.

Moreover, SEM can be categorized into two approaches, which are: 1) covariance-based approach, which is related to tools such as EQS and AMOS; and 2) variance-based approach, which is related to PLS. Therefore, PLS was chosen to be used in this research. Partial Least Square (PLS) was chosen because of the following reasons: 1) research on requirements relationships is relatively new; and 2) there is no measurement model that is already available. PLS is asserted as a suitable technique to be used when the phenomenon to be examined is relatively new [27, 28]. Hence, the assessment of the goodness of measure of these constructs in terms of their validity and reliability within the research framework will be discussed in the next section.

3.4. Measure and Goodness of measure

A questionnaire using five-point Likert scale was designed to collect data for each construct of the research model. Some of the instruments in the questionnaire were newly developed whereas most of the questions were designed based on the theory from literature and other empirical studies. Additionally, some parts of the instruments were adapted from previous literature. The final constructs of the model are illustrated in Figure 3:

3.5. Goodness of Measure

In this study, two main criteria have been utilised for evaluating goodness of measures, which are validity and reliability. The combination of both is essential to assure the quality of a research [29]. Validity is about how well a developed instrument measures the particular concept that is intended to be measured [30]. On the other hand, Trochim and Donnelly [29] also indicated that reliability refers to repeatability or consistency. A measure is considered reliable if it gives the same result over and over again. The validity and reliability measures of this research model are discussed in the next section.

3.6. Construct Validity

Construct validity can be described as the degree to which interferences can legitimately be made from the operational constructs in a particular study to the theoretical

Construct	Item	Description
Success	Q5 (SC1)	The outcome of the project meets the business goal.[11]
	Q6 (SC2)	The outcome of the project meets all the specified requirements.[11]
	Q7 (SC3)	The overall quality of the developed application / product is high.[10,11]
	Q10 (SC4)	The project is completed within scope.[12]
	Q11 (SC5)	The requirements-related tasks (e.g. requirements specification, requirements management) have been completed successfully in the project.[11,12,13]
Requirements Relationships Knowledge	Q42a (RRK1)	The relationships between requirements that exist between the components are considered when deciding to implement the solution. [2]
	Q42b (RRK2)	The relationships between requirements that exist between the components are considered when planning the schedule for the design/development team to complete the task. [20, 23]
	Q35 (RRK3)	Before implementing a change to a particular requirement, any possible impact it will cause to other requirements will be considered. [39]
Requirements Quality	Q14 (RQ2)	Requirements are typically grouped according to similar functionality / business area. [1, 3, 4, 7]
	Q24 (RQ3)	The requirements specified in the requirements document are easy to be located whenever needed. [1]
	Q13 (RQ1)	There is a specific structure/arrangement to follow when specifying requirements in the requirements document. [1,3, 4, 7]

Figure 3: Construct in the Modell

constructs on which those operational constructs are based on [31]. Sekaran and Bougie [30] ascertained that construct validity can be used as a confirmation on how well the results obtained from the use of the measure fit the theories around which the test is developed. Thus, convergent and discriminant validity were used to examine how the instrument fits the concept as theorised. Initially, the respective value of loadings and cross loadings in Table 6 were examined to assess whether there were any problems with any particular items. A cut-off value for loadings at 0.5 was considered as significant [25]. If there were any items with a loading of higher than 0.5 on two or more factors, then they were deemed to be having significant cross loadings. Table 5 shows that all the items that measured a particular construct would load highly on the construct and would have lower loadings values on other constructs therefore confirming construct validity.

3.7. Convergent Validity

Accordingly, the test for validity was continued with the convergent validity. This validity test is concerned about the degree to which multiple items are in agreement to measure the same concept. Factor loadings, composite reliability, and average variance extracted (AVE) were

Table 5
Loading and Cross Loading

Item	RRK	RQ	SC
RR1	**0.926**	0.234	0.246
RR2	**0.930**	0.267	0.247
RQ1	0.076	**0.715**	0.329
RQ2	0.303	**0.807**	0.323
RQ3	0.196	**0.722**	0.320
SC1	0.249	0.323	**0.716**
SC2	0.181	0.300	**0.802**
SC3	0.279	0.373	**0.782**
SC4	0.159	0.306	**0.690**
SC5	0.116	0.297	**0.733**

used to measure the convergent validity. This practice was proposed by Hair et al. [245. The convergent validity test findings showed that the factor loadings for all items exceeded the recommended value of 0.5 [25]. Next, composite reliability values illustrated in Table 6 present the degree to which the construct indicators indicated the latent, ranged from 0.793 to 0.925. The value is apparently exceeded the recommended value of 0.7 [25]. Finally, the average variance extracted assessed the variance captured by the indicators relative to measurement error. The value should be greater than 0.5 to justify the use of the construct [30]. As illustrated in Table 6, the AVE was in the range of 0.556 to 0.861.

Table 6
Loading and Cross Loading

Construct	Measurement Item	Loading	CR	AVE
RRK	RR1	0.926	0.925	0.861
	RR2	0.930		
RQ	RQ1	0.715	0.793	0.561
	RQ2	0.807		
	RQ3	0.722		
SC	SC1	0.716	0.862	0.556
	SC2	0.802		
	SC3	0.782		
	SC4	0.690		
	SC5	0.733		

In addition, the results for the measurement model are summarized in Table 7. According to the results, we can conclude that all of the three (3) constructs: Requirements Quality, Requirements Relationships Knowledge and Success were all valid measures of their respective constructs based on their parameter estimates and statistical significance.

3.8. Discriminant Validity

Then, the study was continued to validate the discriminant validity. Discriminant validity is concerned about

Table 7
Loading and Cross Loading

Construct	Measurement Item	Standardized Estimate	t value
RRK	RR1	0.926	38.286
	RR2	0.930	42.992
RQ	RQ1	0.715	7.767
	RQ2	0.807	13.406
	RQ3	0.722	11.478
SC	SC1	0.716	13.616
	SC2	0.802	22.313
	SC3	0.782	19.591
	SC4	0.690	11.708
	SC5	0.733	14.106

Table 8
Discriminant Validity Results

Item	1	2	3
1. RRK	**0.861**		
2. RQuality	0.073	**0.561**	
3. Success	0.070	0.185	**0.556**

the degree to which items differentiate among constructs where they illustrate the measures that theoretically should not be related are in reality not related. This validity test was assessed by exploring the correlations between measures of potentially overlapping constructs. The items should have the highest loading value on their own constructs in the model, and the average variance shared between every construct and its measures should be more than the variance shared between the construct and other constructs [31]. Table 8 illustrates that the squared correlation for each construct is less than the average variance extracted by the indicators measuring the construct to indicate the adequate discriminant validity. As a consequence, the measurement model has demonstrated adequate convergent validity and discriminant validity.

3.9. Reliability Analysis

Reliability is concerned about the quality of measurement. Reliability in a research is the degree to which a measurement procedure produces the same answer each time the measurement procedure is carried out [33]. One of the general classes of reliability is the internal consistency reliability that is utilised to measure the consistency of result across items within a test [29]. In relation to this, Cronbach's alpha coefficient was used to examine the reliability of the inter item consistency of the measurement items. The summarisation of loadings and alpha values are illustrated in Table 9. Based on the findings in Table 9, all the alpha values are above 0.6,

which are conforming to what have been suggested by Nunnaly and Berstein [34]. Consequently, the composite reliability values also ranged from 0.793-0.925 (refer table 6). Composite reliability values are another method similar to Cronbach's alpha for internal consistency reliability estimate where a composite reliability value of 0.7 or more is considered acceptable [35]. Therefore, it can be concluded that the measurements used in this study were reliable.

Table 9
Loading and Cross Loading

Construct	Measurement Item	Cronbach Alpha	Loading Range	Num of Item
RRK	RR1- RR2	0.839	0.926-0.930	2(3)
RQ	RQ1-RQ3	0.611	0.802-0.910	3(4)
SC	SC1-SC5	0.799	0.690-0.802	5(7)

Another issue in the area of survey research is common method variance. Considering the self-reported nature of the data used, there was a possibility for this issue to happen. Hence, Harman one factor test was performed to determine the extent of this issue. Accordingly, Podsakoff and Organ [36] indicated that common method bias is problematic if a single latent factor would account for the majority of the explained variance. The unrotated factor analysis illustrated that the first factor accounted for only 22.5 percent of the total variance, consequently ascertained that the common method bias was not a serious issue in this study.

Finally, the analysis is continued with the path analysis to test all the hypotheses generated in this study. Table 10 presents the results. The result of the analysis shows that the three hypotheses: H1, H2 and H3 were supported. The results implied that there are significant interrelationships between requirements relationships knowledge, requirements quality and success of software development project. In the analysis, the path coefficient value for RRK->RQ is 0.270 whereas the path coefficient for RQ-> Success is 0.306. Both coefficient values are in the ranges of (0.20-0.30) that have been asserted as acceptable [27]. Hence, it can be concluded that there are significant relationships exist between the three constructs.

Table 10
Path Coefficient and Hypothesis Testing

Hypothesis	Relationship	Coeficient	t value	Support
H1	RRK->RQ	0.270	2.869	Yes
H2	RQ-> Success	0.306	3.398	Yes
H3	RRK->Success		3.465	Yes

Moreover, mediation effect analysis has also been

conducted. The finding reports that, there is exists mediator relationships between the three constructs. Figure 4 illustrates the analysis which represents the initial coefficient for the three constructs. There are several criteria that need to be fulfilled before any mediation effect analysis can be performed. First, the predictor (RRK) has significant impact on the mediator requirements quality (RQ) (later noted as a); second, the mediator (RQ) has significant impact on the criterion variable Success (b); and third, the predictor (RRK) has significant impact on the criterion variable in the absence of the mediators' impact (c). Therefore, to establish the mediating effect, the indirect effect of a x b (see figure 4) has to be significant. In this regard, the z statistic is applied [3], specifically the value is significant at p <0.05. If the z value exceeds 1.96 (p <0.05), then the hypothesis H3 can be accepted where there is an indirect impact of RRK through requirements quality on the success of software development project. The z value is defined as the following:

$$z = \frac{a \times b}{\sqrt{b^2 \times S_a^2 + a^2 \times S_b^2 + S_a^2 \times S_b^2}}$$

(1)

As illustrated in figure 4, there is a significant impact of RRK on requirements quality (0.271, p<0.05) as well as requirements quality on success (0. 387, p<0.05). Consequently, there is also a significant direct impact of RRK on the success of software development project (0.169, P<0.05); thus, requirements quality is established as a partial mediator. This mediating effect of requirements quality in this study is confirmed by z statistic [38]:

$$z = \frac{0.27 \times 0.39}{\sqrt{0.39^2 \times 0.09^2 + 0.27^2 \times 0.09^2 + 0.09^2 \times 0.09^2}}$$

z=2.502

(2)

The result demonstrates that, requirements quality has mediating effects where it implies that there is indirect impact on success; variance accounted (VAF) value then is used to represents the ratio of the indirect effect to the total effect. The VAF value indicates that 38.2 percent of the total effect of RRK on success of software development project is explained by indirect effect (requirements quality):
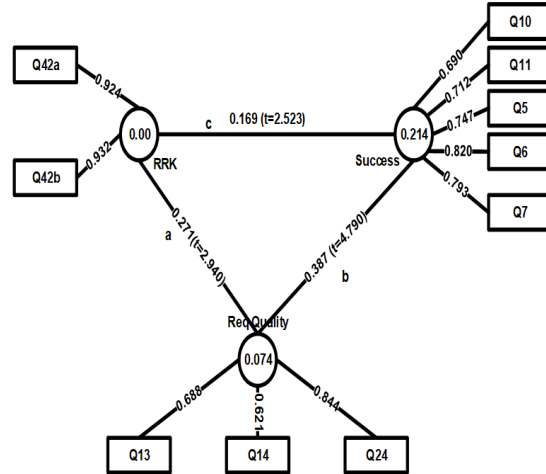

Figure 4: Mediating effect of RRK, RQ and Success

VAF=(a ×b) ÷ (a × b + c)
VAF=(0.271 ×0.387) ÷ (0.271 × 0.387 + 0.169)
$VAF = 0.382$

(3)

Therefore, it can be concluded that the relationships between the three constructs is significant and the three hypotheses are also confirmed by the mediation effects that exist among them.

4. Result and Discussion

This study focusing on the impacts of the RRK as an independent variables on requirements quality as well as the success of software development project using the PLS technique. It is a part of a research in which also investigates the impacts of RRK on other related factors of success including requirements change [39]. In the first part of this study, the goodness of measure is examined by looking at the validity and reliability of the measures using the PLS approach. The findings illustrated that the measures used demonstrate both convergent validity and discriminant validity. In addition, the reliability of the measures was also examined by observing the Cronbach Alpha values and Composite Reliability values. The findings show that both the Chronbach Alpha values and composite reliability values have fulfilled the criteria set up by other established researchers. Thus, the results have confirmed that the measures in the model

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were reliable. Accordingly, the findings of this paper confirmed and supported the direct significant impacts of RRK on requirements quality (H1); the direct significant impact of requirements quality on the success of software development project (H2); and consequently supported hypothesis (H3) that proposed the indirect significant impacts of RRK on the success of software development project.

Firstly, RRK has significant impact on requirements quality in which inline with what have been ascertained in the literature (e.g. [23]) in which supporting H1. The requirements relationships knowledge provides guide on how a set of requirements can be structured and organized in requirements specification document. The requirements documentation that is properly organized and well structured can contribute to the good quality of requirements [4, 23]. According to the analysis of the result, the main characteristics of requirements quality that related to RRK are: 1) Requirements are typically grouped according to similar functionality/business area; 2) The requirements specified in the requirements document are able to be located whenever needed; and 3) There is a specific structure / arrangement to follow when specifying requirements in the requirements document. Characteristics of items 1 and 3 confirmed the important of RRK in structuring requirements in an SRS. Both items then may support the characteristics of items 2. When the requirements can be located whenever needed, an SRS can be indicated as having one of the good characteristics listed in the IEEE-830 recommended practices which is traceable as well as may help in fulfilling other requirements quality characteristics such as modifiable and verifiable. Thus, it is clear that the findings were supporting H1.

Secondly, the findings from the analysis ascertained that a software development project is considered successful when the project has fulfilled several criteria. The criteria are listed as the following: 1) the outcome of the project meets all the specified requirements; 2) the overall quality of the product is high; 3) The requirements-related tasks (e.g. requirements specification, requirements management) are successfully completed in the project; 4) The outcome of the project meets the business goal; and 5) The project is completed within scope. Indeed, all of the criteria listed are in fact quite similar to the criteria proposed by previous researchers (e.g. [10, 12]). The finding asserted that as long as the outcome meets all the specified requirements and business goal, has good quality, completed within scope, and all the requirements-related activities are completed successfully, the project will be considered successful although the project is not completed within time and budget. Thus, the findings are apparently shown how the success of requirements activities in which including maintaining requirements quality will impact success in which supporting H2.

Finally, the phenomena of the interrelationships between RRK->Requirements quality ->Success (H3) has been proved by the findings. The interrelationships between them are also found to be the strongest link that existed in this study.

5. Conclusion

Therefore, the findings have confirmed the three hypotheses listed in this study. As requirements relationships knowledge has significant impact on requirements quality (H1); and requirements quality has direct significant impacts on success (H2); it can be concluded that requirements relationships knowledge is another significant factor that will impact requirements quality as well as project success (H3). Accordingly, the findings also confirmed the significant impacts of RRK on the software project success. In the future, this quantitatively finding of this study will be continued with a qualitative study in investigating further how RRK impacts requirements quality and other related factors on the software project success from the business analyst perspectives.

Acknowledgments

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