

MEASURING PROJECT MANAGER COMPETENCY IN AGILE SOFTWARE DEVELOPMENT PROJECT: A RASCH MODEL ANALYSIS

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ABSTRACT: Project managers have important role to play in ensuring the success of agile software development project (ASDP). The success of a project depends on the competency of the project manager. Previous research had taken the initiatives in introducing; skill, knowledge, personal attribute and behaviour that is needed by a project manager in agile software development project through conceptual study. This research had gathered the data from the respondents through online survey. The items presented on the survey are mostly on the level of competency of the agile project managers in companies. This paper also utilizes the Rasch Measurement Model to analyze the results that had been gathered from the survey. As a result, this paper provides acceptance item reliability and person reliability. Hence, the other initial future works has been conducted by involving more respondents in this research because it is enabling to increase the level of item and person reliability and also to get the accurate result findings.

Keywords: Skill ; Knowledge; Personal Attribute; Behaviour; agile project manager; competency

1.

0 INTRODUCTION

The growth of agile software development project at present continues to be more significant in software industry. It claim that agile provides lower costs, better productivity, better quality and better business satisfaction [1]. Furthermore, agile methods have proved to have a far higher agility and flexibility than the traditional method in software development project [2]. However, there are many challenges in determining agile software development project success an often have a substantial impact to as managerial issues, communications, personnel relationships, and competence management [3].

In the quest to achieve the success, Project managers have an important role in ensuring the success of the agile software development project. Then, they way project managers manage the project is different. Agile provides excellent features such as simplicity, small team members, quick action, frequent meeting and few more. Therefore, the way agile project managers worked is different with traditional project managers. Agile project managers should be more proactive and more competent in order to cope with the new paradigm in the software development process. Moreover, the competency of project managers is important in determining the project success. Therefore, it is important to look at a different perspective on the characteristics of agile project managers. In general, each project manager whether traditional or agile must have the necessary skills in the art of delegation and control resources within the entire project life cycle from inception to completion [4]. As discussed in the past literature, a project manager should good in negotiation skill, leadership skill, high critical thinking, management skill, decision making, communication skills and others. However, agile project managers should have extra skills such as coaching skill, flexible, able to keep the people continuously motivated and engaged with the project and others. Furthermore, the agile project manager is able to keep an eye on the plan, let the plan evolve with time and accordingly take extra steps to

manage the impact and change. Hence, it is important to investigate the competency of an agile project manager in order to determine the success of a project.

2.0 LITERATURE REVIEW

In general, many research focuses on literature analysis in determine agile software development project success such as project management [5], cost management [6], cost estimation [7,8] agile process [9], project managing and risk [3] and social factors [10]. Furthermore, [11] agreed that agile methodology influence the success of software development projects and also because of a far higher agility and flexibility than the traditional method in software development project [2]. However, there were lack of related researches done to identify the project manager competency of the appropriate in contribute to agile software development project.

Furthermore, [11] identified 36 success factors are used in five different attributes such as organizational, people, process, technical and project to identify perceived level of overall project success as in Table 1. However, agile implementation highly depends on people factor [12]. Most literature highlight about team, project manager, developer and customer when discussing about people involved in agile software development project [11]. Furthermore, [13] stated that people-related critical success factors tend to focus upon working with the client or other stakeholders. These factors include concerns such as leadership characteristics of the project manager, upper management characteristics, project team characteristics, and communication skills of the project manager with both clients and team members.

[11] Explained project manager having a team of high caliber and strong customer involvement is a critical to contribute the successful of project in agile software development. However, the study does not address how the appropriate competency required by a project manager to increase the team members with high competence and expertise, competency to increase the team members'

motivation, the managers' knowledge in agile process, the manager's adaptive management style, self-organizing teamwork and customer relationship.

A similar survey was conducted by [8] on relation of success factors in agile cost estimation. He explained that project manager need to measure all requirements such as time, budget and resource. However, he does not explain the appropriate behaviour competency that is needed by project managers to maintain strong communication, to maintain active customer involvement, simplicity, fixed constraints and to maintain adopting of user stories.

Hence, agile software development project success is depending on the competency. Realized that the lack of research on the project manager competency in agile software development projects, this research took steps to introduce the competency needed by a project manager in an agile software development project, how the identified competency determine agile software development process success and developing project manager competency model in agile software development project.

Table 1: Success factors as identified by [11]

Dimension	Factor
Organizational	<ol style="list-style-type: none"> 1. Strong executive support 2. Committed sponsor or manager 3. Cooperative organizational culture instead of hierarchical 4. Oral culture placing high value on face-to-face Communication 5. Organizations where agile methodology is universally accepted 6. Collocation of the whole team 7. Facility with proper agile-style work environment 8. Rewards system appropriate for agile
People	<ol style="list-style-type: none"> 9. Team members with high competence and expertise 10. Team members with great motivation 11. Managers knowledgeable in agile process 12. Managers who have light-touch or adaptive management style 13. Coherent, self-organizing teamwork 14. Good customer relationship
Process	<ol style="list-style-type: none"> 15. Following agile-oriented requirement management 16. Following agile-oriented project management process 17. Following agile-oriented configuration management process 18. Strong communication focus with daily face-to-face meetings 19. Honoring regular working schedule--no overtime 20. Strong customer commitment and presence 21. Customer having full authority
Technical	<ol style="list-style-type: none"> 22. Well-defined coding standards up front 23. Pursuing simple design 24. Rigorous refactoring activities 25. Right amount of documentation 26. Regular delivery of software 27. Delivering most important features first 28. Correct integration testing 29. Appropriate technical training to team
Project	<ol style="list-style-type: none"> 30. Project nature being non-life-critical 31. Project type being of variable scope with emergent requirement 32. Projects with dynamic, accelerated schedule 33. Projects with small team 34. Projects with no multiple independent teams 35. Projects with up-front cost evaluation done 36. Projects with up-front risk analysis done

Competency is the most vital element in project managers of agile software development project [14]. This is due to the fact that the competency of a project manager is the foundation of a project implementation at large. Thus, the project manager needs to work cooperatively with his other team members to achieve the objective of the project. He or

she must also master a few basic skills like communication skills, team building skills, and problem solving skills. This is to enhance the working process, minimize conflicts, and encouraging mutuality and understanding among the team members and thus would enhance cooperation among them[15,16,17]. In addition, the mentioned skills will enable them to contribute effectively in their software development task [18], [19]. The competency of the project managers will also give positive effects on decision makings whether directly or indirectly will give an impact to the costing of the whole software, quality and the productivity of the software [20].

Project managers must be competent in skills such as strategic agility, planning and coaching in order to be more productive in delivering the product and the service [21]. These competency will enhance the productivity of the software development thus enables the agile project manager to make efficient decisions, reduce problems or difficulties faced by the team and will also enables the project manager to enhance the productivity of the team. In addition, this could also make the role of a project manager to more important such as, helping the organization leaders to assess their organization level from strategic agility[4,17,22,23]. Else than that, this could also guide the team and the managements more efficiently through proper planning and effective coaching[14.19.24].

Next, understanding the competency of the project managers' personal attributes in agile software development project such as common sense, a good listener, a good communicator a good motivator and courageous. These personal attributes will respond to the aspects of technicality such as how arising problems could or could not be solved by the team manager. Moreover, the success of the project manager in agile software development project success depends on the fact whether he or she is a good listener, or does the project manager practice openness in communication, and his or her other attributes such as positivity and his confidence in developing the software [15.22]. With these attributes, the project manager can communicate what it is needed to be done by the team members in order to make the whole project a success[18,25]. This could also ensures that the team members did not stress out on the needs of the work and thus creates a conducive working environment [26,27].

Finally, this section focuses on the previous works related to the research. The research question was approached from seven behaviors a project manager in agile software development project will be discussed briefly in the following sections such as Leadership, Openness, Results Orientation, Ethics, Communication, Strategic, Creative and Innovative. The findings can be translated into recommendations for improving behavior a project manager required to contributes of project success. Therefore, by identified these behaviors this research hoped that it can be guidelines to project manager in majoring their project is successful managed.

[28] Explained the different leadership styles are more likely to lead to a successful outcome on different types of project. Furthermore, leadership style an adopted includes patterns

of behavior such as communication, conflict resolution, criticism, teamwork, decision making and delegation. However, the leadership is primarily accomplished through communication [29]. It involves many of behavior such as oral and written communication. Furthermore, the leadership requires good communication skills. Therefore, the leaders communicate a lot with personnel will contribute to the factor of employee's experience of communicating efficiency and contribute to factor of the high competence and expertise on team members [11].

Creativity and innovation will enhance creativity and innovation of project manager behavior in agile software development. The project manager must be creative in communication through effective use of colors, charts, and pictures to communicate concepts visually [30]. In addition, communication in the team has to be open using problems, tips and options shared freely between particular people [31]. Moreover, project manager need to provide expertise or training or encourages travel and foster collaboration to ensure the team member is not depressed in completing the development project [30,32,33]. Lastly, project manager must be creative in meeting [34].

The behavior of Openness an project manager involving to ideas, collaboration and communication [35], and [36]. When using the agile approach, manager is needed to do collaboration with client within a constant stakeholder discussion. The particular agile manifesto places the main client relationship [31]. Furthermore, the behavior of feedback and transparency can improve venture performance in addition to productivity and facilitates open communication and the early discovery of problems [37], [38].

Communication behavior is an important to project manager in agile software development project [37]. The effective of communication behavior a project manager in agile software development project must have Feedback Face to face and frequent communication among developers and between developers and customers [39,40,41]. Listening to what the customers need to do and understand these needs well enough to give the customer feedback about the technical aspects of how the problem might be solved, or cannot be solved [19]. In addition, the effective of communication behavior a project manager in agile software development project must have osmotic communication for small agile teams [42]. Osmotic communication behavior makes the cost associated with communications low along with the feedback rate high, and so that errors are corrected extremely easily as well as knowledge can be disseminated quickly [43].

A project manager required ensure project results satisfy ones stakeholder relevant and to help focus current teams and also attention on key objectives to obtain orientation optimum outcome [44]. Therefore, as project manager should work with the customer toward a shared definition of done for the requires the further trusting relationship and more flexible contract equipment [45]. However, the trust between your client and the team lets the parties avoid waste connected in addition to effort [46]. In addition, credibility is the single most important quality every project manager must possess. Credibility is a combination of being

seen to be trustworthy, convincing, and reliable [47]. The behavior of results-oriented leader is usually to be able to broaden section members' learning along with capabilities, and also that creates credibility. Furthermore, respect the stakeholders very important in aspect behavior because project manager will benefit being realistic for having project's interests at heart [19], [48] and [2].

However, without having an effective leadership strategy, this really is believed, that the organizational techniques do not work. However, the research finds 4 characteristics of strategically agile leaders in writing [49] as the basis of strategic leadership. Therefore, the first three are curiosity, creativity, and courage. The fourth is strategic agility. According to [49] Strategic leaders, tend to exhibit curiosity about many things and take a more holistic view of the world. However, strategic agility is especially important for knowledge throughout project manager behavior in agile software development project [49]. Strategy is usually important to cover attention to the strategic direction this leads towards big goal, and make decisions accordingly. Strategic agility can contribute to organizational leaders to assess their company's level of Strategic Agility [17]. In this research identified some of tips to contribute the Strategic Agility of project manager behavior and what can a project manager do in order to raise leadership competency when it comes to strategic agility. The following are techniques, to increase Strategic Agility of project manager behavior is Interaction strategies [22], Transformational Strategy [4], and Coordination strategy [23].

Finally, Ethics should be respected to allow project manager without conflict challenge in project [44]. Furthermore, according to [50], ethical behavior leads to better project. Therefore, Honesty is important in order to be an ethical and also effective project manager in agile software development. Furthermore, one of the most important issues in any line of work is the honesty with which project manager deal with other people [51]. In addition, Respect the Stakeholders, Project manager need to remember in mind will be this is a professional relationship as well as demands to be expressed respect at all times. There is nothing to be able to say that project manager can't make application for a different point from stakeholders and project manager will generate up the strong relationship and also a good feeling of mutual trust within stakeholders subsequently. This will likely stand throughout good stead for its future [52], and [53]. However, project manager need to be fair in dealings with everyone in the agile software development project. Therefore if project manager do this then project manager are sure to build good relationships and gain the kind of reputation for ethical behavior [51].

Hence, seven behaviours also enhance the developer-customer relationship, increase the ability to manage knowledge in agile process, increase self-organizing teamwork and increase the motivation of team members [11].

3.0 METHODOLOGY

At the initial stage, the researchers had distributed questionnaires to 30 respondents that are mainly individuals

that work in software development project teams in Malaysia. Unfortunately only 2 feedbacks were received, thus the researcher took an extra mile by building the questionnaire online via Google docs and redistributed it again through social media platforms: LinkedIn. The researchers also redistributed the questionnaire via email. The questionnaire had also been distributed to other new possible respondents. After redistributing the questionnaire, 15 respondents had managed to give feedback.

A pilot survey questionnaire on the agile of project manager competency in Software Development Project was developed to measure all the 18 dimensions of success determinants based on the conceptual framework. The researchers aimed to identify the project manager's competency for successful agile software development projects. If such benefit exists, this instrument is able to measure the degree of improvement that took place. This is a major step before a detailed scrutiny can be made as well as necessary measurements to be taken to prove the success determinants of agile software development projects. Moreover, A scale of project manager competency in agile based from software development project was established. A preliminary instrument construction was done based on the 18 dimensions that were defined in the conceptual framework.

A pilot test was carried out on 15 organizations that were involved in software development project such as Hewlett Packard Malaysia Sdn Bhd, T-system Malaysia, AVO Technologies, Booster Service Asia, HeiTech Padu Bhd, Erricsson, IProperty, Bank Muamalat, iGEN Technology, Bestinet Sdn Bhd, Kamin InfoTect, Pos Malaysia, SCA Mobile, Mesin Niaga and Nintex Malaysia Sdn Bhd. The respondents were college graduates and possess bachelor's degrees or other certificates before working as agile project managers in their respective companies. The ages of the respondents are mainly in the age range between 21-46 and above.

The questionnaire consists of three main sections, which are: Section A, demographic information; Section B, skill, knowledge and personal attribute; and Section C, the 7 behaviour of the agile project manager. The purpose of acquiring the respondents' information is for the researchers to administer interviews sessions with the respondents later. In Section A which is the demographic information, the respondents need to answer nine questions such as the status of their organizations and the nature of their business, the total duration of their involvement in project implementation, size of the project team and the preference of agile methodology when managing their software project. The purpose of asking these questions is to investigate whether any of these factors have influenced good practices and also to identify the competency level of the project managers. In Section B and Section C, the questions are on factors that influence the project managers' competency in agile software development project as in Figure 1. In this Section, questions about the 18 dimensions and the 78 attributes have been asked. Respondents were given a five points Likert scale, that ranges from "Strongly Disagree",

"Disagree", "Natural", "Agree" and "Strongly Agree" as in Figure 2.

The outcome of this survey will give the measurement of the audit quality practice that had been adopted in the organization established reflected by the Person Mean, μ PERSON being the Maximum Likelihood Estimate (MLE) in Rasch Analysis.

No	1. SKILL RELATED TO BEHAVIOR OF MANAGERS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I am able to gather, review, consolidate, and report to stakeholders based on their particular requirements.	1	2	3	4	5
2	I am able to develop communication skill which is an important factor in software development	1	2	3	4	5
3	I am able to arrange a frequent meeting to communicate with the agile project team.	1	2	3	4	5
4	I am able to oversee the day-to-day progress of project(s) and release initiatives with regard to time, budget, scope and quality.	1	2	3	4	5
5	I am able to understand the difference of personalities among the team members to ensure that collaboration can be implemented between team members.	1	2	3	4	5
6	I am able to build a strong team building skill with other team members	1	2	3	4	5

Figure 1 Sample of Questionnaire Format and Rating Scale

4.0 RESULT AND FINDINGS

The survey instrument was developed to measure all dimension of competency such as skills, knowledge, personal attributes and behaviours of project manager in agile software development including demographic questions. The study was carried out to investigate the project manager competency in agile software development project, to find out if such practice exists or not.

The purpose of this instrument is to measure the degree of improvement that took place during survey: to examine all items in order to achieve an actual result that would be used for proceeding for data collection through validation. Pilot was carried out among project manager in agile software development project to validate the contents of the survey instrument. The instrument was six pages long containing 78 items with rating scale of 1-5. During this preliminary survey, 40 questionnaires were dispatched among the selected population and 15 out of the 40 were returned to further analysis of the pilot. Bond and Fox Steps, a Rach Model application was used to analyze the result of the pilot.

4.1 SUMMARY STATISTICS

A total of 1170 data points arising from 15 respondents on 78 items was analysed. It yields a Chi-Square value of 2123.34 with 1075 of freedom. The test raw score Cronbach- α register a reliability of 1 which allows further analysis of the instrument in measuring the understanding of project manager competency in agile software development Project. Table 2 and Table 3 shows a summary statistics assessing the validity and reliability of the instrument. Item Reliability is a high 0.70 indicating insufficiency (poor) of item range but the Person mean; μ =+1.03 logit consider the instrument has a fair item targeting. The maximum item measure is +1.27 logit (SE:0.08) as compared to maximum Person ability stands at a high +2.98 logit (SE:0.27). Furthermore, the person infit MNSQ and z-STD values are +0.91 and -0.6 and the item infit MNSQ and z-STD values are +0.91 and -0.2 respectively giving an indication of the goodness of fit of the instrument measuring what is to be measured in the underpinning theory hence validity. The optimal categorization in which provides the best construct

definition, best separates respondents along the variable and produces the best fit of data to model. Targeting is at 1.03 (MNPerson – MNItem; 1.03-0.00) which indicated for targeting.

Table 2: Summary of 15 Measured Persons

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	303.9	78.0	1.03	.17	.83	-1.0	.91	-.6
S.D.	39.3	.0	1.02	.04	.33	1.9	.31	1.6
MAX.	361.0	78.0	2.98	.24	1.60	3.0	1.57	2.3
MIN.	221.0	78.0	-.53	.11	.33	-3.9	.33	-4.1
REAL RMSE	.17	TRUE SD	1.01	SEPARATION	5.80	Person	RELIABILITY	.97
MODEL RMSE	.17	TRUE SD	1.01	SEPARATION	5.93	Person	RELIABILITY	.97
S.E. OF Person MEAN	= .27							

Person RAW SCORE-TO-MEASURE CORRELATION = .96
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .97

Table 3: Summary of 78 Measured Items

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	58.4	15.0	.00	.37	.93	-.2	.91	-.2
S.D.	6.3	.0	.74	.08	.37	.9	.35	.8
MAX.	67.0	15.0	1.27	.51	2.18	1.9	2.07	2.0
MIN.	45.0	15.0	-1.37	.26	.33	-2.3	.32	-2.1
REAL RMSE	.41	TRUE SD	.62	SEPARATION	1.53	Item	RELIABILITY	.70
MODEL RMSE	.38	TRUE SD	.64	SEPARATION	1.69	Item	RELIABILITY	.74
S.E. OF Item MEAN	= .08							

UMEAN=.0000 USCALE=1.0000
Item RAW SCORE-TO-MEASURE CORRELATION = -.98
1170 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 2123.34 with 1075 d.f. p=.0000
Global Root-Mean-Square Residual (excluding extreme scores): .6961

Table 4: Consolidated Item Misfit

ENTRY NUMBER	RAW SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEA CORR.	EXACT OBS%	MATCH EXP%	Item
36	45	15	1.27	.26	.66	-1.1	.85	-.2	.72	33.3	41.8	L6 ANALYTICAL SKILL
68	46	15	1.20	.26	.41	-2.3	.32	-2.1	.75	53.3	41.7	S4 AGILE TECHNIQUE
34	47	15	1.13	.26	.51	-1.8	.44	-1.6	.80	46.7	41.4	L4 DECISION
35	47	15	1.13	.26	.54	-1.6	.45	-1.5	.79	46.7	41.4	L5 COACH
72	47	15	1.13	.26	.56	-1.5	.51	-1.3	.69	53.3	41.4	E1 ETHICS
32	48	15	1.06	.26	.59	-1.3	.62	-.9	.81	40.0	38.8	L2 ADOPT PATTERN
37	48	15	1.06	.26	.62	-1.2	.50	-1.3	.76	40.0	38.8	L7 CAPACITY
71	48	15	1.06	.26	.63	-1.2	.64	-.9	.72	53.3	38.8	S7 COORDINATION STRATEGY
73	48	15	1.06	.26	.60	-1.3	.57	-1.1	.72	53.3	38.8	E2 GOOD ETHICAL
70	49	15	.99	.27	.74	-.7	.80	-.4	.73	46.7	38.6	S6 INDIVIDUAL ISSUE
69	50	15	.92	.27	.85	-.3	.97	.1	.74	46.7	41.8	S5 INTERACTION STRATEGIC
74	50	15	.92	.27	.45	-1.9	.47	-1.5	.72	66.7	41.8	E3 GOOD EFFECTIVES
13	51	15	.85	.27	1.05	.3	1.10	.4	.51	33.3	44.2	KW3 MINIMIZE DISRUPTION
31	51	15	.85	.27	.46	-1.8	.35	-2.0	.64	66.7	44.2	L1 PROJECT OBJECTIVE
33	51	15	.85	.27	1.05	.3	1.12	.4	.80	40.0	44.2	L3 INFORMATION SHARING
7	52	15	.77	.28	.82	-.4	.77	-.4	.65	33.3	44.1	SK7 FORMING STORMING
9	52	15	.77	.28	.90	-.2	.62	-.9	.54	53.3	44.1	SK9 TEAM RELATIONSHIP
10	52	15	.77	.28	.95	.0	.73	-.6	.60	40.0	44.1	SK10 CAPACITY
12	52	15	.77	.28	.78	-.5	.91	-.1	.74	33.3	44.1	KW2 VELOCITY
75	53	15	.69	.28	.54	-1.3	.52	-1.2	.63	60.0	43.9	E4 GOOD RELATIONSHIP
6	54	15	.61	.29	1.17	.5	1.02	.2	.56	46.7	47.1	SK6 STRONG TEAM BUILDING
11	54	15	.61	.29	1.24	.7	1.27	.7	.71	33.3	47.1	KW1 UNDERSTANDING
76	54	15	.61	.29	.86	-.2	.59	-1.0	.45	66.7	47.1	E5 RESPECT
5	55	15	.52	.30	1.26	.7	1.01	.2	.65	53.3	49.8	SK5 PERSONALITIES
65	55	15	.52	.30	.50	-1.4	.45	-1.4	.47	80.0	49.8	S1 EXECUTING STRATEGY
4	57	15	.34	.32	.74	-.5	.59	-.9	.55	80.0	54.8	SK4 DAY TO DAY
8	57	15	.34	.32	1.96	1.8	1.47	1.0	.57	46.7	54.8	SK8 MANAGE CLIENT
62	57	15	.34	.32	.76	-.4	1.05	.3	.71	40.0	54.8	I4 NOT DEPRESSES
67	57	15	.34	.32	1.06	.3	1.06	.3	.58	46.7	54.8	S3 EXHIBIT CURIOSITY
39	58	15	.23	.33	.72	-.5	.81	-.3	.63	40.0	56.0	O2 TRANSPARENCY
40	58	15	.23	.33	.64	-.7	.65	-.7	.70	53.3	56.0	O3 IDEAS OF CLIENT
41	58	15	.23	.33	.91	.0	.78	-.3	.74	46.7	56.0	O4 COLLABORATION
60	58	15	.23	.33	.53	-1.1	.53	-1.0	.65	60.0	56.0	I2 COMMUNICATE CONCEPTS
61	58	15	.23	.33	1.04	.3	1.18	.5	.36	46.7	56.0	I3 PROBLEM SOLVING
14	59	15	.12	.35	.55	-.9	.53	-1.0	.61	73.3	58.6	KW4 PLANNING
45	59	15	.12	.35	.57	-.8	.56	-.9	.43	73.3	58.6	C1 CLARIFY
38	60	15	-.01	.36	.89	.0	.88	-.1	.79	53.3	59.1	O1 CRITICSIDE
47	60	15	-.01	.36	1.10	.4	1.27	.7	.61	53.3	59.1	C3 NONVERBAL

4.2 Item FIT

Rasch model statistic analysis utilize item misfit order determine which item is fit misfit to further the survey. After random selections of items, Bond and Fox Steps assess each of the item based on their fit order conditions. According to Rasch model condition, an item having larger MNSQ than the sum of the mean of MNSQ and SD gives an indication of possible high z-std. Therefore, From Table 4, it shows the sum of the mean of MNSQ and SD is 1.91. In this case fit item should be between 1.30 (maximum) and 0.56 (minimum) and z- std<+/-2. Table 3.5 shows misfit items are 49, 24, 8, 16, 51, 17, 78, 3, 23, 19, 18, 53, 54, 14 ,35, 75, 60, 34, 59, 65, 74, 31, 46, and 68 with MNSQ > 1.30 logit and z-std> +/-2.

4.3 PERSON FIT

Same as Item Fit, fit person is obtained by summing the mean of MNSQ and (+/-) SD. The person fit should be in the range from 0.50 to 1.16 and z-std must be less than (+/- 2). As a result, items whose MNSQ is nearer to 1 and z-std nearer to 0 is deemed a better fit. From Table 5, it shows that there is no person out of range. It proves that all respondents are fit in this case.

59	60	15	-.01	.36	.50	-1.0	.49	-1.1	.58	60.0	59.1	I1	ENHANCE COMMUNICATION
77	60	15	-.01	.36	.81	-.2	.81	-.2	.15	46.7	59.1	E6	BE FAIR
25	61	15	-.15	.38	.76	-.3	.71	-.5	-.09	66.7	62.3	P5	FACE INTERACTION
46	61	15	-.15	.38	.33	-1.5	.41	-1.4	.74	80.0	62.3	C2	MISCOMMUNICATION
53	61	15	-.15	.38	.53	-.8	.67	-.6	.39	66.7	62.3	R2	MOTIVATOR
64	61	15	-.15	.38	1.23	.6	.92	.0	.76	60.0	62.3	I6	CREATIVITY
66	61	15	-.15	.38	.74	-.3	.83	-.2	.50	53.3	62.3	S2	STRATEGICALLY
3	62	15	-.30	.40	1.36	.8	1.39	.9	.29	60.0	62.8	SK3	FREQUENT MEETING
15	62	15	-.30	.40	1.22	.6	1.21	.6	.39	60.0	62.8	KW5	XP PLANNING
21	62	15	-.30	.40	1.25	.6	1.29	.7	.07	60.0	62.8	P1	COMMON SENSE
27	62	15	-.30	.40	1.20	.5	1.17	.5	.11	46.7	62.8	P7	SELF MOTIVATION
52	62	15	-.30	.40	1.13	.4	1.23	.6	.41	66.7	62.8	R1	THREE KEY
57	62	15	-.30	.40	.84	-.1	1.01	.2	.59	73.3	62.8	R6	VELOCITY
63	62	15	-.30	.40	.98	.2	.90	.0	.77	60.0	62.8	I5	EXTERNAL CONTACTS
2	63	15	-.47	.43	1.02	.2	.93	.0	.51	73.3	65.8	SK2	COMMUNICATION SKILL
26	63	15	-.47	.43	.73	-.3	.77	-.3	.04	66.7	65.8	P6	CURRENT SITUATION
29	63	15	-.47	.43	1.00	.2	1.04	.3	.15	66.7	65.8	P9	STRESS ON THE JOB
42	63	15	-.47	.43	.91	.0	.98	.1	.67	53.3	65.8	O5	FEEDBACK
50	63	15	-.47	.43	.81	-.1	.86	-.1	.61	66.7	65.8	C6	FREQUENT MEETING
22	64	15	-.67	.45	.77	-.3	.76	-.4	.19	66.7	66.8	P2	ESTIMATE TIME
23	64	15	-.67	.45	1.35	.8	1.38	.9	-.09	40.0	66.8	P3	MANAGE AGILE
43	64	15	-.67	.45	.98	.2	1.03	.2	.59	66.7	66.8	O6	LISTEN
44	64	15	-.67	.45	.88	.0	.98	.1	.60	66.7	66.8	O7	TRANSPARENCY PROCESS
48	64	15	-.67	.45	.68	-.4	.69	-.6	.60	80.0	66.8	C4	POSITIFE RELATIONSHP
54	64	15	-.67	.45	.52	-.8	.56	-.9	.47	80.0	66.8	R3	RISK INVOLVED
78	64	15	-.67	.45	1.40	.8	1.29	.7	.30	53.3	66.8	E7	REMOVE IMPEDIMENTS
18	65	15	-.88	.47	1.35	.8	1.32	.8	.10	46.7	67.3	KW8	TEAM COACHING
24	65	15	-.88	.47	1.97	1.6	1.82	1.6	.03	46.7	67.3	P4	PROVIDE FORUM
30	65	15	-.88	.47	1.04	.3	1.04	.2	.03	60.0	67.3	P10	COURAGEOUS
49	65	15	-.88	.47	2.18	1.9	2.07	2.0	.40	66.7	67.3	C5	CLOSE INTERACTION
56	65	15	-.88	.47	.95	.1	.95	.0	.48	73.3	67.3	R5	ACCURATE RESULT
58	65	15	-.88	.47	.57	-.8	.51	-1.2	.77	86.7	67.3	R7	ESTIMATE TIME
1	66	15	-1.12	.49	1.04	.2	1.15	.5	.12	66.7	67.1	SK1	CONSOLIDATE
16	66	15	-1.12	.49	1.72	1.4	1.53	1.2	.32	53.3	67.1	KW6	SCRUM
19	66	15	-1.12	.49	1.35	.8	1.29	.8	-.14	53.3	67.1	KW9	RIGHT PATH
20	66	15	-1.12	.49	1.18	.5	1.14	.5	.02	53.3	67.1	KW10	BASIC PRINCIPLES
51	66	15	-1.12	.49	1.52	1.1	1.40	1.0	.44	66.7	67.1	C7	MANAGE CLIENT
17	67	15	-1.37	.51	1.40	1.0	1.49	1.2	-.13	53.3	67.1	KW7	COACHING STAFF
28	67	15	-1.37	.51	1.16	.5	1.16	.5	.12	66.7	67.1	P8	CONFIDENT
55	67	15	-1.37	.51	.63	-.8	.59	-1.0	.62	80.0	67.1	R4	PROVIDE EMPLOYEE

MEAN	58.4	15.0	.00	.37	.93	-.2	.91	-.2		57.0	56.7		
S.D.	6.3	.0	.74	.08	.37	.9	.35	.8		13.1	10.1		

SUM OF MEAN +S.D.: 0.56<MNSQ>1.30

Table 5: Consolidated Person Misfit

ENTRY NUMBER	RAW SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEA CORR.	EXACT OBS%	MATCH EXP%	DISPLACE	Person
7	280	78	.28	.13	1.60	3.0	1.57	2.3	.66	32.1	53.4	.00	M1DN26126
5	267	78	.08	.12	1.42	2.4	1.35	1.6	.77	29.5	47.7	.00	M1BY11321
4	309	78	.86	.16	1.35	-3.6	.37	-3.7	.02	80.8	60.6	.00	F1BY11431
9	306	78	.79	.16	1.35	-3.3	.33	-4.1	.11	76.9	59.9	.00	M1BN21114

MEAN	303.9	78.0	1.03	.17	.83	-1.0	.91	-.6		57.0	56.7		
S.D.	39.3	.0	1.02	.04	.33	1.9	.31	1.6		16.9	8.3		

SUM OF MEAN +S.D.: 0.50<MNSQ>1.16

4.4 RATING SCALE VALIDITY

Scale calibration is importance in any measurement system. This section investigates the validity of the scale ultimately to dictate the respondent rating pattern and their correspondence. Rasch analysis offer this very unique verification process to validate the rating assumed (saedah and zulkefli 2014; Masodi 2008). Table 6 indicates that the observed average increases steadily and consistently descending from -0.39 to 1.96. The Observed Average increases steadily and consistently from -0.39 to 1.96 indicates consistency in response pattern. The Rasch-

Andrich Threshold is where the transition of decision making occurs from one scale to another. This is captured in the Structure Calibration column where the difference shall be 1.4 logit apart but not exceeding 5. If the separation is less than 1.4, then it is recommended to collapse the affected ratings into one and split if more than 5.

It was found that the separation between rating 1 and 2 is 0.50, thus no need to collapse. Separation between rating 2 and 3 is 2.27, and separation between rating 3 and 4 is 0.72 needs to be collapsed since the separation is less than 1.4. If

the Infit MNSQ SD is found to be smaller and yield a larger Person Separation, then the new score of '11234' will be taken instead.

Table 6: Rating Scale Validity

CATEGORY	OBSERVED	OBSVD	SAMPLE	INFIT	OUTFIT	STRUCTURE	CATEGORY	
LABEL	SCORE	COUNT	% AVRGE	EXPECT	MNSQ	MNSQ	MEASURE	
1	1	78	7	.98	-.78	.65	.43 NONE (-1.99)	1 STD Strongly Disagree
2	2	26	2	.39	-.41	1.12	1.13 .50 -1.16	2 D Disagree
3	3	131	11	.11	.14	.99	1.01 -1.77 -.52	3 N Nature
4	4	640	55	.10	.99	.68	.94 -1.05 .78	4 A Agree
5	5	295	25	1.96	2.12	1.22	1.09 2.32 (3.44)	5 STA Strongly Agree

4.5 PERSON ITEM MAP

Item map gives insight about the hierarchy of difficulty order of items and the heart of Rasch Analysis. This section is a very important part of the instrument construct validity acceptance. When the item difficulty order is in place, it means that the instrument construct is more in order. Based on Figure 2 the difficult item refers to the skills, knowledge and behaviour competency. Furthermore, Figure 2 also item are considered to be easy items and extremely easy items which mean the items did not contribute to any significant meaning in any measurement thus made these items to be discard or can be revised in the future. Item L6 and S4 in Behaviour competency which is situated on the highest position are considered as items that are difficult to fulfil by the project managers.

On the other hand, the G1 section is project managers that considered that the items mentioned are not challenging their abilities. According to Azrilah, Mohd Saidudin, and Azami, (2013) Rasch proposed further research must be made to observe the difficult task like measuring agile project managers' competency in a more precise manner. Nevertheless, Rasch model could predict the respondents positions with more precise and this is the main advantage

of Rasch model and could not be done by any measuring model. The G2 section on the other hand are project managers that could fulfill the mediocre task where else the G3 section on the other hand are project managers that could fulfill the easy task only.

4.6 ITEM ANALYSIS

It was found that there are 36 out of 78 (46.15%) difficult items but many easy items, 43.58% and the rest extremely easy item are 10.27%. The difficult, easy items and extremely easy item are shown by ItemMean. Those items are above ItemMean are considered difficult item and those under ItemMean are easy item. Those items located between ItemMax and PersonMean are considered most difficult items.

In this case, L6 Analytical_Skill and S4 Agile_Technique identified as most difficult items. It can be concluded that one people who involve in the agile project management are not familiar with these items. Suppose, all items in Person free should be removed however, in this case, these items cannot be removed due to the small number of respondents and the respondent is not representative of the sampling unit. C3 Nonverbal and E6 Be_Fair are inline MeanItem 0.00 logit. It shows these two items are very familiar item in agile project management.

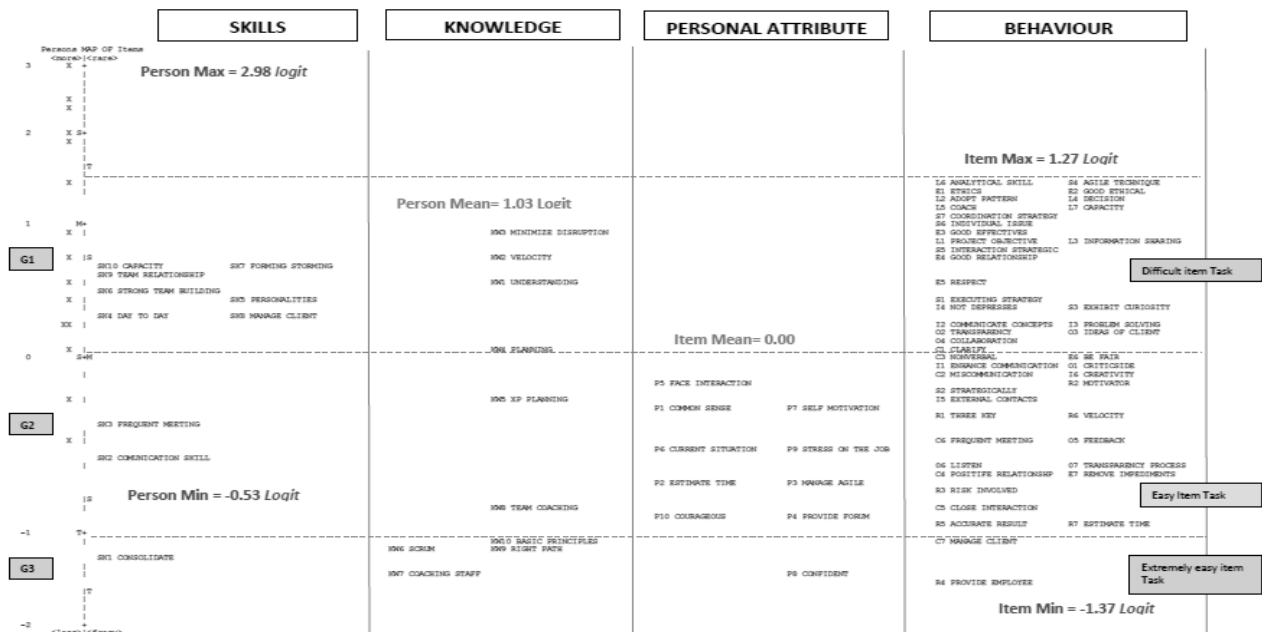


Figure 2 Person-Item Map

4.7 PERSON ANALYSIS

There were 12 males and 3 females who responded to this survey. 9 respondents were between 21-30 years old, 4 respondents between 31-45 years old, and only 2 respondent was above 45 years old. Most of them were holding bachelor degree holders. In terms of sector of business, most of the respondents were from a multinational company. 10 respondents were from the software industry, 5 respondents were from others such as services, Banking and Telco. Most of the 3 respondents take 0 to 6 months to complete a given project. 5 of the respondents take up 1-2 years, 3 respondent takes up 3 to 4 years and 4 of the respondents take more than 5 years to complete a project. The normal duration of any agile software development project to complete, are only within a few months due to the fact that it focuses on small scale project. If the team takes a long time to complete a project, this will lead to the failure of the project in terms of the cost, the timeline and the scope of the project. Therefore, this became the reason for this research to be focused on the competency of an agile project manager in determining the success of a project. Based from the person analysis, 3 of the respondents handled up to 5 team members. 6 of respondents handled 6-10 team members, 4 of the respondents have handled 11-20 team members and 2 of the respondents have handle 21-50 team members. The main reason for an agile methodology to have small project team members is because agile methodology focuses on the small projects where these project budgets will only covers for fewer resources. Although a small project team members are involved in this type of project. A parallel team project is able to help in delivering a quality product to the clients. The parallel team project plays an important role to help reducing risk by hiring more experts and ensuring that the project cost decreases. Next, an analysis is done on the types of agile methodology used. 7 of the respondents have used the scrum methodology to complete their project while 4 have used the agile unified process. Whereas, 1 of the respondents have used the lean software development process and 3 have used the Dynamic system development method.

5.0 CONCLUSION & FUTURE WORKS

As a conclusion, we cannot generalize good analysis because of poor item reliability, even though, the person reliability was good. The unidimensionality failed to be achieved due to less than acceptable value as required in the Rasch measurement, which had a cut-low point of 40%. In general, the researcher faced difficulty to make good generalization, due to small number of respondents, and they were not representing the sampling unit. It is hoped that a larger size of respondent will be secured so as to increase the item and person reliability. Hence, the other initial future works has been conducted by involving more respondents in this research because it is enabling to increase the level of item and person reliability and also to get the accurate result findings.

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