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A model for assisting software project managers to treat project teams as key stakeholders: What do experts say?

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Abstract

Project teams (PTs) are critical resources in the success of projects in the Information and Communication Technology (ICT) sector, as projects in this sector are highly dependent on human resources. Numerous researchers have written about the key role played by the PTs. However, PTs have not received commensurate recognition from their project managers (PMs) when it comes to the addressing of their needs and interests. ICT PTs have become forgotten stakeholders. In an effort to address the neglect of project teams by PMs, a model was developed by the authors of this paper to assist ICT PMs in treating PTs as key stakeholders. The purpose of this paper is to present the results of the refinement and evaluation process to which this model was subjected, using a two-phase Delphi methodology, using experienced experts comprising five PMs, twenty PT members as well as five academics. The data collected from the experts using interviews was analysed by means of statistical and qualitative methods. The results show that the experts have welcomed the use of the model in the ICT sector, acknowledging its suitability for a real-life project environment. Future studies should include the validation of the model in a real-life project environment.

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1. Introduction

Walt Disney, quoted by [1], states, *'You can dream, create, design and build the most wonderful place in the world … but it requires people to make the dream a reality'.*

These sentiments resonate within the Information and Communication Technology (ICT) sector because projects in the ICT industry are human intensive and dependent on human capital [2]. Without project teams (PTs), there are no projects to speak of in the ICT sector. In fact, PTs are some of the key stakeholder groups consisting of professional knowledge workers whose efforts are coordinated to meet project objectives [3]. Project success is dependent on the project stakeholders [4], especially PTs in the field of ICT [3], [5]. The pivotal role played by project teams in the success of projects in the industry is well documented by various studies, including [2], [6], [7]. A project manager (PM) is duty bound to address the interests of all stakeholders, including PTs and these sentiments are also echoed by [8] who calls for better treatment of ICT PTs by PMs. The calls are in line with what stakeholder management is about.

However, the sad truth is that PTs have been forgotten and neglected key project stakeholders [2], [9], despite being key strategic assets of ICT projects and companies. Their expectations and interests do not form part of many PMs' agendas, and their views 'count for nothing' as noted by a team member in a study conducted by [2]. Their interests have also not received much attention from the scholars of stakeholder management, a view also supported by [10], who say the focus has been on stakeholders who are perceived to possess more economic project interests.

The neglect of project teams has resulted in a number of challenges and problems, such as unfavourable working environments, mistrust (PTs lacking trust in project managers), unsatisfied project teams, unproductive teams and high turnover of team members [2], [11]. On the contrary, when project managers attend to the needs of their project teams, the PTs reciprocate by giving their all and providing the PMs with valuable project support [12].

The poor treatment of PTs prompted the authors of this research paper to propose and develop a model (in a separate study, which from now on will be referred to as the original study) aimed at assisting ICT project managers to treat PTs as key stakeholders. This research work, an extension of that research project, is therefore aimed at presenting the research results of the refinement and the evaluation processes of the model. The following are this study's research questions (RQs): ***RQ** 1: Is the model shown in Figure 1 needed by the ICT sector? **RQ** 2: How usable is the model in a real-life project environment? **RQ** 3: How well does the model meet its purpose?*

The remainder of the structure of the paper is as follows: Section 2 provides a discussion on the literature review, while Section 3 briefly discusses the model. The research methodology and results are outlined in Section 4, while the results in relation to the study's research questions, the conclusion and the limitations are all presented in Section 5.

2. Literature review

A project manager is obligated to balance the array of demands and interests of various project stakeholder groups. Unfortunately a number of projects fail because project managers neglect the interests of project stakeholders, project teams included [13]. In order for project managers to receive full support of stakeholders, PMs should involve stakeholders in the decisions which affect their project interests [14]. One of the duties of a project manager is to maintain healthy project relationships with *all* project stakeholders [15]. Good communication, building of trust between a PM and team members, and the ability of a PM to listen attentively (not listening to tell [16]) and respond accordingly, are key components for managing good stakeholder relationships [15]. ICT project managers are expected to address the needs of stakeholders and thus satisfy them in the process [17].

The preceding discussion signifies the importance of effective project stakeholder management for the successful achievement of ICT project objectives [18]. There are various existing stakeholder management frameworks and models aimed at improving the management of project stakeholders for project managers. Two prominent frameworks are Stakeholder Circle methodology [19] based on the work of [20], and the Social Network Analysis [21], which considers stakeholder networks of a project. However, according to [22], current stakeholder management frameworks and models cannot assist project managers to identify all project stakeholders and their project interests. In an attempt to address these limitations, [22] developed a new stakeholder analysis model based on Actor-Network Theory. This

model, however, has been met with criticism by [23], arguing that [22]'s model was not developed in the context of project success but on failed project contexts. The limitations of the abovementioned frameworks and models could be exacerbating the poor attention relegated to PT interests by PMs resulting in the treatment of project teams as non-key stakeholders. To address this gap, the authors of this paper developed a model aimed at assisting ICT PMs to treat PTs as key stakeholders. This study presents the refinement and evaluation results of this model.

3. Brief discussion of the model

Figure 1 depicts the model evaluated by this study. The six critical stages of the model that must be followed by a project manager are briefly discussed. The processes of the model begin at the entry point; this would normally happen at the commencement of a project. At this stage, all PT members should be identified, along with their interests, thereby starting Stage 1 of the model.

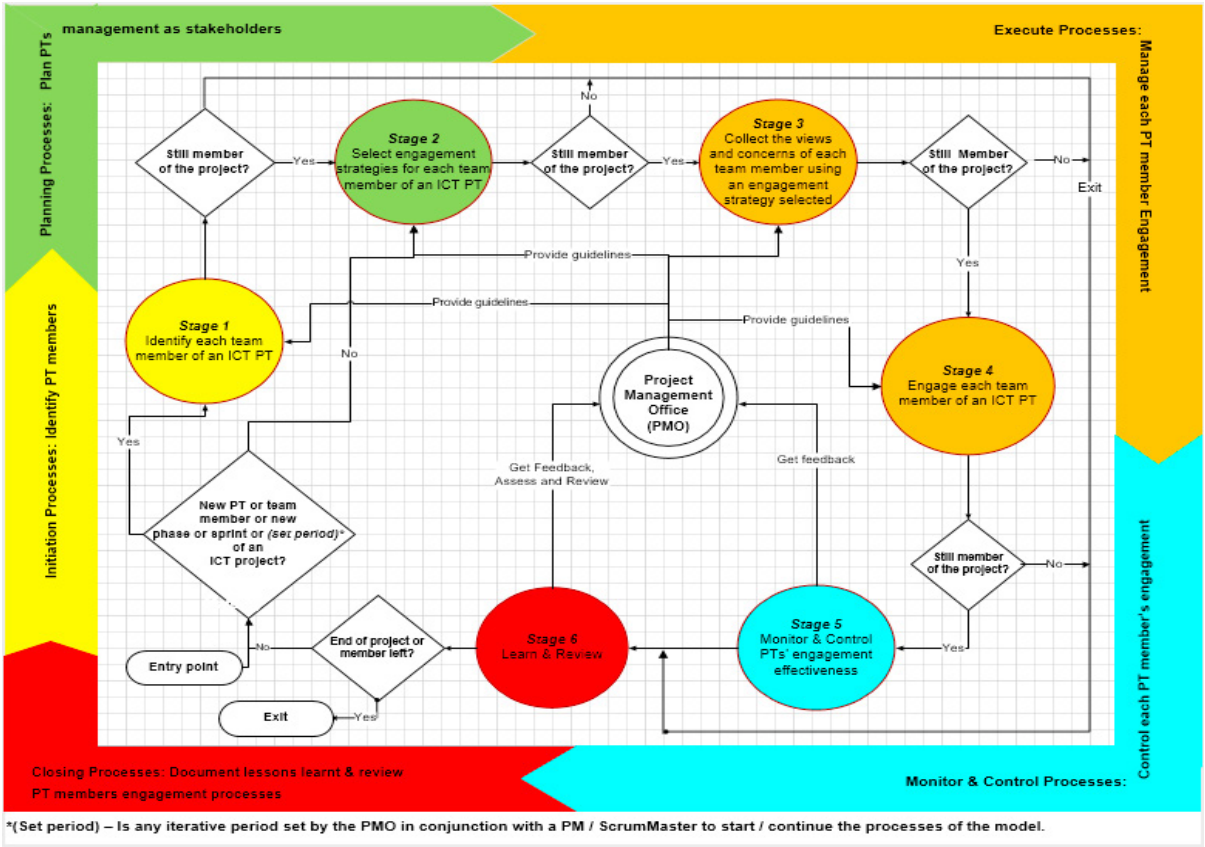

Fig. 1. A model to assist ICT project managers to treat project teams as key stakeholders

Stage 1: Identify each project team member of the ICT project team – The purpose of this stage is for a PM to identify each team member who is a stakeholder at this phase of the project or sprint or a set period by the project management office in conjunction with a PM or a Scrum master to start or continue the processes of the model.

Stage 2: Select engagement strategies for each identified team member – Engagement strategies for team members differ from one team member to the other because PT members are unique. A communication strategy may be an enabler or impediment to achieving intended results between a PM and a team member [24]; hence, a strategy should be tailored to each team member.

Stage 3: Collect the views and concerns of each team member – During this stage, the interests of each identified PT member are solicited by a PM using appropriate engagement strategies selected in the previous stage.

Stage 4: Engage each team member of the project on the collected views and concerns – Using appropriate engagement strategies selected in Stage 2, a PM converses with each team member to attend to individual needs.

Stage 5: Monitor and control the project manager-project team engagement process – During this stage, a PM and the project management office as the custodian of project management practices within the organisation should evaluate feedback received from each team member to improve the guidelines regarding engagement with PTs.

Stage 6: Learn and Review – In the case of this step, the project management office would use the valuable information provided as feedback by both PMs and PTs, as inputs to the process of reviewing project management standards, and guidelines regarding the effectiveness of engagement between PMs and PTs.

4. Research methodology and results

This section discusses the research methodologies used in the study and presents the research results.

4.1. Research methodology

Two complementary research methodologies were used in this study, namely, the design science research (DSR) methodology and the Delphi research methodology. The model was developed using the DSR methodology because it (DSR) is appropriate for research aimed at producing artifacts [25], a model in this case. The Delphi research methodology was used to refine and evaluate the model through two phases as recommended by [26]. Two phases of the Delphi methodology were used here because two rounds were sufficient to determine a high level of consensus amongst the experts about the model and the point at which no new recommendations were offered to improve it.

No specific number of experts are required in the Delphi research methodology [27], but [28] say the number can be between ten and eighteen. There were three panels of experts who participated in the refinement and evaluation of the model. The first panel consisted of five ICT project managers, with an average project management experience of 12 years, while the second panel consisted of twenty-five experienced PT members, each with at least two years of work experience. Both groups of panel members participated in the study wherein the model in Figure 1 was developed. The third panel of experts was comprised of five academics from two universities, each with a minimum of eight years of experience. All thirty-five panel of experts were chosen using a purposive selection approach which is in line with the selection approach used in the original study as it was a case-based study [2]. However, only thirty experts participated in the study, as five project team members (from three different projects) did not respond to requests for participation. The experts were selected on the basis that their critical judgment of the model is indispensable as people who have direct and indirect interest in the model, as suggested by [29]. This study used telephonic interviews for data collection due to Covid-19 pandemic government restrictions. Interviews are suitable for data collection when using the Delphi methodology [29]. The interview instruments were tested with one panel expert from each of the three panels for clarity and to ascertain validity of the construct**.**

In phase 1, the experts answered Questions 1 to 3 by choosing answers on a pre-coded Likert scale. Question 4 was an open-ended question. In phase 2, while Questions 1 and 2 had to be answered by choosing answers on a pre-coded Likert scale, Question 3 was open-ended. Due to space limitations, some Likert scale items are abbreviated on the graph, for example, *Strongly agree(1)* is abbreviated to *Str. Agree(1).* Likert scale values not selected by the experts are not shown on the graphs. Graphic analysis and descriptive statistics including the mean, the mode and the standard deviation were used to interpret the data and determine the level of consensus amongst the experts. In a normal distribution, 68% of the responses are within one standard deviation of the mean. The information in Table 1 was used to establish the level of consensus reached by the experts.

Table 1. Criteria for determining level of consensus [30]

Standard deviation range	Consensus level
$0 \leq x < 1$	High level
$1 \leq x < 1.5$	Reasonable/fair level
$1.5 \leq x < 2$	Low level
$2 \leq x$	No consensus

4.1.1. The results of the refinement and evaluation of the model – Delphi phase 1

In the first phase of the Delphi research methodology, four main questions were asked during a telephonic interview with each expert. Question 1 was to establish whether the developed model was needed in the ICT industry. The responses of the three groups of experts are shown in Figure 2. The most frequently selected answer by the team members was *'Agree(2)'*, confirmed by the calculated mode value of 2 (*'Agree(2)'*). The standard deviation value for the responses of team members was 0.373, indicating a high level of consensus amongst the experts of this panel. The most selected Likert item by the project managers was also *'Agree(2)'* (mode), followed by *'Strongly agree(1)'*. The standard deviation value for this group was 0.490, also showing a high level of consensus amongst the panel members, even though the level of agreement for this panel was slightly lower than that of the team members. As for the academics panel of experts, *'Agree(2)'* was also the most chosen value. The value of the standard deviation for this panel was 0.633, indicating a high level of consensus amongst the academics, albeit not as high as the other two panels. Collectively, all the respondents in the three groups selected either 'Agree' or 'Strongly agree' except for two team members and one academic who responded with '*Somewhat agree(3)'*. In other words, 27 of the 30 experts contended the model was undoubtedly needed by the ICT sector, while the other three gave the model a weak nod. The standard deviation value of 0.623 for the responses of all panellists confirms a high level of consensus.

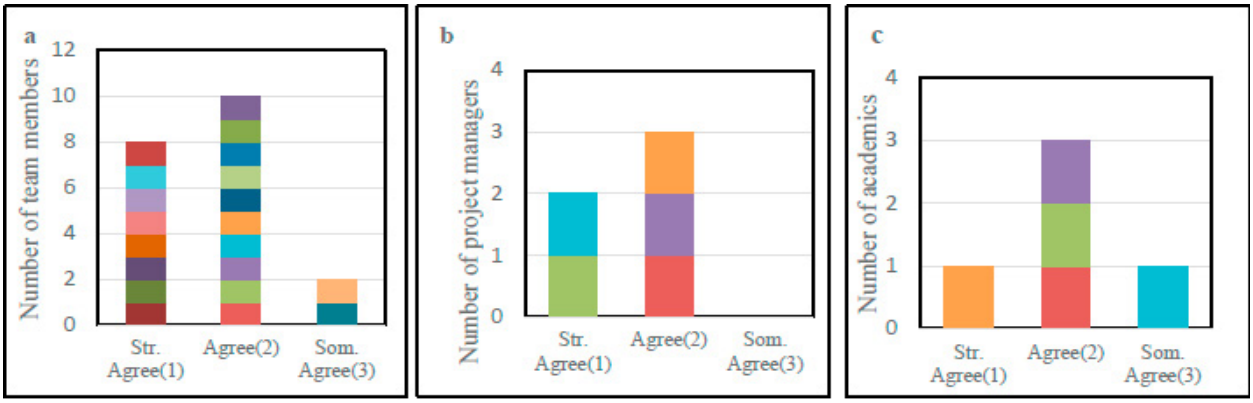

Fig. 2. (a) Team members' responses to Question 1; (b) Project managers' responses to Question 1; (c) Academics' responses to Question 1

The aim of Question 2 was to establish how applicable the model is in a real-life project environment. Figure 3 summarises the experts' responses. The responses of the PT members for this question are by and large consistent with their answers to Question 1, with the exception of one team member who gave the need for the model a weak thumbs-up in Question 1 but thought that the model was '*Highly feasible(1)' (H. feasible)* in the real-life environment. Similarly, the academic expert who was not totally convinced that the model was needed, however, thought it was *'Feasible(2)'* for the real-life environment. The responses by the PMs for the two questions are more consistent than the other two groups of experts. The panels of experts for project managers and academics had similar answers, with *'Feasible(2)'* and *'Highly feasible(1)'* selected by four and one panel member, respectively, by each group. Both panels of experts for project managers and academics had a relatively high level of consensus (0.4) compared to the project team member group which had 0.625. The statistical analysis carried out on the overall responses of the three groups of experts indicates that the experts reached a high level of consensus (0.562) on this issue.

The third question was intended to establish how well the model is fulfilling its purpose. Figure 4 presents a summary of the participant answers. One PT member indicated that the model was not fulfilling its purpose. The response, though, seems to have been caused by lack of understanding on how the model works, as revealed by follow-up questions during the interview. Two project team members decided to 'sit on the fence' regarding the answer to this question by selecting *'Neither(3)'*. On probing their responses further, the indications were that there were some questions concerning how the model deals with agile teams. On the other hand, the majority (12 experts) of the PT members indicated that the model was *'Well(2)'* suited for its function, while the remaining five experts indicated it fulfilled its purpose *'Very well(1)'*. Likewise, the expert groups of project managers and academics thought that the

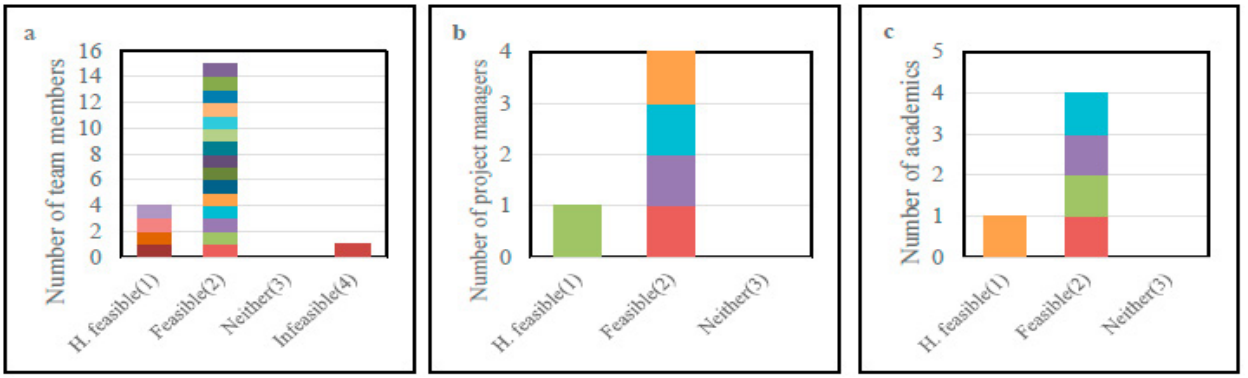

Fig. 3. (a) Team members' responses to Question 2; (b) Project managers' responses to Question 2; (c) Academics' responses to Question 2

model was fulfilling its intended purpose *'Well(2)'*. Furthermore, there was a high level of consensus amongst the members of each group, as indicated by the standard deviation values of 0 for both groups. However, the standard deviation of the PT members' responses was 0.740, indicating that the group had lower level of consensus than the other two groups. The overall majority (27) of the experts from the three panels maintained that the model was meeting its purpose *'Well(2)'*. The standard deviation value of 0.605 points to a high level of consensus by the three panel groups.

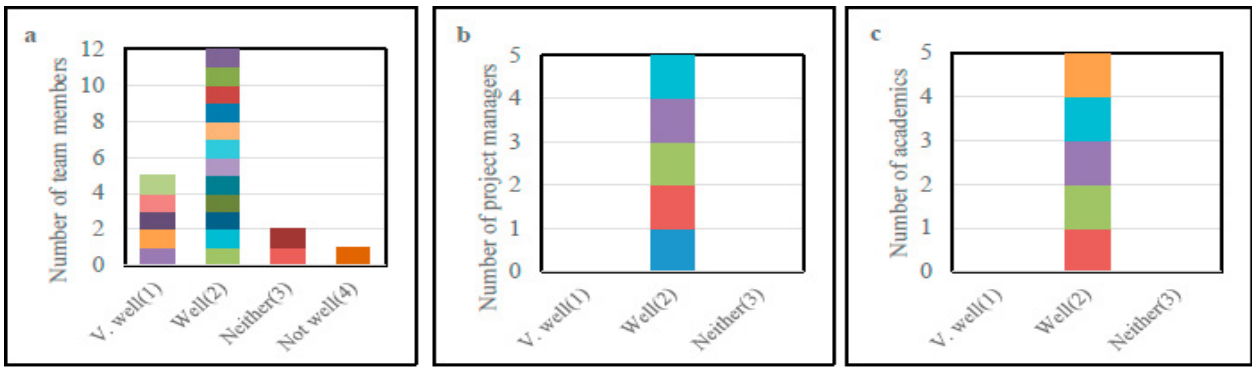

Fig. 4. (a) Team members' responses to Question 3; (b) Project managers' responses to Question 3; (c) Academics' responses to Question 3

The final question, Question 4, was intended to solicit participant suggestions for improving the model. Following careful analysis of suggestions by the experts, the model was revised based on the suggestions that were deemed practical and implantable. One notable suggestion related to the swapping of Stage 2 and Stage 3 of the model – Stage 2 to be Stage 3 and Stage 3 to be Stage 2. An interesting observation is that there was only one case where two different team members gave two similar suggestions. We did, however, address every suggestion offered by the experts.

4.1.2. Results of refinement and evaluation of the model – Delphi phase 2

At the beginning of phase 2, the revised model and the responses as well as the suggestions from each expert were made available to all the experts for consideration. Using the feedback from the experts from the previous phase, interview questions were generated, and as a result, only the last three questions of phase 1 constituted the interview questions for this round. In other words, the first question of the last phase was deemed unnecessary.

Figure 5 presents a summary of the responses of the three panel members for Question 1. The project team member who mentioned that the model was *'Infeasible(4)'* for a real-life environment in phase 1 revised his decision in this phase to *'Feasible(2)'*. The change of heart could have come from the discussion between the interviewer and the member in phase 1 during the interview. Another possible reason for changing the answer could have been based on the responses and comments of other experts or the revised model. At the same time, two team members who had selected *'Feasible(2)'* as their initial answer to this question in the previous phase chose *'Highly feasible(1)'* in this

phase. Again, the possible cause for this change of position could be as explained before. Once more, a similar explanation may be given as the reason for the PM who changed from *'Feasible(2)'* to *'Highly feasible(1)'* in this round. However, the responses of the academics remained unchanged.

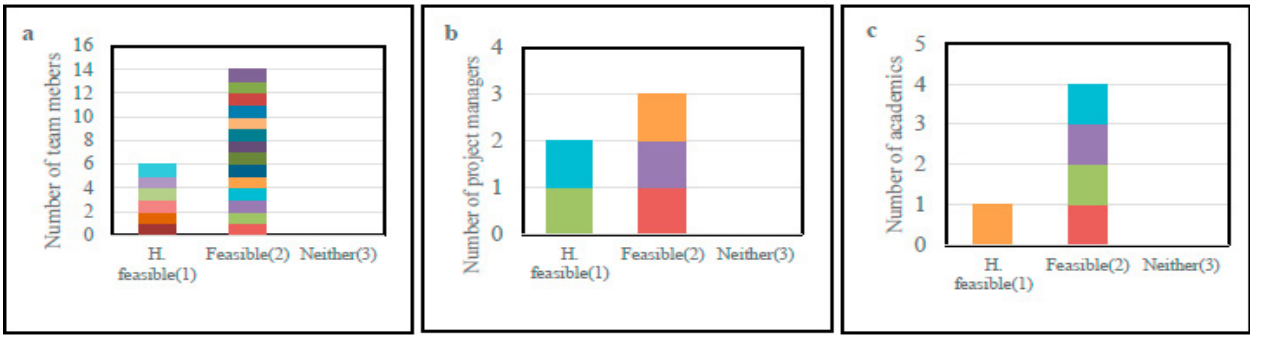

Fig. 5. (a) Team members' responses to Question 1; (b) Project managers' responses to Question 1; (c) Academics' responses to Question 1

The statistical analysis performed on the new responses of the three panels revealed the following:

- The panel of the project team members had higher level of consensus for this question in this round, as shown by the drop in the standard deviation value from 0.625 to 0.465. The high level of consensus may be attributed to the two team members who changed their answers from *'Feasible(2)'* to *'Highly feasible(1)'* in this phase.
- The level of consensus for the panel of PMs shifted down slightly from 0.4 to 0.5; this drop may be attributed to the PM who chose *'Highly feasible(1)'* in this round instead of *'Feasible(2)'* as chosen in round 1.
- The level of consensus for the academics remained the same as in the previous phase.

The standard deviation value of 0.458 for the combined responses of the three groups shows a slight increase in the level of consensus for this question in this round on the model as *'Feasible(2)'*.

The answers by the panellists for Question 2 are depicted in Figure 6. The two team members who indicated that the model was *'Neither(3)'* fulfilling nor unfulfilling its purpose as well as the team member who said the model was not meeting its purpose (*'Not well(4)'*) changed their responses in this round to *'Well(2)'*. Once more, the decisions to change their initial responses may have been influenced by the answers of other panel members or the revised model. This re-alignment of answers by the three project team members caused the level of consensus by this panel to increase slightly – from 0.740 in the previous round to 0.433 in this round – for this question. Though this decreased slightly, the median and the mode, however, did not change, meaning the project team members maintained that the model was well suited for a real-life environment. One member of the project manager panel indicated that the model met its purpose *'Very well(1)'* as opposed to her initial response of *'Well(2)'* in the previous round. The plausible explanation for the expert altering her initial answer was the revised model or certain responses from the other two panels, not likely from the answers of her fellow panel members because their answers were similar. The alterations of the answers slightly lowered the level consensus, from 0 to 0.4, for the project managers' panel for this question. However, the median and mode remained the same at 2 and *'Well(2)'*, respectively, despite the mean dropping from 2 to 1.8. The academics panel was the only panel of experts to not change any initial responses meaning neither the revised model nor the responses of experts from the other two panels persuaded the academics to alter their positions. The overall statistical values for the combined responses of the three panels for this question show a high level of consensus with a standard deviation=0.4, a slight improvement from the previous value of 0.605. The value of the mode of *'Well(2)'* show that the three groups maintained their decisions of the model as well suited for a real-life project environment.

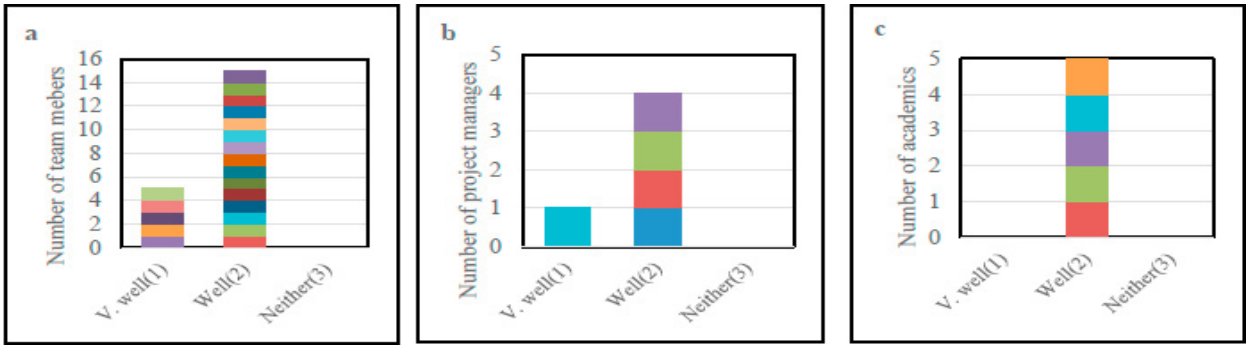

Fig. 6. (a) Team members' responses to Question 2; (b) Project managers' responses to Question 2; (c) Academics' responses to Question 2

Question 3 was intended to solicit suggestions from the panellists for improving the model. In this round there were no further recommendations from the experts except one for having the model tested in the real-life environment. For the first two questions of this round, there was a high level of consensus amongst the three panel members as discussed above. Furthermore, the absence of suggested improvements from the panellists is an indication of no needed improvement of the model with any further phases of the Delphi methodology. This, therefore, completes the Delphi iterative process and the refinement and the evaluation process of the model.

5. Conclusion, limitations and future studies

The purpose of this study was to present the results of the evaluation and refinement of a model developed in previous study by the authors of this research study. In the process of achieving its objective, three research questions were addressed. The previous section provided answers to the research questions followed here by a discussion of the answers to these questions.

Research question 1: *Is the model shown in Figure 1 needed by the ICT sector?*
The answer to this question is the response given by the experts to Question 1 of phase 1 of the Delphi methodology. Ninety percent (90%) of the experts concluded that the model is necessary for the ICT sector.

Research question 2: How usable is the model in a real-life project environment?
All experts claimed the model was usable in a real-life environment – nine experts said the model was very feasible, while the remaining 21 indicated that its application was feasible in a real-life project environment.

Research question 3: How well does the model meet its intended purpose?

Six experts were convinced that the model was meeting its purpose very well, while twenty-four of the experts felt that it was fulfilling its purpose well. Once more, all three panels stated that the model was meeting its purpose.

The answers to the study's research questions indicate that the model has an important role in assisting ICT project managers to treat project teams as key stakeholders, as is necessary. As this study solicited answers from various experts, the answers are not context based [28], notwithstanding the limitations of the lack of in-depth knowledge of some experts; this is a possibility with any study using the Delphi methodology, as alluded to by [27]. The usage of the model in a real-life project environment will not only address some of the limitations presented by the experts in this study but will also provide a true test and validation for the model. Furthermore, the case-study research approach used by the original study limits the generalisation of the study's findings.

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