GUIDELINE FOR SAFEGUARDING INTELLECTUAL PROPERTY RIGHTS OF CROWDSOURCED SOFTWARE ENGINEERING ACTIVITIES

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DECLARATION

I hereby declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently submitted for any other degree at Universiti Tenaga Nasional or at any other institutions. This thesis may be made available within the university library and may be photocopies and loaned to other libraries for the purpose of consultation.

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ABSTRACT

Leveraging the power of the crowd to perform Crowdsourced Software Engineering (CSE) tasks is likely to result in benefits such as high quality, better reliability, and flexibility at a lower cost and shorter time. However, the benefits of crowdsourcing come with issues of Intellectual Property (IP) rights associated with the identification of IP ownership and level of acquisition, the confidentiality of the crowdsourcing tasks, and the originality of the crowdsourced content. These issues emerged due to the absence of a unique mechanism effectively manages IP rights in CSE activities, based on the findings of the literature review. This study focuses on this gap and intends to develop a guideline for crowdsourcing platforms supporting CSE activities to safeguard IP rights through effective management and control among stakeholders. The current status of the poor management of IP rights was mainly identified through the analysis of 31 legal documents of crowdsourcing platforms supporting CSE activities. Based on this, a review of 4 existing IP rights guidelines abstracted the IP rights sound practices. It served as inputs to the recommendations, together with those of former researchers and the structure and components in the propose IP rights guideline. The developed guideline was then reviewed and refined until an expert panel consensus was achieved prior to the evaluation process. The execution of evaluation involved 28 international experts specializing in IP/IP rights, Cyber Law, Information and Communication Technology Policy, Cloud Data Protection, Technology Transfer from both academia and corporate. The proposed guideline presents ownership and licensing positions together with circumstances which constitute the body of evidence for each position identifying the IP ownership and controlling the level of acquisition. Besides, the proposed guideline provides a flowchart illustrating the step-by-step guide, along with a practical example to ensure the active engagement of all stakeholders in the decision-making process and obligations relating to both confidentiality and originality. Ultimately, the recommendations conclude with a contractual agreement on all necessary provisions to be agreed upon prior to implementation, using the entering mechanisms into the crowdsourcing process (broadcasting and assigning mechanisms). The proposed guideline would enhance the crowdsourcing process dealing with various software engineering tasks that differs in characteristics and the knowledge required to be achieved. The crowdsourcing platforms supporting CSE activities could adopt this completely developed, reviewed, and evaluated IP rights guideline. To streamline their broadcasting and assigning mechanisms to ensure appropriate management of IP rights for a mutually beneficial arrangement between the stakeholders, which further ensures crowdsourcing success.

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DEDICATION

I dedicate this study wholeheartedly and with all gratitude to these two individuals who mean and continue to mean so much to me, my beloved Mother and heavenly Father. You both have been my source of spiritual, moral, emotional, and financial support every step of the way.

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LIST OF ABBREVIATIONS

AGREE	Appraisal of Guideline for Research & Evaluation
API	Application Program Interface
CPC	Crown Procurement Contracts
CSD	Customer Software Development
CSE	Crowdsourced Software Engineering
CSFV	Crowd Sourced Formal Verification
GC	Government Contract
GUI	Graphical User Interface
iCAHE	International Centre for Allied Health Evidence
ICT	Information and Communication Technology
IP	Intellectual Property
IPO	Input-Process-Output
WIPO	World Intellectual Property Organization
PDSA	Plan-Do-Study-Act
UML	Unified Modeling Language

LIST OF GLOSSARIES

Activities	In relation to Crowdsourced Software Engineering (CSE), means software analysis, software design, software coding, software testing, software evolution, or software maintenance.
Background	Intellectual Property (IP) that existed or came into existence outside of the Contractual Agreement and excluding Foreground.
Content	All intangible property, including software, documentation and any other information or materials that a Crowdsourcer receives from a Crowd under a Contractual Agreement
Contractual Agreement	A legally enforceable agreement is binding the two entities relating to a transaction for Crowdsourced Software Engineering (CSE) activities.
Crowd	The engineers or experts in the domain of software engineering recruited by the Crowdsourcing Platform to accomplish tasks requested by the Crowdsourcer.
CSE	The use of Crowdsourcing Platforms to recruit software engineering experts from a large pool of Crowd to complete software engineering-related tasks.
Crowdsourcer	Individuals or organizations which seek to utilize the participation of Crowds to accomplish requested tasks via Crowdsourcing Platform.

Crowdsourcing platform and Platform	A website that facilitates the posting of the Crowdsourcer's task to be selected and accomplished by interested Crowds in which strict Legal Documents bound the activity.
Foreground	IP that is newly developed or produced by the Crowd as part of the task under a Contractual Agreement.
IP	Any rights resulting from intellectual activity including all intellectual creativity legally protected through patents, copyright, industrial design, trademarks, trade secrets, and database rights
IP Ownership and Ownership	In relation to an entity, means having absolute legal control over a specific Foreground.
Legal Documents	Rules by which one must agree to abide to be able to use the service of Crowdsourcing Platforms and can be referred to as any of the following: 'terms and conditions,' 'terms of use,' 'privacy policy,' 'terms of service,' 'terms and privacy,' 'policy,' 'copyright infringement policy,' 'legal,' 'user agreement,' 'legal terms' or 'participation agreement.'
Licensing	In relation to the Foreground, it means the granting of permission for the exploitation of Intellectual Property (IP), whether for the purpose of use, modification and/or commercialization.

LIST OF PUBLICATIONS

1. Al-Bloush, H., & Solemon, B. (2017). Software Engineering in an Effective Collaborative Environment: An Evaluative Study on Crowdsourcing Platforms. Pertanika Journal of Science and Technology, 25, 27-38.
2. Al-Bloush, H., & Solemon, B. (2017). Users' intellectual property rights in crowdsourced software engineering tasks in Zulikha, J. & N. H. Zakaria (Eds.), Proceedings of the 6th International Conference of Computing & Informatics (pp 369-376). Sintok: School of Computing.
3. Al-Bloush, H., & Solemon, B. (2017, April). Intellectual Property Challenges in the Crowdsourced Software Engineering: An Analysis of Crowdsourcing Platforms. In International Conference of Reliable Information and Communication Technology (pp. 875-884). Springer, Cham. (Best Paper Award see **Appendix E**)
4. Al-Bloush, H., & Solemon, B. (2018). An Analysis of Intellectual Property Challenges in Crowdsourcing Platforms for Software Engineering. International Journal of Engineering & Technology, 7(4.35), 354-360. doi:http://dx.doi.org/10.14419/ijet.v7i4.35.22761.
5. Al-Bloush, H., & Solemon, B. (2018). crowdsourcers' and crowds' intellectual property rights when engaging in crowdsourcing software tasks. In The landscape of computing & informatics research (1st ed., pp.208-224). UUM Sintok: School of Computing.
6. Solemon, B., & Al-Bloush, H. (2019). Analysis of Intellectual Property Rights Guidelines for Crowdsourced Software Engineering Platforms. In International Graduate Conference on Energy, Engineering, Technology & Business Management (pp.). (Best Paper Award see **Appendix F**)
7. Task Broadcast and Assignment Mechanisms as Focal Points for The Effective IP Rights Management in Crowdsourced Software Engineering. (Accepted)
8. Contractual Agreement: Essential Recommendation to Ensure Crowdsourced Software Engineering Success. (Accepted)
9. Consolidated Evaluation Criteria in Appraising the Quality of IP Rights Guideline. (Accepted)

CHAPTER 1

INTRODUCTION

1.1 Overview

The chapter commences with an introduction to research displaying the background of the problem that provides general information and the context of the study. After this, a detailed description of the problem and research questions that the research is attempting to address. Following this is the establishment of the research significance by the narration of the contribution of this study. Lastly, the chapter presents the scope by stating the research's limitations and delimitations and the critical assumptions used to develop the conduct of the study.

1.2 Background of the Problem

Howe's introduction of crowdsourcing sparked a revolution that created a new landscape for software engineering activities through the exploitation of collective intelligence in an online, distributed problem-solving and production model (Brabham, 2008; Howe, 2006b; Mao, Capra, Harman, & Jia, 2017). The new landscape was reinforced by Stol and Fitzgerald (2014), who noted that *"Software engineering no longer takes place in small, isolated groups of developers, but increasingly takes place in organizations and communities involving many people."* Since the adoption of crowdsourcing in software engineering activities, various terms arose to indicate this movement, and among them was 'Crowdsourced Software Engineering,' also known as CSE (Mao et al., 2017; Siyal & Franch, 2018). In the CSE model, software engineering experts are recruited from a large pool of crowd to generate new products or solutions of software engineering-related tasks requested by a crowdsourcer via a crowdsourcing platform. CSE is a powerful tool to create better software products or services with high quality, better reliability and flexibility at a lower cost and shorter time as stated in various research including (Craig-Wood, 2010; Franke, Keinz, & Klausberger, 2013; Mao et al., 2017; Stol & Fitzgerald, 2014; Suganthy & Chithralekha, 2016).

Although the distributed nature of the CSE, it is very different from other distributed software development models, namely, open-sourcing and outsourcing. Essentially, CSE allows crowd members to participate as providers of crowdsourcer-requested tasks; at the same time, it supported the transfer of business value between crowd participants and crowdsourcers (Peng, Babar, & Ebert, 2014). By contrast, open-sourcing development allows open participation but doesn't support business value transfer between the service providers and requesters (Schenk & Guittard, 2009). Unlike traditional outsourcing, which doesn't allow open participation by assigning tasks to a specific organizational entity, but support the business value transfer between the service providers and requesters (Haider, Samdani, Ali, & Kamran, 2016; Naik, 2016). In both CSE and outsourcing, the business value is essential. Still, open participation in CSE tasks places business value at significant legal risk related to Intellectual Property (IP) rights (Ågerfalk, Fitzgerald, & Stol, 2015). IP defined in the Cambridge Dictionary as *"someone's idea, invention, creation, etc., that can be protected by law from being copied by someone else."*

One of the particular issues in CSE tasks is that the 'leakage' of pre-existing IP (also known as the background) and the resulting loss of competitive advantage challenge the adoption of crowdsourcing (Ford, Richard, & Ciuchta, 2015). Crowdsourcers may be reluctant to provide too many details about a particular task (i.e., component or module) that is crowdsourced to maintain confidentiality (Stol, Caglayan, & Fitzgerald, 2017). However, sufficient information in the specifications is necessary for crowd developers to gather to understand what crowdsourcer requires. Another problem that may arise is ownership of newly generated IP, also known foreground (Ford et al., 2015). Given that software development is a highly innovative process, crowdsourcers will want to ensure their ability to own a potential IP that arises without any ambiguity about ownership (Ågerfalk et al., 2015). Still, the decision at the acquisition level to acquire IP rights may be a source of considerable concern and legal confusion, as expectations may vary between crowd participants and crowdsourcers (Birgelyte, 2019). A third risk that may arise is the contaminated content (de Beer, McCarthy, Soliman, & Treen, 2017) when a crowd provides solutions that are not their own, crowd participants failed to maintain the originality (Jouret, 2009). For example, if the crowdsourced solution contains an open-source code with a restricted public license, it

can be dangerous for crowdsourcers because it affects their business or product (Stol & Fitzgerald, 2014).

Even though the issues of IP rights in CSE-crowdsourcing related activities are widely recognized in the literature, rare research studies on IP rights management strategies in the crowdsourcing process. Literature emphasized on alternative IP rights management strategies that crowdsourcing platforms could adopt to encounter these issues is still sparse. For example, de Beer et al. (2017) identify and illustrate "four approaches to IP rights management," Feller, Finnegan, Hayes, and O'Reilly (2012) propose "mechanisms for filtering proposed solutions" that support IP transfer, and Chanal and Caron-Fasan (2010) present "crowdsourcing business models" that recognize the implications of IP. However, Tekic and Willoughby (2019) emphasize that a "one-size-fits-all" approach to IP rights management and control in the crowdsourcing process is not viable and that crowdsourcing platforms need to adapt their IP rights strategies to the characteristics of particular crowdsourcing activities. Researchers in the field to date have limited their scope of attention to one specific crowdsourcing context of interest. Therefore, a comprehensive study is needed that takes into account various CSE activities when discussing IP rights management and control in the crowdsourcing process (Mao et al., 2017).

1.3 Statement of the Problem

Literature is abundant on the topic of IP rights and related risk management, as it exists in the context of crowdsourcing in general. Previous researchers have developed approaches to adapt through crowdsourcing platforms for IP rights management within specific contexts (Chanal & Caron-Fasan, 2010; de Beer et al., 2017; Feller et al., 2012). However, a "one-size-fits-all" approach in the crowdsourcing process is neither applicable nor provides the protection needed for IP rights in all crowdsourcing activities (Tekic & Willoughby, 2019). Accordingly, given that CSE activities are inherently complex with multi-interdependencies, they involve different tasks with different requirements for their completion (Ågerfalk et al., 2015; Mao et al., 2017; Stol & Fitzgerald, 2014). The crowdsourcing process employed to accomplish various CSE tasks poses serious IP rights concerns and requires a unique management mechanism (Peng et al., 2014).

IP rights issues continue to be a key concern in CSE activities. Difficulties in ensuring the active engagement of all stakeholders in decision-making and related obligations, often leading to hesitation (Stol et al., 2017), loss of confidentiality (Ford et al., 2015), and loss of originality (de Beer et al., 2017) in the crowdsourcing process. These issues occurred due to the absence of an effective mechanism that ensures appropriate management and control among stakeholders of various interests, expectations, and needs for IP rights (Chiu, Liang, & Turban, 2014; Franke et al., 2013). As the crowdsourcing process involves a triangular relationship combining crowdsourcing platform facilitators, crowdsourcers, and crowd participants, effective coordination is of high importance (Hosseini, Phalp, Taylor, & Ali, 2014; Mao et al., 2017; Stol & Fitzgerald, 2014). Giving that the IP rights issues first and foremost appears as a gap in the crowdsourcing process linked to priorities and arrangements (Mazzola, Acur, Piazza, & Perrone, 2018). In furtherance of this, Simula (2013) stressed the nature of the crowdsourcing process and the facilitator's role in addressing the IP rights issues, and stated that *"delicate handling of IPR issues is highly relevant for intermediaries."* (p.2788) In this sense, issues arising from the IP rights management to correspond to various CSE activities evoke the need for more in-depth research that contributes to existing research on this topic (Mao et al., 2017). Meanwhile, guiding facilitators on how to deal with various IP rights issues emerging between crowdsourcers and crowd participants (Peng et al., 2014).

1.4 Research Questions

Based on the above-mentioned problem statement, the research question investigated in this research is:

"How crowdsourcing platforms shall safeguard IP rights in CSE activities?"

In particular, this research study intends to guide the facilitators in crowdsourcing platforms to ensure the appropriate handling of various IP rights issues arises in CSE activities. This to strike a balance between the crowdsourcer protection and crowd participation maximization to increase crowdsourcing success, by investigating the following research questions:

- RQ1: What are the current issues and challenges in dealing with IP rights in the legal documents of the crowdsourcing platforms supporting CSE activities?
- RQ2: What are the essential components of a guideline for safeguarding the IP rights of CSE activities?
- RQ3: How relevant and comprehensive is the proposed guideline in safeguarding the IP rights of CSE activities?

The order of these three research questions was gradual, suggesting that the answer to each question was used as a basis for the next one performed in sequence. The approach to answering the first two questions was through literature review and analysis of IP rights legal documents of the crowdsourcing platforms supporting CSE activities. The results obtained provided the input for the development of the new IP rights guideline, which was the answer to the second question. Finally, the third question led to the evaluation of the proposed IP rights guideline by the expert panel.

1.5 Research Objective

In line with the aforementioned research questions, the objectives of this research are as follows:

1. To investigate the existing issues and challenges of IP rights in legal documents of crowdsourcing platforms supporting CSE activities.
2. To develop IP rights guideline for crowdsourcing platforms supporting CSE activities.
3. To evaluate the relevancy and comprehensiveness of the proposed guideline in safeguarding the IP rights of CSE activities.

1.6 Significant of the Research

As a basis for this research study, the central allegations made herein seek to provide a further precise understanding of the existing IP rights issues based on the legal documents of the crowdsourcing platforms supporting CSE activities. And thus, to establish a new reform of that understanding on the basis of the IP rights sound practices. The results of this study will redound to the benefits of the crowdsourcing process, considering that the IP rights play an essential role in CSE activities, which is

inherently complex with multi-interdependencies. The numerous allegations surrounding the IP rights issues in CSE activities justify the need for a useful guideline that is managing the triangular relationship combining three stakeholders in the crowdsourcing process. Such an effort ultimately may reduce the risks of endangering CSE activities and improve the confidence of the stakeholders that CSE activities will not create unpleasant surprises in terms of legal aspects of possible outcomes. Therefore, the crowdsourcing platforms that apply the resulting guideline will be guided by ensuring proper management and control of the interests, expectations, and needs of both the crowdsourcer and the crowd over the IP rights. This will contribute to encouraging crowdsourcer to initiate the process and maximize the crowd's motivation to participate, and therefore increasing the crowdsourcing success. For researchers, the study will aid them to uncover the critical areas in the crowdsourcing process that many researchers have not been able to explore. Thus, a new approach or necessary procedures in managing IP rights may be arrived at.

1.7 Scope and Assumptions of the Research

The analysis was conducted to investigate the current practices of IP rights in the legal documents of crowdsourcing platforms as perceived by facilitators, crowdsourcers, and crowd participants in CSE activities during 2016 and earlier. The aspects investigated were the issues related to the decision on IP ownership and level of acquisition, the confidentiality of the crowdsourcing task and originality of crowdsourced content, and how such issues can be addressed. Only available crowdsourcing platforms and those with accessible legal documents were included for further analysis. On the other hand, the inclusion criteria for the existing IP rights guidelines are as follows: (1) supporting software engineering activities; (2) authored and being utilized by acknowledged organizations; (3) bias-free, i.e., the guideline serves the interests and expectations of both the client and the supplier; (4) clear with regards to the statement of recommendations primarily; and (5) focused on the recommendations with regards to sourcing of foreground and protecting background. However, only publicly available guidelines were included in the research. And that's because documentation is sometimes inaccessible, or accessibility is difficult. As Yin (1994) has pointed out, access to documentation could be deliberately denied. Just sound practices, which streamlined the decision-making process and ensured effective coordination between

stakeholders contributed in the contractual agreement were included in the research, no regulations enforced by law were considered. Because countries differ in the extent to which they protect IP and implement its regulations (Jain, 1996).

Additionally, the study was limited by the lack of evaluation criteria applicable to assess the quality of IP rights guidelines. The consolidation of two widely used evaluation criteria proceeded as a result of the identified absence. This is due to divergences of items in congruence domains as how and to what extent requirements of each item are addressed on the one hand, and the quality level on the other (Grimmer et al., 2014). Similarly, the integration of different domains between these two criteria, which are essential and applicable in assessing the quality of IP rights guideline. Brouwers et al. (2010) confirmed this by stating that *"...some AGREE II items may not be applicable to the particular guideline under review."* (p.9) On the other hand, the only expert who has a minimum 5 years of experience in IP/IP rights, Cyber Law, Information and Communication Technology Policy, Cloud Data Protection, Technology Transfer and any other relevant fields from both academia and corporate were considered to conduct the review and evaluation quality of the proposed guideline.

Leedy and Ormrod (2010) posited, *"Assumptions are so basic that, without them, the research problem itself could not exist."*(p.62) The research was developed on the assumption that the issues and challenges of IP rights management can be revealed through the analysis of the legal documents as these documents reflect the management strategy of the crowdsourcing platform. Moreover, the study was conducted on the assumption that the review of legal documents based on the last published date available at the time of the conduct of the study reflects the current management strategy for IP rights of the crowdsourcing platforms. Additionally, it assumes that the sound practices for the management and control of the IP rights decision-making process. As well as the synthesized structure and components from existing guidelines can be integrated to create a comprehensive IP rights guideline for crowdsourcing platforms supporting CSE activities.

On the other hand, the assumption with regards to the consolidated evaluation criteria is that the utilization of widely used appraisal criteria shall direct to the contents specific to IP rights guidelines. And lastly, a set of expert panels with sufficient experience and

knowledge in the field were given appropriate orientation and assured to have aligned understanding of the review and evaluation of IP rights guideline. With this, it is assumed that they objectively rated the guideline using the consolidated evaluation criteria, that the accuracy of the information is reliable and that the transferability to the results of the evaluation is possible to be made to represent the appropriateness to the IP rights guideline in CSE activities.

1.8 Organization of Thesis

This thesis is structured as follows:

- **Chapter 2** provides the context of the research problem that this thesis addresses. This chapter reviews definitions of terminology related to CSE, general crowdsourcing process, CSE activities, tasks, and the IP concern surrounding it and how it is compared to in-house software development. This chapter also presents IP rights and their role in software engineering and the importance of appropriate management of it. Following this is the review of existing IP rights guidelines to reveal sound practices, the discussion towards automated wrap agreements, and the synthesis of structure and components of these existing guidelines to provide a framework for the proposed IP rights guideline. After which is the review and consolidation of two widely used appraisal criteria for the purpose of assessing the quality of IP rights guideline and the assessment of the existing IP rights guidelines against it.
- **Chapter 3** outlines the research methodology employed in this research. This chapter begins with an introduction of the three-phase methods, which is the overall research design utilized in this thesis. This is followed by a detailed description of the tasks conducted for each of the phases starting with Phase 1: Preliminary Study, which is primarily performed to set the direction for the research by serving as input for succeeding phases. Following this is the discussion of the procedure undertaken during Phase 2: Development and Phase 3: Evaluation and Conclusion on the basis of the proposal of this research, which is an IP rights guideline for crowdsourcing platforms supporting CSE activities.
- **Chapter 4** provides a detailed discussion on the findings of the analysis performed to investigate the current IP rights issues and challenges using the

legal documents of crowdsourcing platforms supporting CSE activities as a result of executing Phase 1: Preliminary Study. The chapter also discusses the issues relating to the trustworthiness of the document's analysis. Furthermore, the chapter also discusses the review and refinement tasks performed to the developed IP rights guideline, which is the output for Phase 2: Development—followed by a presentation of the reviewed IP rights guideline before being evaluated.

- **Chapter 5** presents a detailed discussion on the evaluation results of the overall quality of the proposed IP rights guideline, the output for Phase 3: Evaluation and Conclusion.
- **Chapter 6** concludes the research described in this thesis by summarizing the key findings of the study conducted according to each objective. This is followed by discussions on the contributions made to the existing literature and the limitations of the study. Finally, some recommendations for future work to provide prospective insights are presented.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purpose of this literature review is to present a background needed to gain an understanding of the problem that this thesis addresses and to provide requirements and context for the development of the proposed IP rights guideline. The first part of this chapter discusses the review of the CSE activities in the general crowdsourcing process and the concern of IP rights surrounding such activities followed by the presentation of the CSE and IP-related terminology definitions. Following that is the review of existing IP rights guidelines to obtain the sound practices and synthesize essential guideline's structure and components to gain more direction for the development of the IP rights guideline specific for this study. Lastly is the review of guideline assessment and appraisal methods available in the literature to construct consolidated evaluation criteria.

2.2 Crowdsourced Software Engineering (CSE) and IP Concern

Crowdsourcing model is a new approach that inevitably provides easy access to the creativity of software experts who can provide ideas, work, and content that help generate new products or solutions to problems (Mao et al., 2017; Siyal & Franch Gutiérrez, 2018). However, crowdsourcing comes with issues associated with IP rights. For instance, software engineering is a highly creative process that may constitute a potential emergence of new IP; in other words, foreground (Stol & Fitzgerald, 2014). In this connection, one frequent question is, 'Who owns the actual IP?'. This concern about foreground ownership concentrated on who might own the foreground generated by the crowd: the content creator (crowd), the content facilitator (the crowdsourcing platform), the solution seeker (crowdsourcer), or some combination of each of three (Ågerfalk et al., 2015; Ford et al., 2015; Mazzola et al., 2018; Stol & Fitzgerald, 2014). A particular focus on the context of crowdsourcing recommends that activities must be crowdsourced only if the IP rights can be clearly specified (de Beer et al., 2017; Mao et al., 2017; Vinaja, 2016).

The remaining of this section presents the definitions of related terminologies, the discussion on the concept of general crowdsourcing process, and how it is being utilized in CSE activities together with the IP concern surrounding it. Moreover, the distributed nature and value of IP in CSE, open-sourcing, and outsourcing models were highlighted along with the complexity of addressing IP rights in CSE activities. Besides, the comparison of characteristics of CSE as opposed to inhouse software development was presented. Finally, a list of crowdsourcing platforms supporting CSE activities was presented, which were drawn mainly from the literature review for further analysis. These provided the basis for discussion on the need for management and control of IP rights in CSE activities.

2.2.1 Definition of Crowdsourcing and CSE

Crowdsourcing is a portmanteau word for "crowd" and "outsourcing," in layman's term means outsourcing from a crowd of individuals. It was first coined by Jeff Howe and (the Wired editor Mark Robinson) in Jun 2006 in a Wired magazine article 'The Rise of Crowdsourcing' (Howe, 2006b). This article reports an emerging trend, where firms begin appealing to the online community by assisting in the performance of various activities such as problem-solving and content creation. The term was proposed to be an expression of outsourcing and was therefore not specified in the article. As individuals began utilizing the term 'crowdsourcing' in a loosely defined manner, Howe decided to provide a precise definition on his blog with the powerful role of the Internet in mind (Howe, 2006a). Howe's definition "*...the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call.*" This act can be performed by sole individuals or through peer-production (when the job is performed collaboratively). Crowdsourcing is based on the concept of 'the wisdom of crowds' (Springer, 2018; Surowiecki, 2005), which implies that the collaboration of a group in order to generate ideas or solutions is better than it being suggested by an individual.

Since the adoption of crowdsourcing in a software engineering field, various terms arose to indicate this movement and among them were '*Crowdsourced Software Engineering*' (Mao et al., 2017; Siyal & Franch, 2018), '*Software Crowdsourcing*' (Wei Li, Huhns, Tsai, & Wu, 2016; Prikladnicki, Machado, Carmel, & de Souza, 2014), '*Crowdsourcing*

Software Development' (Hasteer, Nazir, Bansal, & Murthy, 2016; Stol et al., 2017; Stol & Fitzgerald, 2014) and '*Crowdsourced Software Development*' (Habib et al., 2018; Karim, Yang, Messinger, & Ruhe, 2018). These words vary in their comprehensiveness to include various software activities wherein some of which refer to specific activities that do not include all software engineering activities. Although the term 'Crowdsourced Software Engineering' was coined to refer to any activity involved in the software engineering context, in this manner covering activities that do not necessarily lead to the software themselves. For instance, these activities include requirements elicitation, project planning, test case refinement, and security augmentation. The applications of the crowdsourcing model to support software engineering activities are shown in Figure 2.1.

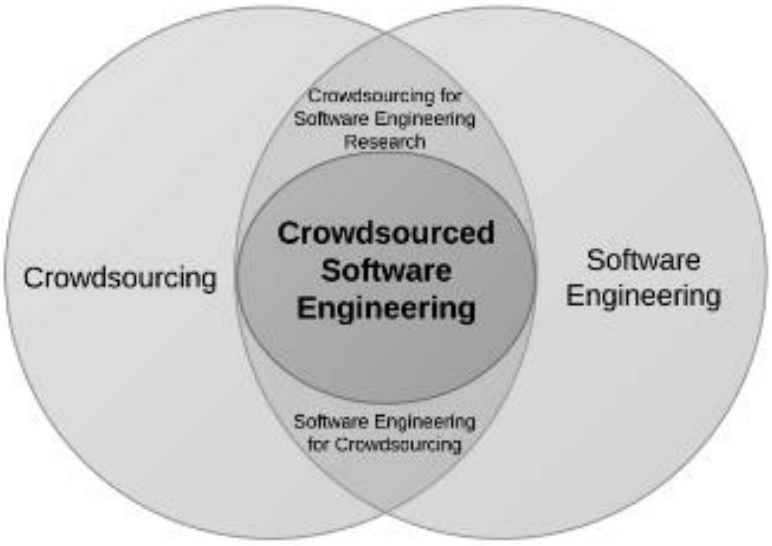

Figure 2.1: Crowdsourced software engineering (Mao et al., 2017)

In a study of Mao et al. (2017), the term CSE simply defined as a representation of Howe's definition, as *"…the act of undertaking any external software engineering tasks by an undefined, potentially large group of online workers in an open call format."* The definition was derived from the general crowdsourcing principle, enabling software engineering experts to be recruited from a huge pool of participants to complete software engineering-related tasks through crowdsourcing platforms. This definition resonates deeper with the work involved in this thesis. Consequently, for the purpose of this study, the definition as coined by Mao et al. (2017) was applied, and when CSE pertained to, this definition will offer the foundation.

After defining the basic definition of the CSE concept, the next step was to perform a comprehensive review of the existing literature involving the general crowdsourcing process, CSE activities, and IP concern surrounding such activities.

2.2.2 General Crowdsourcing Process

According to Howe's definition, there are three types of stakeholders (also known as actors) that play various roles in the crowdsourcing process. These include *Crowdsourcer* (also known as Solution Seeker, Employer, Client or Requestor), who has software engineering tasks and seeks online to get work done; *Crowd* (also known as Workers, Participators or Contributors), who takes part in developing software engineering tasks and *Crowdsourcing Platforms* (known as Supplier, Facilitators or Service Providers), which provide an online infrastructure to facilitate crowdsourcers' and crowds' meeting (Difallah, Checco, Demartini, & Cudré-Mauroux, 2019; Suganthy & Chithralekha, 2016; Tsai, Wu, & Huhns, 2014; S. Wu, Sun, Chen, & Liu, 2018). The roles that each stakeholder needs to act upon and interactions that exist between each other are adequately depicted in Figure 2.2. As shown in the figure that the crowdsourcing platform acts as a mediator between the crowdsourcers and crowd participants where a CSE task is being accomplished (Hossain & Kauranen, 2015; Hosseini et al., 2014; Mao et al., 2017; Siyal & Franch Gutiérrez, 2018). However, the crowdsourcers and crowd participants on these crowdsourcing platforms are unknown to each other. They do not abide by similar rules and the roles of regulations for accomplishing the tasks, which are also not known in advance (Saunders, Bex, & Woods, 2013).

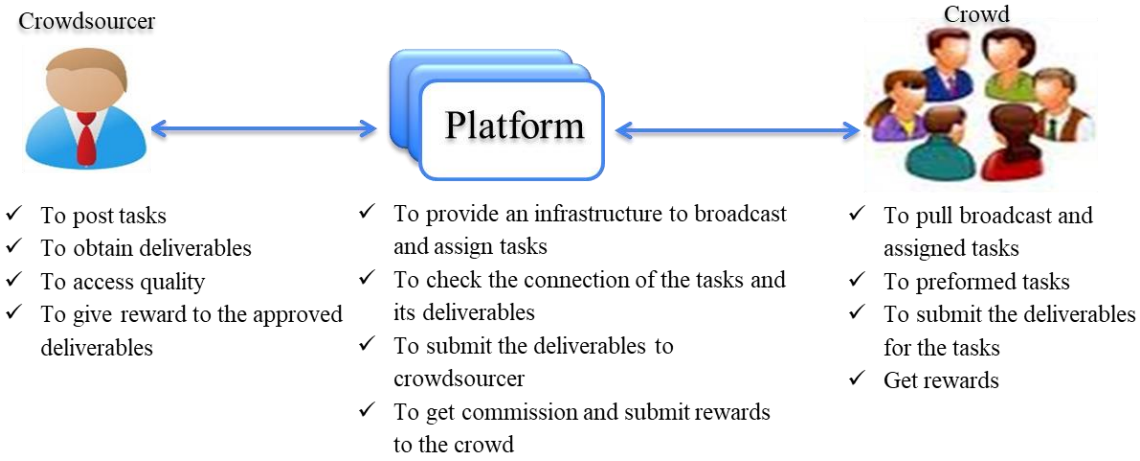

Figure 2.2: General crowdsourcing process

In addition, crowdsourcing platforms play a vital role in facilitating the interaction between crowdsourcers and crowd participants. This interaction happens through a series of mechanisms involving enrolment mechanism, authentication mechanism, crowdsourcer task broadcast mechanism, task assignment mechanism, assistance mechanism, crowd skill declaration mechanism, crowdsourcer provide time negotiation mechanism, crowdsourcer provides price negotiation mechanism, result submission mechanism, result verification mechanism, coordinate crowd mechanism, supervise crowd mechanism and feedback loops mechanism. Table 2.1 summarized the mechanisms of a crowdsourcing platform, their brief description, and related work in literature.

Table 2.1: List of crowdsourcing platform mechanisms

Mechanism	Facilities	Reference
Enrolment Mechanism	For the crowd and crowdsourcer to register in the platform	(Lofi, Selke, & Balke, 2012)
Authentication Mechanism	For the validation of the crowd	(Vukovic, 2009)
Task Broadcast Mechanism	For the crowdsourcer to publicize their crowdsourcing task	(Cavallo & Jain, 2013)
Task Assignment Mechanism	For the delegation of crowdsourcing tasks to the crowd	(Crescenzi, Merialdo, & Qiu, 2013; Vaughan, 2013)
Assistance Mechanism	For the provision of support in the activities of the crowd and crowdsourcer	(Adepetu, Ahmed, Al Abd, Al Zaabi, & Svetinovic, 2012)
Skill Declaration Mechanism	For the crowd to declare their proficiency	(Vukovic, 2009)
Time Negotiation Mechanism	For the crowdsourcer to discuss and agree the lead time for the completion of the crowdsourcing task with the crowd which can also be finalized without the negotiation	(Fraternali, Castelletti, Soncini-Sessa, Ruiz, & Rizzoli, 2012)
Price Negotiation Mechanism	For the crowdsourcer to discuss and agree the financial incentives and rewards with the crowd which can also be finalized without the negotiation	(Vaughan, 2013)
Result Submission Mechanism	For the turning over of the results of the crowd	(Zhao & Zhu, 2014)
Result Verification Mechanism	For the crowdsourcer to countercheck the results from which was taken from the crowd	(Sun, Zhao, & Zhu, 2015)
Coordinate Crowd Mechanism	To harmonize and direct the crowd during the execution of crowdsourcing activities	(W. Wu, Tsai, & Li, 2013a)
Supervise Crowd Mechanism	To manage the crowd during crowdsourcing activities	(Crescenzi et al., 2013)
Feedback loops Mechanism	To give after-action review to the crowd and crowdsourcer about their crowdsourcing activities	(Oleson et al., 2011)

As mentioned, the crowdsourcing platform acts as a facilitator between the crowdsourcers and crowd participants managing and controlling the crowdsourcing process. Despite the aid of the mechanism discussed above, there are particular mechanisms which are essential in the execution of a crowdsourcing activity. These

mechanisms, which govern the crowdsourcing process, were linked into the steps in the general crowdsourcing process in Figure 2.2, as presented in Figure 2.3.

In summary, there are seven (7) essential crowdsourcing mechanisms-related interactions provided by the platform between the crowdsourcers and the crowd participants. These mechanisms commencing with *task broadcast mechanism* wherein the crowdsourcer publicize their crowdsourcing tasks (Step 1). Once the task was already posted through the crowdsourcing platform, the *assistance mechanism* is being triggered. This mechanism is the responsibility of the platform facilitator wherein the task must be posted in infrastructure for broadcasting and assigning (Step 2) together with the provision of support in these essential activities for the involved parties. After this, the crowd shall pull the broadcasted and assigned tasks (Step 3) and, consequently, perform it (Step 4). These two steps consist of the *task assignment mechanism,* which formalizes the delegation of the task to the crowd.

Further into the crowdsourcing process is the *result submission mechanism* in which the tasks performed by the crowd shall result in the emergence of deliverables. These deliverables of the tasks shall firstly be turned over by the crowd to the platform (Step 5). This step shall follow the *coordinate crowd mechanism* wherein the platform checks the connection of the tasks to its deliverable (Step 6) as part of the platform's responsibility to harmonize and direct the crowd during the execution of the tasks. Step 5 and Step 6 are cyclical steps in which revisions may be required as a result of the feedback from the platform facilitator.

Once satisfied, the *result submission mechanism* shall be initialized again by submitting the deliverables to the crowdsourcer (Step 7), and the crowdsourcer shall further obtain these deliverables (Step 8). Immediate to this is the assessment of the obtained deliverables' quality by the crowdsourcer (Step 9), which is the *result verification mechanism*. Once completed, this shall proceed to the final mechanism, *payment mechanism*. This mechanism is composed of the final Steps 10, 11, and 12 of the crowdsourcing process in which the approved deliverables equivalent to a reward shall be given to the platform, followed by the acquisition of the platform of their commission and finally, the crowd shall be given their warranted reward.

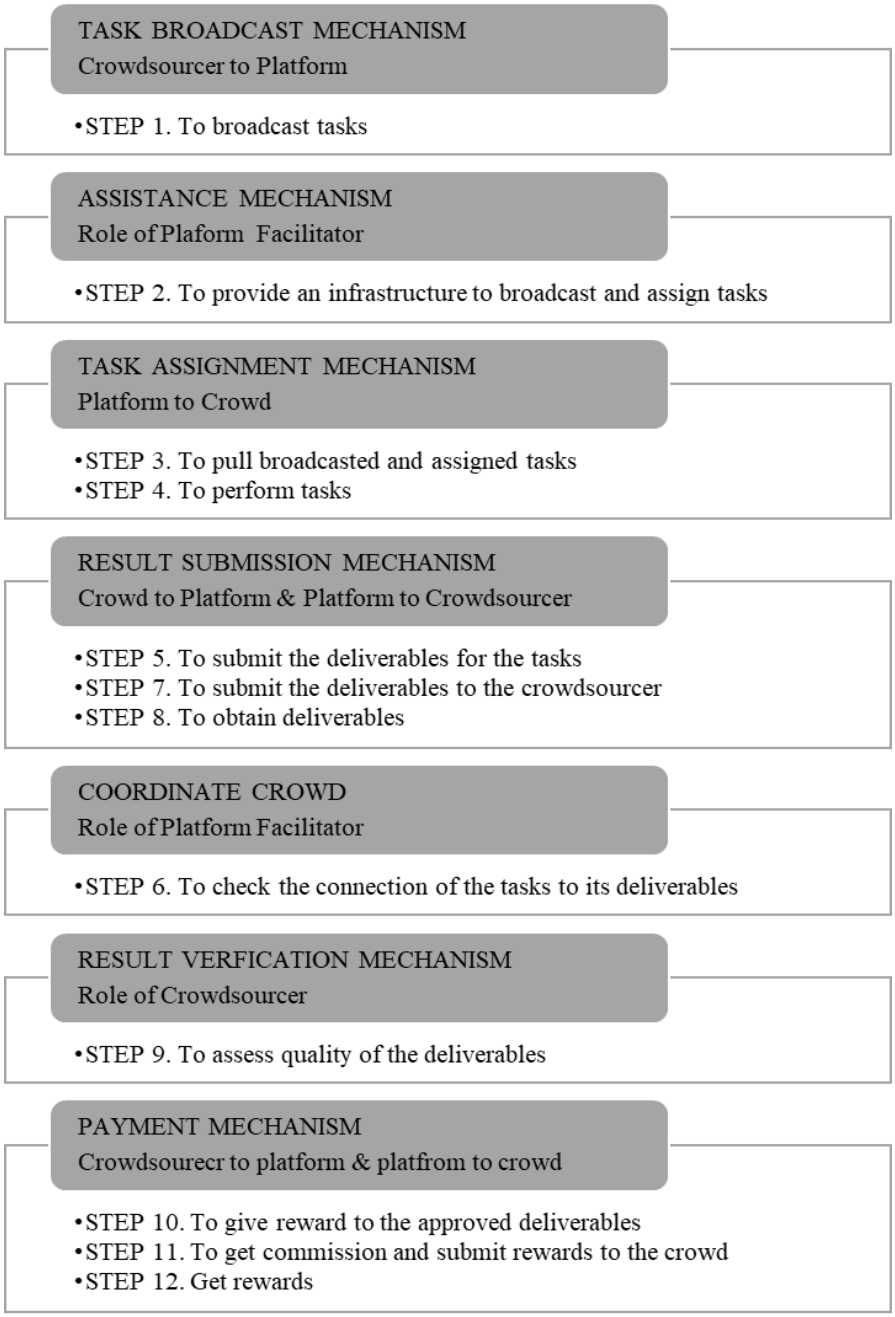

Figure 2.3: Mechanisms governing the general crowdsourcing process

In summary, the crowdsourcing process enables the crowdsourcer to reach through an accessible crowd workforce online in a cost-effective manner while harnessing its creative potential. On the other hand, a crowd may be an individual or a group of software engineers or experts who participate as a solution provider, who can receive financial rewards and incentives from the crowdsourcer while gaining a good reputation for their work. Particular emphasis will be given to IP concerns in the context of CSE activities in the following section.

2.2.3 CSE Activities and IP Concern

Since any software activities can be crowdsourced (Tsai et al., 2014), this means that there are numerous CSE activities which can be involved in the process. These are mainly *software analysis* (Nascimento, Aguas, Schneider, & De Souza, 2012; Wang, Wang, & Wang, 2014), *software design* (Lasecki et al., 2015; LaToza, Chen, Jiang, Zhao, & Van Der Hoek, 2015), *software coding* (Cochran, D'Antoni, Livshits, Molnar, & Veanes, 2015), *software testing* (Dolstra, Vliegendhart, & Pouwelse, 2013), *software verification* (F. Chen & Kim, 2015), *software evolution* (Sherief, Jiang, Hosseini, Phalp, & Ali, 2014) and *software maintenance* (Chen & Zhang, 2014; Exton, Wasala, Buckley, & Schäler, 2009).

These CSE activities are implemented in the form of assigned tasks through online open calls involving various CSE stakeholders, who play different roles and interact with each other to complete CSE activities, as presented in Figure 2.2. Each task may involve different stakeholders according to the specialized knowledge of the assigned task, which requires different skills, tools, and techniques to accomplish the task (Hosseini et al., 2014; Stol & Fitzgerald, 2014; W. Wu et al., 2013a). Among these tasks are software idea generation, capturing user requirements, requirements categorization, converting user requirements into software features, representing software requirements into UML diagram, user interface design, algorithm writing, receiving design feedbacks and critiques, writing codes for the design, reviewing the codes, functional test, performance test, usability test, localization test, GUI testing, code testing, beta testing, oracle problem mitigation, general evaluation, test generation, non-expert verification, software adaptation, software documentation, and software localization among others. A summary of the integration of CSE tasks at the CSE activities with a brief description and reference to available research work is provided in Table 2.2.

Because software engineering tasks are often interdependent, complex, and heterogeneous, they may require cognitive effort and different types of expertise (Kittur et al., 2013). Therefore**,** enough detail of the specifications necessary to be disclosed by the crowdsourcer for crowd developers to understand what the crowdsourcer is requesting to ensure that the crowdsourced task is completed (Borromeo, Laurent, Toyama, & Amer-Yahia, 2017). However, crowdsourcers are reluctant to provide details about a particular

task (i.e., a component or module) because of the IP 'leakage' and its consequences of losing the competitive advantage of the crowdsourcing task (Ford et al., 2015; Stol & Fitzgerald, 2014). In that connection, Ågerfalk et al. (2015) commented on the risk of IP 'leakage' in crowdsourcing process by stating: "*A key difference with traditional outsourcing is that there is no single supplier that develops an in-depth understanding of the problem domain of a crowdsourced project; rather, the continuous turnover of workers is an inherent characteristic of crowdsourcing."* (p.55) Muntés-Mulero et al. (2012) pointed out that tasks contain confidential information, including IP, are not suitable for crowdsourcing. Nevertheless, other researchers believe that by taking further action on these tasks, it is still possible to be crowdsourced (Afuah & Tucci, 2012; Roy, Balamurugan, & Gujar, 2013).

A range of previous studies has considered the potential arise of new IP in CSE activities as a source of concern on the assigned CSE tasks. Of these studies (Ågerfalk et al., 2015; Ford et al., 2015; Mazzola et al., 2018; Stol & Fitzgerald, 2014), stated that CSE tasks require intellectual creativity and may raise a concern about the foreground. Most of these studies have not identified specific IP issues and challenges. However, Ford et al. (2015) briefly stated that the concern is about the decision to acquire ownership of the foreground and focused on who owns the actual IP created by the crowd. In the same vein, de Beer et al. (2017) and Birgelyte (2019) confirmed that the decision to obtain rights could be a major source of risk and legal confusion, as expectations may vary between the crowdsourcers and the crowd participants. The reason is that crowds are not subject by employment laws that might stipulate crowdsourcers' rights of ownership for creative crowd works (de Beer et al., 2017; Wolfson & Lease, 2011). On the other hand, the previous sentence highlights the difficulties in maintaining the integrity of IP rights in crowdsourced content, when numerous members of the crowd participate in crowdsourcing work (Lichten, Ioppolo, D'Angelo, Simmonds, & Morgan Jones, 2018).

Moreover, de Beer et al. (2017) confirmed not only the IP ownership concerns but also the risk associated with the originality of the content submitted by crowd participants. This risk of contaminated content can arise when the crowd participants provided solutions that are not their property (Jouret, 2009). In this regard, Stol and Fitzgerald (2014) provided an example: *"if the solution contains open source code with the restrictive GNU Public License (GPL) license. This may be a risk for crowdsourcing*

customers as it affects their product." Further to this, several studies also indicated the risk of losing control over the IP rights in CSE activities as legal pitfalls (Mao et al., 2017; Sarı, Tosun, & Alptekin, 2019; Wolfson & Lease, 2011). These legal pitfalls are the result of the absence of an effective approach that ensures transparency and fairness among crowdsourcer and crowd about the acquisition level of ownership, confidentiality of the crowdsourcing task and originality of the work being submitted by the crowd over the IP rights (Peng et al., 2014). In this sense, an incomplete or poorly coordinated process that addresses various IP rights issues among stakeholders often results in hesitating the crowdsourcer to initiate the process and diminished the crowd sense to participate (de Beer et al., 2017; Franke et al., 2013)

Along with the recognition of IP rights concerns, recommendations to mitigate the risks mentioned above in the management of IP rights were proposed by some of the scholars. One of which is de Beer et al. (2017) articulating that *"...organizations need to consider intellectual property-related risks when sourcing solutions from the Crowd"* (p.208) as a precaution to be taken by the crowdsourcer when dealing with a foreground ownership concern prior to the decision to broadcast the task. Additionally, it is also recommended that efficient handling of IP rights which encompasses managing the risks, focusing on the acquisition of ownership rights and limitation of liabilities while managing the crowd expectations is done more appropriately by documenting the provisions clearly in terms and conditions with which it is mandatory that the crowd is in full alignment and must be agreed upon in a manner clearly understood by all parties.

In addition to these recommendations, Chanal and Caron-Fasan (2010) provided a problem-solving model, highlighting IP implications with particular focus on the perspective of the crowdsourcers. The model consists of two different phases to clarify the CSE landscape to the crowdsourcer before attempting to broadcast their tasks. Phase one, which is the Decision Phase, has an objective to motivate the crowdsourcer using the advantages and disadvantages of the crowdsourcing model. To decide whether to crowdsource the tasks or not, where the IP consideration is at the first level of concerns. Phase two, which is the Implementation Phase, deals with the question of how the crowdsourcing platform intends to protect the IP and whether they have a default position in dealing with IP rights.

Table 2.2: Summary of the potential tasks in CSE activities

CSE Activities	Description	CSE Task	Reference
Software Analysis	Participation of the crowd is beneficial for innovative concepts and ideas for novel product development, considering the user requirements and converting them to software features	• Innovative idea generation • Capturing user requirements • Converting user requirements into software features • Requirements Categorization	(Breaux & Schaub, 2014; Hosseini et al., 2015; Howe, 2009; W. Wu, Tsai, & Li, 2013b)
Software Design	Crowd designing is beneficial in formulating UML diagrams, algorithm design, and component specifications for software requirements. The crowds offer good suggestions in the design of the user interface. Moreover, in particular scenarios, the criticism they offer is innovative and informative	• Representing software requirements into UML diagram • User interface design • Algorithm writing • Receiving design feedbacks and critiques	(Lasecki et al., 2015; LaToza et al., 2015; Nebeling, Leone, & Norrie, 2012; W. Wu et al., 2013b)
Software Coding	Crowd coding is useful in developing a code for a particular software task or solving a given problem. Also, crowdsourcing allows multiple developers to review the code changes made by other developers, reducing the risk (bugs) and missed requirements	• Writing codes for the design • Reviewing the codes	(Barzilay, Treude, & Zagalsky, 2013; de Souza, Campos, & Maia, 2014; E. Fast, Steffee, Wang, Brandt, & Bernstein, 2014; Wightman, 2013)
Software Testing	Crowd testing recruiting both professional testers and end-users to support on-demand testing services, such as GUI testing. That helps in testing quickly to the market	• Functional testing • Performance testing • Usability testing • Localization testing • GUI testing • Code testing • Beta testing • Oracle problem mitigation • Test generation	(Bari, Johnston, Wu, & Tsai, 2016; N. Chen & Kim, 2012; Dolstra et al., 2013; Musson et al., 2013; Pastore, Mariani, & Fraser, 2013; Pham, Singer, & Schneider, 2013; Schneider & Cheung, 2013; Sherief, 2014; Vliegendhart, Dolstra, & Pouwelse, 2012; W. Wu et al., 2013b; Xue, 2013; Yan, Sun, & Liu, 2014)
Software Verification	Non-expert crowd helps reduce the skill barriers and costs for software verification to achieve requirements without any bugs or gaps. The verification happens through gamification (i.e., CSFV)	• Non-expert verification	(Wenchao Li, Seshia, & Jha, 2012; Lin, Rojas, Chu, & Lai, 2014; Linares-Vásquez, White, Bernal-Cárdenas, Moran, & Poshyvanyk, 2015)

CSE Activities	Description	CSE Task	Reference
Software Evolution	Crowd (developers or testers) is helpful in evaluating software bugs that users care about and after which, fix it or suggest new features	• Software adaption	**(Akiki, Bandara, & Yu, 2013; Almaliki, Ncube, & Ali, 2014; Hamidi, Andritsos, & Liaskos, 2014; Nebeling & Norrie, 2011; Nebeling, Speicher, & Norrie, 2013)**
Software Maintenance	Crowd documenting helps in comprehensive understanding in all software phases, such as API, algorithm and code. Crowds can generate rich documentation through contributed questions and answers(knowlegde sharing). As for crowd localizing is useful in translating the output from software system to differant languages in order to be accepted and approved by international products or services	• Software documentation • Software localization	(Chen & Zhang, 2014; Gritti, 2012; Jiau & Yang, 2012; Mijnhardt, 2013; Parnin, Treude, Grammel, & Storey, 2012; Pawlik, Segal, Sharp, & Petre, 2015)

On the other hand, Peng, Xin, Muhammad, and Christof (2014), highlighted the value of IP and emphasized the need for a mechanism that can manage the IP rights by coordinating various IP issues between the crowdsourcers and crowd participants. A mechanism shall be in the form of an agreement encompassing the strategy on how the deliverables of IP rights are managed.

Moreover, the extent of participation depends on the understanding of legal rights and responsibilities, which is impacted significantly by the language and form of agreement (de Beer et al., 2017). There are several modes of adhesion that can bind the crowd effectively to manage expectations and to safeguard the crowdsourcer legally from contaminated content (i.e., content owned by third parties). Meanwhile, maximizing contributions from the crowd as these factors can significantly influence their decision to participate, and in return, taking full advantage of crowdsourcing (Franke et al., 2013). Among these that commonly used in online agreements are clickwrap agreements in which 'signing' the contract is by clicking to agree and browsewrap agreement in which access or use of the web page/platform legally binds users to the contents of the agreement. However, risks have been identified due to the characteristic of browse-wrap agreement, which discussed in detail in **Section 2.3.4**.

Despite this acknowledgment with regards to IP rights concerns and the attempts for resolution, the problem remains vague. It requires a more in-depth understanding of how the existing crowdsourcing platforms deal with the broadcast of CSE tasks and solicitation of solutions (Mao et al., 2017). Not all CSE activities are the same; the requirements of their tasks cause the diversity of contexts that may impact the way crowdsourcing platforms manage IP rights in such activities. The following section highlights the differences between the online distributed models and related IP rights management.

2.2.4 CSE Versus Open-sourcing and Outsourcing Models

Software-sourcing models facilitate resources, technology, and expertise to the requester to accomplish their tasks; they are somewhat different in terms of hiring software experts and managing IP rights. CSE model hires software experts from the crowd via an open call format to undertake all or part of the requested software development tasks (Mao et

al., 2017). Outsourcing model hires a company or individual as an external service provider to undertake all or part of the requested software development tasks (Schenk & Guittard, 2009). Open-sourcing model calls for skilled volunteers from the open-source community to undertake all or part of the requested software development tasks (Fogel, 2005). Each of the software-sourcing models has several strengths and may be useful for certain types of projects, but the limitation of these models may restrict its use in some other projects (Peng et al., 2014). For example, projects with business values where the management of IP rights resides between providers and requesters.

In both crowdsourcing and outsourcing models, the requester seeks to transfer the solution from the provider, while the open-sourcing solution remains publicly available. Open-sourcing model limited to protect the created IP under several licenses such as GUN, copyleft, and general public licenses. Meanwhile, software source code remains open for others to use, copy, change, improve designs, and share as long as licenses are available with the same openness (Free Software Foundation, 2011). In the outsourcing model, the solution has business value and requires to remains confidential and secure (Hadavi & Jalili, 2010). Whereas the solution transfer arrangement between the requester and the provider done through careful negotiation of the IP rights provisions using a contractual agreement that must be agreed upon before the execution (Naik, 2016). The CSE model is far from other software sourcing models – quite the contrary. It is challenging to manage the IP rights between crowdsourcers and crowd participants due to the distributed nature of the crowdsourcing process (Stol & Fitzgerald, 2014). However, the CSE model supports business value transfer and solution requires to remain confidential and secure, which requires effective management of IP rights (Peng et al., 2014). Here, therefore, the motivation lies behind the study.

2.2.5 CSE as Opposed to Inhouse Software Development

CSE can be easily distinguished from an in-house development based on the way of the former works through an open call format that allows anyone to participate. This distinguishes simply described by Stol and Fitzgerald (2014) as: *"Software engineering no longer takes place in small, isolated groups of developers, but increasingly takes place in organizations and communities involving many people."* Since CSE has unique features, software industry takes the opportunity in obtaining the benefits of these features

to generate better software products or services with high quality, better reliability and flexibility at a lower cost and shorter time (Craig-Wood, 2010; Franke et al., 2013; Mao et al., 2017; Stol & Fitzgerald, 2014; Suganthy & Chithralekha, 2016). For instance, compared to in-house software development, TopCoder's crowdsourcing development holds the ability to provide crowdsourcer's request at a lower cost with less time and less defect rate (Archak, 2010; Lakhani, Garvin, & Lonstein, 2010). These promising benefits reported mostly by TopCoder are cost reductions of 30% - 80% or 5 to 8 times decrease in defect rate compared with in-house software development practices (Lakhani, 2016). The statement mentioned above of Stol and Fitzgerald (2014) did not cancel the role of in-house development despite considerable benefits provided by CSE for software development. Thus, this is a clear indication of the presence of challenges encountered with CSE activities such as task decomposition (Mao et al., 2017), motivation and remuneration (Chandler & Kapelner, 2013), quality assurance (Schenk & Guittard, 2009), coordination and communication (Kittur et al., 2013), planning and scheduling (Zhao & Zhu, 2014) and particularly on IP rights previously discussed in **Section 2.2.3** of this study.

In the context of management and control of IP rights, inhouse development is superior as compared to CSE. Generally, the employer will own the IP generated by its employees while in their employment (Bently & Sherman, 2014; Graham, 2014; Stim, 2016, 2017). However, if the IP is created by an employee, other than in the course of his/her employment, the ownership of the IP will be granted to the employee and not to the employer (Queensland, 2016). In the case of CSE, the ownership is ambiguous because of the involvement of three different stakeholders in which the default IP and commitments in crowdsourcing situations are contrary to that of in-house employment. The reason is that crowds are not governed by employment laws that might stipulate employer rights of ownership for employees' creative works (de Beer et al., 2017).

Furthermore, an employer has liability for their employees, but this liability does not extend to their contractors or solution providers coming from an independent crowd. Besides, the employer has both rights and liabilities for an employee-sourced content, which is not the case for a crowdsourced content (Bently & Sherman, 2014; Graham, 2014; Stim, 2016, 2017). The crowdsourcers are therefore excluded from these rights nor

liabilities, and this creates a scenario that poses challenges related to the IP rights that must be acknowledged before entering the crowdsourcing arrangements.

While existing literature emphasizes on IP rights concerns in general and strategies on how to balance the rights of the crowdsourcers and the crowd participants, there has been no investigation conducted on how existing crowdsourcing platforms supporting CSE activities deal with IP rights. This unexplored IP rights in CSE activities has been demonstrated by the extensive survey conducted by Mao et al. (2017) from 2006 to 2015. They highlighted that: *"…intellectual property…according to our analysis of the papers we were able to find for this study, they have not been explored under the specific Crowdsourced Software Engineering context."* (p.25) Therefore, to arrive at a full understanding based on the IP rights issues discussed in **Section 2.2.3**. This research thesis intends to execute an analysis of the current practices of IP rights in the legal documents of crowdsourcing platforms as perceived by the platform facilitators, crowdsourcers, and crowd participants. Thus, for the legal document's analysis, a list of crowdsourcing platforms supporting CSE activities revealed from the review of literature, are provided in the following section.

2.2.6 Crowdsourcing Platforms supporting CSE Activities

As a result of the review of literature, 51 crowdsourcing platforms supporting CSE activities were identified. Each crowdsourcing platform was assigned with a unique ID number labeled from P1 to P51 to organize the crowdsourcing platforms for easy identification. Table 2.3 summarizes the name, URL, and primary work category for the identified platforms and their corresponding references.

Based on the primary work category of each of the selected crowdsourcing platforms, these platforms are generally classified into two different types. First, are the platforms considered as purely involved in software engineering activities, such as TopCoder (P1) (Stol & Fitzgerald, 2014) and Innocentive (P3) (Mao et al., 2017). Second, are platforms that are partially involved, which are not designed solely for software engineering activities and are supporting various activities, including those for software engineering (Mao et al., 2017). For instance, AMT (P25) (Karger, Oh, & Shah, 2014) and Upwork (P24) (Zanatta, Machado, Pereira, Prikladnicki, & Carmel, 2016). In summary, the

specific primary work categories of the crowdsourcing platforms are project marketplace (9 platforms), software testing (9 platforms), software development (8 platforms), graphic design (5 platforms), problem-solving (3 platforms), mobile app testing (3 platforms), software security testing (3 platforms), programmer marketplace (3 platforms), 'question and answer' (2 platforms), 'any task' (2 platforms), mobile development (1 platforms), technical support (1 platforms), and data mining (1 platforms).

Table 2.3: Crowdsourced platforms support CSE activities

ID	Name	URL	Primary Work Category	Reference
P1	TopCoder	http://www.topcoder.com/	Software Development	(Stol & Fitzgerald, 2014)
P2	GetACoder	http://www.getacoder.com/	Software Development	(Mao et al., 2017)
P3	Innocentive	http://www.innocentive.com/	Problem Solving	(Mao et al., 2017)
P4	Geniusrocket	http://geniusrocket.com/	Graphic Design	(Peng et al., 2014)
P5	TryMyUI	http://www.trymyui.com/	Software Testing	(Bruun & Stage, 2015)
P6	Usertesting	http://www.usertesting.com/	Software Testing	(Bruun & Stage, 2015)
P7	99designs	http://99designs.com/	Graphic Design	(Araujo, 2013)
P8	uTest	http://www.utest.com/	Software Testing	(H. Li, Hao, Ge, Gao, & Guo, 2016)
P9	Stackoverflow	http://stackoverflow.com/	Software Development	(Hart & Sarma, 2014)
P10	Passbrains	http://www.passbrains.com/	Software Testing	(Dubey et al., 2016)
P11	99Tests	http://www.99tests.com/	Software Testing	(Mao et al., 2017)
P12	TestBirds	http://www.testbirds.com/	Software Testing	(Dubey et al., 2016)
P13	TestBats	http://www.testbats.com/	Software Testing	(LaToza & van der Hoek, 2016)
P14	Pay4Bugs	http://www.pay4bugs.com/	Software Testing	(LaToza & van der Hoek, 2016)
P15	CrowdTesters	http://www.crowdtesters.com.au/	Software Testing	(Mao et al., 2017)
P16	TestFlight	http://www.testflightapp.com/	Mobile App Testing	(H. Li et al., 2016)
P17	Mob4hire	http://www.mob4hire.com/	Mobile App Testing	(Mao et al., 2017)
P18	Testin	http://www.itestin.com/	Mobile App Testing	(Mao et al., 2017)
P19	Ce.WooYun	http://ce.wooyun.org/	Software Security Testing	(Mao et al., 2017)
P20	BugCrowd	http://www.bugcrowd.com/	Software Security Testing	(LaToza & van der Hoek, 2016)
P21	Guru	http://www.theknowledgeguru.com/	Software Security Testing	(Dubey et al., 2016)
P22	Freelancer	http://www.freelancer.com/	Project Marketplace	(Ford et al., 2015)
P23	Tackcn	Not found		(Mao, Yang, Wang, Jia, & Harman, 2015)
P24	Upwork	https://www.upwork.com/	Project Marketplace	(Dubey et al., 2016)
P25	AMT	http://www.mturk.com/	Project Marketplace	(Mao et al., 2017)
P26	Fiverr	https://www.fiverr.com/	Project Marketplace	(Dubey et al., 2016)
P27	Crowdflower	http://www.crowdflower.com/	Data Mining	(Mao et al., 2017)
P28	Askville-Amaz	http://askville.amazon.com/	Question-and-Answer	(Thuan, Antunes, & Johnstone, 2016)
P29	PeoplePerHour	http://www.peopleperhour.com/	Project Marketplace	(Vukovic, 2009)
P30	Crowdspirit	http://www.crowdsourcing.org/	Graphic Design	(Ford et al., 2015)
P31	GetSatisfaction	https://getsatisfaction.com/	Technical Support	(Ambani, 2017)
P32	Fixya	http://www.fixya.com/	Question-and-Answer	(Lopez, Vukovic, & Laredo, 2010)
P33	Getfriday	https://getfriday.com/	Project Marketplace	(Costas & Grey, 2012)
P34	BizReef	http://www.bizreef.com/	Project Marketplace	(Oliveira, 2014)
P35	CGILance.com	http://www.cqilance.com/	Programmer Marketplace	(Piao, Han, & Jing, 2009)
P36	Chaordix Inc.	http://www.chaordix.com/	Problem Solving	(Zogaj, Bretschneider, & Leimeister, 2014)

ID	Name	URL	Primary Work Category	Reference
P37	Eufreelance	http://www.eufreelance.com/	Software Development	(Ruggieri, Mosconi, Poponi, & Silvestri, 2016)
P38	Freelance Web Programming	http://www.freelancewebprogramming.com/	Programmer Marketplace	(Hong & Pavlou, 2013)
P39	Limeexchange	http://www.limeexchange.com/	Software Development	(Alsmadi & Saeed, 2013)
P40	Programmibids	http://www.programmingbids.com/	Programmer Marketplace	(Oliveira, 2014)
P41	Rent A Coder	http://www.rentacoder.com/	Software Development	(Alsmadi & Saeed, 2013)
P42	Scriptlance	http://www.scriptlance.com/	Software Development	(Alsmadi & Saeed, 2013)
P43	DesignQuote	http://www.designquote.net/	Graphic Design	(Munoz-Chacon, 2012)
P44	Programmerm-eetdesigner	http://www.programmermeetdesigner.com/	Software Development	(Hong & Pavlou, 2013)
P45	Project4hire	www.project4hire.com	Project Marketplace	(Hong & Pavlou, 2013)
P46	LiveWork	http://www.livework.com/	Any Tasks	(Lopez et al., 2010)
P47	MobileWorks	http://www.mobileworks.com/	Any Tasks	(Gupta, Thies, Cutrell, & Balakrishnan, 2012)
P48	Witmart	http://www.witmart.com/	Project Marketplace	(To & Lai, 2015)
P49	CrowdSpring	http://www.crowdspring.com/	Graphic Design	(Ford et al., 2015)
P50	Zintro	http://www.zintro.com/	Problem Solving	(Brandon, Long, Loraas, Mueller-Phillips, & Vansant, 2013)
P51	AppStori	http://www.appstori.com/	Mobile Development	(W. Wu et al., 2013a)

2.3 Intellectual Property (IP) Rights

As a result of the creativity of an individual or a team, intangible property is generated whereby the concept of IP rights is introduced. Making use of widely accepted IP conventions as promulgated by the World Intellectual Property Organization (Organization, 2004) and commentaries from scientific sources (Halbert, 2016; Moore, 2017; Richard, David, & Richard, 2016; Stim, 2017). IP rights are defined here as that category of intangible assets granted by the absolute legal rights under which the recipients of such rights have the power to exclude others from using, manufacturing, distributing, selling, copying, importing, or exploiting such assets without authorization. Some intangible assets (for example, non-new technical ideas, or "secrets" that are neither trade nor, in fact, secret) may not accrue legal IP rights in this way and thus are not included as part of what is called here IP rights. However, a range of intangibles assets that qualify for IP protection such as new and non-obvious technical ideas, original graphics, new software product designs, and even some types of software product or business ideas (Bauer, Franke, & Tuertscher, 2016). Hence, the IP rights are not referred to in this study as 'intangible assets' in general, but rather as synonymous with a narrower subclass of intangible assets eligible for IP protection.

The remaining of this section presents IP rights as a tool for protection and the types of IP rights relevant to software engineering activities. Consequently, the discussion

towards the impact of its utilization in this field and the importance of proper IP management and control. Lastly is the review of existing guidelines to gain an understanding of the IP rights sound practices and its structure and components to determine the critical elements to develop a useful IP rights guideline for this study.

2.3.1 IP Rights in Software Engineering Activities

The field of software engineering is considered a field requiring creativity encompassing nearly all of its aspects like requirements specifications, design documents, and source code represent (Sharp, 2016). Afegbua (2017), on his blog, stated that: "*IP rights are at the foundation of the software industry, the term refers to a range of intangible rights of ownership in an asset such as a software program."* In this regard, it is not surprising that software protection under IP rights is critical to the software industry (Abdulrahman & Al-Hakeem, 2016; Suh & Oh, 2015). For this reason, IP rights are therefore considered in itself an asset, a slice of the overall ownership pie. With its relevance, the necessity to manage the protection of such was recognized, and this is the rationale behind the available provisions in the law providing different types in protecting ownership rights, and six of which that are relevant to software engineering activities are namely: copyrights, patents, trade secrets, trademarks, industrial design and database rights (Cohen, 2014; Saxena, Deodhar, & Ruohonen, 2017).

In the case wherein protection of specific software is required, copyrights, patents, trade secrets (confidential information), industrial design, and database rights can opt (Bently & Sherman, 2014; Sharma, 2014; Suh & Oh, 2015). The difference of using trademarks as a protection form as it solely protects the recognition of a particular item in the marketplace to differentiate it, among others. It may be in the form of words, names, symbols, marks, or designs, but it does not protect the software itself (Blackett, 2016; Sharma, 2014; Stim, 2016). To differentiate further the protection tools particularly relevant in this field, Table 2.4 provides a summary of these IP rights, which might typically appear in or be influenced by software engineering activities.

Since IP rights are a concept of granting protection rights, its primary function will, therefore, be giving appropriate authorization to the owner the use of their creations in conjunction with the protection against illicit use of it by other individuals (Chen,

Bharadwaj, & Goh, 2017). However, this does not prohibit the owner from granting another individual or entity an endorsement to utilize the property. This agreement can be dealt through licensing wherein the licensor, which is the owner or under the directive of the owner, gives permission of use to the licensee. The mutual agreement is documented in a contract wherein terms and conditions apply (Bogers, Bekkers, & Granstrand, 2012; Newman, 2012). It is all at the discretion of the licensor what are the privileges and limitations of the licensee upon authorization, including the covenants and rights of each party involved (Gurry, 2015). Software licensing also abides into this setup whether the involvement is a software component or the software itself.

Because of the apparent significance of IP rights, the impact of its implementation cannot be understated. With the protection provided by IP rights, one is ensured that their specific creations will not be repeated without authorization. With IP rights, others are confined from replicating other's thought, item, plan, and behaviors business (Fast, Olson, & Mandel, 2016; Nielsen, Cruickshank, Foged, Thorsen, & Krebs, 2010). As a result of this, IP rights motivate individuals to build innovations (Longo & Giaccone, 2017). These protected innovations will eventually assure the buyers of the availability of genuine and original products available in the market. Moreover, since IP rights give the aggregate control over another development to its maker and give the innovator the privilege to utilize the creation, IP rights ensure the provision of due recognition to the creators and inventors (Rao & Srirekha, 2018). Apart from the acceptance, the material reward can also be compensated by the IP of a person by giving the office to the innovator to do restraining infrastructure business of his select development or creation.

Another benefit of IP rights is the maintenance of differentiation with the use of trademarks or any other components of IP rights to guarantee the individual's or association's items from the contenders' items (Erixon, 2015). Because of this distinct identification, clients can straightforwardly recognize the favored source's items. From the financial aspect perspective, proprietors of IP can appreciate profits from the acquired property and to give a budgetary motivating force to the formation of interest in IP (Parr, 2018). On the other hand, the settlement of WIPO and some of the relevant global agreements have begun on the basis that securing IP rights is essential in maintaining financial development (Dutfield, 2017). With these, the utilization of IP rights can create a considerable impact on personal, financial, and economic advancement.

Table 2.4: Summary of IP rights in software engineering

Rights	Protection Provided to Software Components	Registration required	Terms of Protection	References
Copyright	To protect the creative dimensions and graphical elements of the software such as source code, diagrams, charts, user guides, and icons from illegal copying by end-users.	No, as protection is automatic; however, complimentary arrangements are accessible, for example, i-DEPOT or open forges with a specific end goal to additionally secure rights. In a few nations' registrations is available and can satisfy fundamental purposes.	Seventy years from the date of first publication, or the Lifetime of the creator in addition to 70 years.	(Bouchoux, 2012; Boyle & Jenkins, 2014; Menell, 2018; Suh & Oh, 2015)
Patent	To protect the functional dimension of the software, which are mainly its technical effects and technological features against market competitors.	Yes, under specific circumstances.	Twenty years from the date of filing (subject to the annual renewal fee).	(Bouchoux, 2012; Capatina, Bleoju, Matos, & Vairinhos, 2016; Mossoff, 2014; Suh & Oh, 2015)
Trade-Secret	To protect through contractual agreements, the maintenance of specific and identified information which can be in the form of a Non-Disclosure Agreement (NDA) or Proprietary Information Agreement (PIA).	It is highly recommended to request registration.	As long as the technical information remains confidential – it may be indefinite.	(Bouchoux, 2012; Boyle & Jenkins, 2014; Duston & Ross, 2013)
Industrial- Design	To protect the Graphical User Interface (GUI) aspect of the software.	Registration is generally suggested, even though unregistered designs can be protected.	• Registered Design Right (Up to 25yrs). • Unregistered Design Right (10-15yrs).	(Corell, 2015; Hook, 2016; Stigler, 2014)
Trademark	To protect the visual aspect such as a logo and textual aspect such as a word of the software, which makes the asset recognizable, among others.	No	Forever (subject to 10 years renewals).	(Bouchoux, 2012; Stim, 2016, 2017; Zeidman, 2011)
Database- Right	To protect the output of the software process, which encompasses the protection of any kind of data generated.	No	Fifteen years from when the database was completed.	(Bellantuono & Lara, 2015; Guibault & Wiebe, 2013)

In light of the foregoing, companies around the world are growing in value from intangible assets, a significant share of which is IP, and companies tend to rely on IP rights to protect, and abstract value from their innovation (Candelin-Palmqvist, Sandberg, & Mylly, 2012). Nonetheless, the new trend towards online communities, in which innovative companies rely on the activities of multi-external actors to increase or support innovation projects in company products, has made the IP rights management in these projects more challenging and complex (Bonabeau, 2009; Huizingh, 2011; Lakhani & Panetta, 2007). Therefore, the following section points to the importance of the management of IP rights in CSE activities.

2.3.2 The Importance of IP Rights management

CSE activities require the contribution of information, knowledge, and IP from both the crowdsourcers' side and the crowd participants' side, and it may involve the generation of new IP. Thus, CSE is almost inevitably followed by challenges related to IP rights protection and ownership, as discussed in **Section 2.2.3**. This is further compounded by the triangular relationship of two's companies and three's undefined crowd, which is an inherent characteristic of the crowdsourcing process relative to outsourcing, opensource, and in-house development (Stol & Fitzgerald, 2014). Therefore, coordination is essential in the management of IP rights in CSE activities that ensure the active engagement of crowdsourcing platforms facilitators, crowdsourcers, and crowd participants (Peng et al., 2014). To manage the protection of crowdsourcers' inputs to the crowdsourcing task; the protection of crowd participants' inputs to crowdsourcing tasks; and the protection and ownership of the crowdsourced content.

As a necessary feature of their involvement in CSE activities, crowdsourcers are almost certain to disclose information about their strategy or product to crowd participants, and thus face risks of unclear accountability if a triangular relationship goes wrong (Hienerth, Keinz, & Lettl, 2011). For instance, involuntary cross-border transfer of knowledge (Bonabeau, 2009; Füller & Matzler, 2007; Greer & Lei, 2012), the use of knowledge by crowd participants for their purposes (Enkel, Kausch, & Gassmann, 2005), or the failure of crowd participants to maintain confidentiality (Greer & Lei, 2012). Confronted with the difficulties of balancing between IP protection and sharing (Macedo & Camarinha-Matos, 2011), crowdsourcers averse to these risks may, therefore, be hesitant to engage

in crowdsourcing process, despite benefits that they may otherwise enjoy (de Beer et al., 2017).

Likewise, crowd participants, i.e., a participant may feel that they protect their inputs and share limited information with the crowdsourcers, to avert the risk of injustice appropriation or exploitation by initiating crowdsourcers (Abhari, Davidson, & Xiao, 2018; Bartl, Füller, Mühlbacher, & Ernst, 2012) or by other crowd participants through copying or misappropriation (Bauer et al., 2016; Bockstedt, Druehl, & Mishra, 2016).

Lastly, the issues of protecting crowdsourcing tasks and crowdsourced content and agreeing on their ownership could become problematic, with crowdsourcing process based on collaborative efforts, and individual contributions challenging to identify (Mazzola et al., 2018). In crowdsourced content, the know-how of all parties is certainly combined, even if crowd participants may voluntarily surrender their IP rights, they may still sometimes continue to see the results of crowdsourced content as their property. They may ultimately demand shared or full ownership, or use of the results of joint creation (Mehlman et al., 2010). Thus, the crowdsourcing process makes it difficult and problematic for crowdsourcers to benefit adequately from crowdsourced content (Belderbos, Cassiman, Faems, Leten, & Van Looy, 2014; Dahlander & Gann, 2010; Fowles & Clark, 2005).

With this perceived difficulty in management, the necessity of having a specific set of guidelines in managing IP rights was acknowledged. For example, the New Zealand State Services Commission (2008) developed a guideline for IP rights management, which comprises several integrated management activities. The guideline was developed with specific reference to the software activities in the government-sector environment. It comprises a number of management elements that work together to manage the IP rights ensuring full compliance of contracting parties. This includes the decision to acquisition level and licensing opportunity, confidentiality (i.e., non-disclosure of information to any third-party), and originality (i.e., deliverables not infringes third-party rights). Similar to this, other organizations from different fields developed similar guidelines applicable for their activities in managing IP rights such as the Australia Department of Industry and Resources in conjunction with their Government IP Policy Council (Government of Western Australia, 2003).

The IP rights guidelines provide effective management, which results in the efficient use of resources, enhanced and eased operations of the organization, and optimized positions for the said property. Therefore, with the perceived consequences of poor IP rights management and as an alignment with the purpose of this current research study, there is a necessity to develop a new guideline which could help crowdsourcing platforms to ensure effective coordination between crowdsourcer and crowd in handling various IP rights issues (Peng et al., 2014). This includes the absolute obligation of both crowdsourcer and crowd in terms of acquisition and licensing decision, confidentiality, and originality, as mentioned in **Section 2.2.3**. The succeeding sections provide a comprehensive review of the sound practices utilized in the management of IP rights in several existing contracted guidelines that have been developed primarily for inhouse development. The study considers only the contracted IP rights guidelines following de Beer et al. (2017) whereby stating that the legal documents on online platforms take a form of contractual agreement where the terms to settle with is presented, and the agreement of which may be through clicking agree on a button or visiting the legal document link.

2.3.3 Practices in IP Rights Guidelines

According to Bekkers and Updegrove (2013), guideline documents provide an appropriate and reliable source for understanding the IP rights sound practices required in various circumstances. Table 2.5 presented a list of four guidelines, which streamlined the IP rights practices of different organizations according to their activities, labeled from G1 to G4, inclusive of the detailed information of each. The IP anticipated in the deliverables of these activities includes all application software, database software, web software, documents, materials, recorded information, other assets, and products of any kind, which will be delivered as part of the contractual agreement. Practices revolve around the decision-making process to identify IP rights ownership and licensing (i.e., commercialization, utilization, and modification). The reason is that the provisions regarding the complexities surrounding the identification of the first owner of the foreground and the variety of the probable circumstances (Buckworth et al., 2015). This view is substantiated by (Parr, 2018) in his book concerning licensing, where he emphasized the need for identification of the first owner of the foreground to ensure proper exploitation.

Table 2.5: List of existing IP guidelines and related information

ID	Name	Category	Origin	Author(s) or Publisher(s)	Year of Publication	Reference
G1	Guideline for Treatment of Intellectual Property Rights in Information and Communication Technology (ICT) Contracts	ICT	New Zealand	New Zealand State Services Commission	2008	(Vanmellea, 2008)
G2	Government IP Policy and Best Practice Guideline	Generic	Australia	Department of Industry and Resources in conjunction with the Government IP Policy Council	2003	(Government of Western Australia, 2003)
G3	IP Guideline for Custom Software Development Contracts	Software Development	Canada	Department of Highways and Public Works Information & Communications Technology	2005	(Choleswo, 2005)
G4	Implementation Guide Policy on Title to IP Arising Under Crown Procurement Contracts	Generic	Canada	Ministry of Industry, Government of Canada	2015	(Ministry of Industry, 2015)

A review performed on these four guidelines revealed the differences with regards to their scope of application. However, similarities observed between each other is the provision of standard rules or instructions in making appropriate decisions, whether regarding foreground ownership and licensing position between entities (clients and suppliers). This is consistent with the Oxford dictionary in defining guidelines as *"... set of rules or instructions that are given by an official organization telling you how to do something, especially something difficult."* There are three primary positions for the IP rights ownership and licensing provided by these guidelines, labeled from P1 to P3, summarized in Figure 2.4. Primarily, these guidelines seek to provide clarity and direction on all the probable circumstances in which clients must be granted ownership right on any foreground arising from the deliverables. This comes to the context based on the precaution needed to be taken by the client before getting into an agreement. As stated by Mosey (2009), which suggested that clients are supposed to provide the declaration of intention to own the foreground explicitly. The precaution helps avoid the settlement with a silent agreement, which in the best-case scenario can only grant a license to the client. IP ownership must, therefore, be secured before execution as failure to do so may disrupt the attainment of the desired objective, and this ensures the right of

the client on the developed foreground to avoid any inappropriate exploitations (Azizi, 2018 ; Parr, 2018).

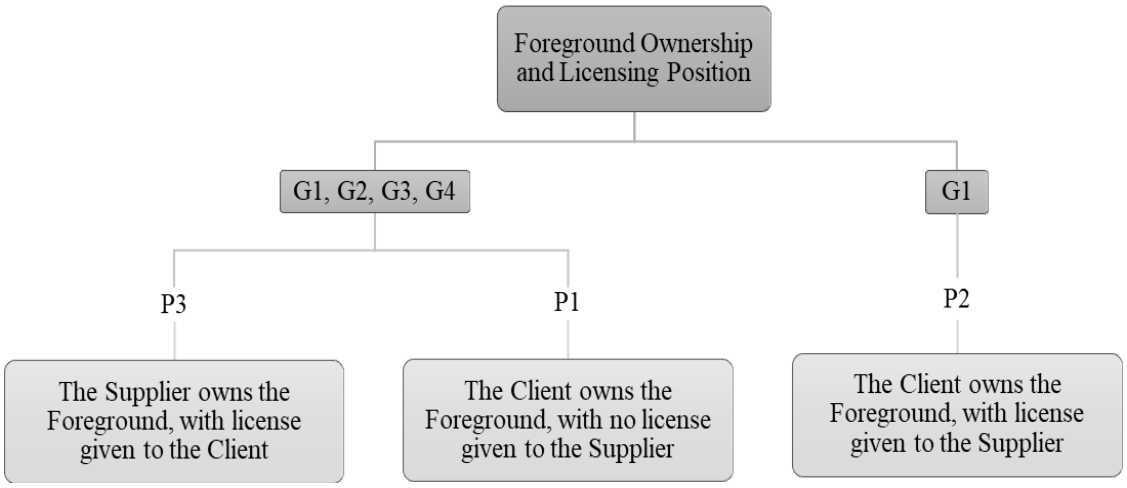

Figure 2.4: Summary diagram of foreground ownership and licensing position

Based on Figure 2.4, all of the guidelines provide a position for the client to own the foreground without the granting of a license to the supplier (P1). However, G1 provided an ownership circumstance wherein even if the client is to own the foreground, the supplier may be given the license for exploitation for the satisfaction of both parties (P2). These guidelines also specified cases wherein the client might consider not acquiring the ownership right provided that it does not affect the desired purpose (P3). Therefore, in these particular instances, the supplier has the opportunity to own the foreground with a pre-requisite that the client is granted an exploitation license, which includes any third-party affiliation. Burden (2004) commented on that as:

> *"…if a client is not going to own the IP rights but is concerned about its potential loss of competitive advantage if the supplier is able to freely market the new materials elsewhere, a provision can be inserted to prohibit the supplier utilizing the materials with the client's competitors (either at all, or for a stated period of time)."* (p.204)

Based on the analysis of the four guidelines, three positions on the ownership and licensing strategy are proposed after taking into account individual circumstances based on the necessity of the foreground. These circumstances revolve in general around the value of the newly arising foreground and the pre-existing background, which is provided

by both client and supplier. It primarily influences the decision-making process presented in each of the ownership and licensing positions offered by these guidelines. After this, the circumstances presented in each of the guidelines were categorized based on the similarities and shall be linked upon the rationale supporting the position an entity must undertake. For instance, G1 stated that IP rights, which apply to a critical system, support the position whereby the client should own the IP rights (Manzini & Lazzarotti, 2016). Taking another example in G2, it was stated that statutes, regulations, or prior obligations of the client to a third party or parties preclude supplier ownership of the foreground (Guarda, 2015; Rajaeian, Cater-Steel, & Lane, 2016). This circumstance was grouped with the circumstance presented in G1 as both support the same position. The categorization, in turn, simplifies the decision-making process by summarizing which circumstances support each of the positions supported by a valid rationale. In summary, 13 circumstances are supporting this three ownership and licensing positions, as presented in Figure 2.5.

The circumstances included licensing arrangements as an option for either commercialization, utilization and/or modification. As provided in the circumstances, the license may be from the client to the supplier, and vice versa or client may be binding on third parties. This licensing is essentially a legally compulsory agreement between a licensor and a licensee, by which the licensor grants the licensee specific rights or permission for the exploitation of its IP, which would not otherwise be possible without the grant given to the licensee(Bogers et al., 2012). For example, in the context of the crowdsourcing process, crowdsourcers may obtain exclusive licenses to crowdsourced content, under which crowd participants may neither grant any other licenses to third parties nor use the crowdsourced content themselves. Another example, non-exclusive licenses, leaves crowd participants with the right to licenses third parties or to use crowdsourced content themselves (de Beer et al., 2017; Mazzola et al., 2018). There are three types of licenses, categorized based on the level of exclusivity of rights granted under each type as presented below in Table 2.6.

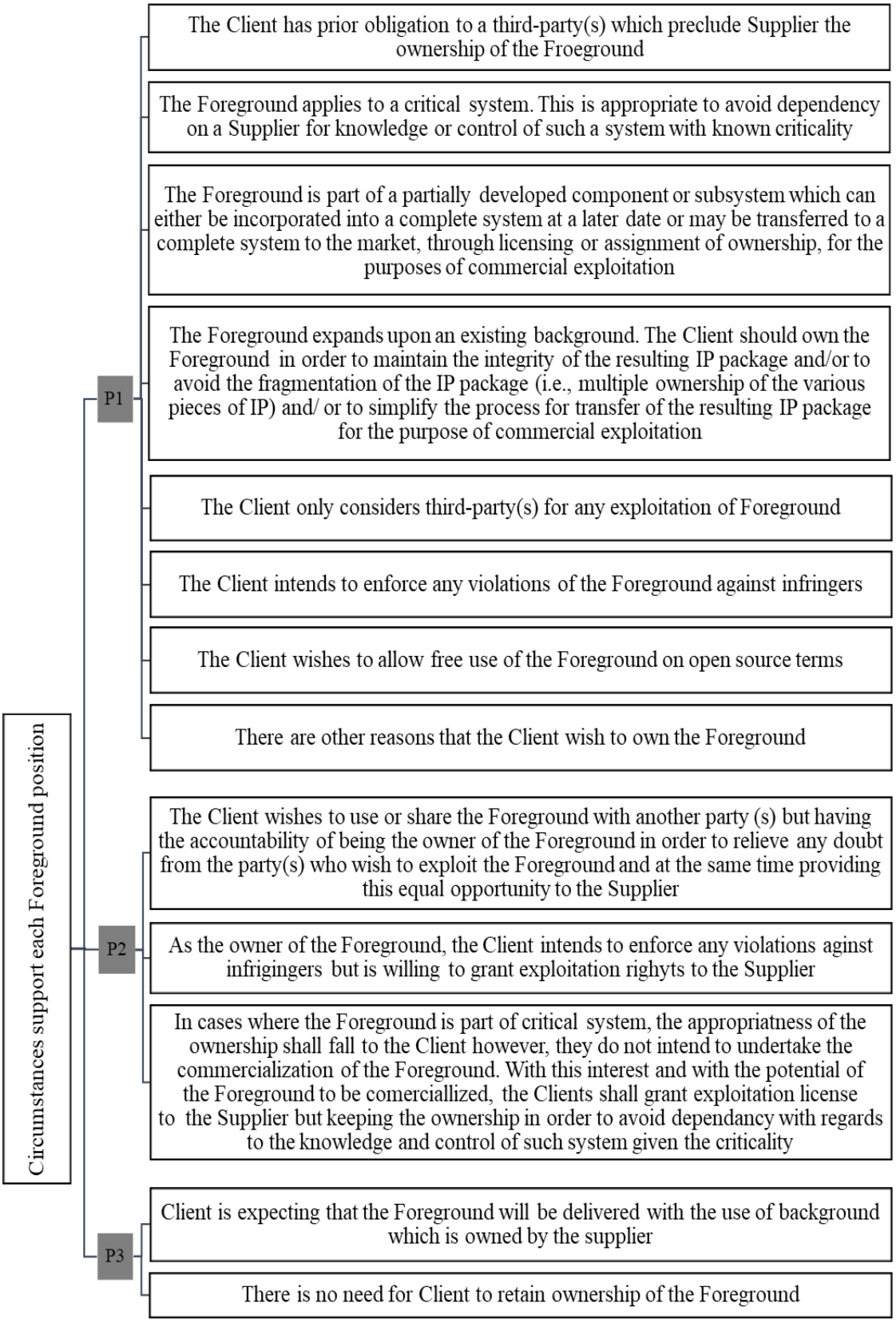

Figure 2.5: Circumstances influencing the decision-making process for IP Rights

These licensing arrangements are not used as a tool to prevent others, but rather as a mechanism to incorporate them, with some regulation and control (Benkler, 2017; Parmentier & Mangematin, 2014). In this way, it creates broad opportunities to foster broad-based innovation and creative activity in the wider community, increasing the efficiency and effectiveness of research and development (Belenzon & Schankerman, 2015; Benkler, 2017; Nagle, 2018). Although such "inclusive" and permissive licensing arrangements might be a motivation for contribution and more active involvement in crowdsourcing process, they leave a crowdsourcer without full or control IP ownership, and thus limit its ability to determine the appropriate value of the crowdsourced content (Dahlander & Gann, 2010; Henkel, Baldwin, & Shih, 2013).

Table 2.6: Licensing-Exclusive/Non-Exclusive/Sole(Shkopiak, 2018)

Type of license	Exclusivity description
Exclusive	An exclusive license is one where the licensee is the only one that is granted rights by the licensor. This license not only disallows the licensor to give the same rights to any other party, but it also excludes the licensor from using its rights. Essentially, an exclusive license allows only one party to exploit the IP, and it is none other than the exclusive licensee.
Non-exclusive	A non-exclusive license is one where the licensee is granted the right to exploit the IP but implies that the licensor remains free to exploit the same IP to permit any other licensees the same grant. A typical example of a non-exclusive license is the license for computer programs where many users are granted permission to use the same software.
Sole	A sole license is equivalent to an exclusive license with the difference that the licensor maintains its rights to exploit the IP. This implies that, for a sole license, both the sole licensee and the licensor have the right to exploit the IP.

As the nature of circumstances enables the identification of the appropriate position to be undertaken, this finalized position will limit the scope of necessary provisions required in the contractual agreement. It is considered as a legally enforceable agreement binding the two entities whereby the acceptance signifies absolute compliance, and any non-compliance must be treated accordingly. Such an agreement is widely accepted offline, which is not fully compatible with the crowdsourcing process. Therefore, and in alignment with the goal of this study, the electronic version of contractual agreement termed as wrap agreements where users can access and/or signify to the provisions of the agreement online is discussed further in the following section.

2.3.4 Online Legal Agreements

Legal agreements are in the form of a contract in which involved parties are required to act in full compliance with. Among these that considers the formation of contracts online prominently used in the online marketplace (i.e., website) is 'clickwrap' and 'browsewrap' (MacLean, 2017; Powers, 2015). Both of which were adapted from the 'shrink-wrap' agreement where a user upon receipt of software packages with a contract under the packaging shall signify the agreement to set of terms and conditions by opening the package (Smith & Boardman, 2007). Clickwrap, as presented in Figure 2.6, is one wherein a user is presented with terms of use of a website (on a page, or in a scroll box), and clicking on a button 'I accept' or any other language with similar meaning shall signify undertaking the desired activity.

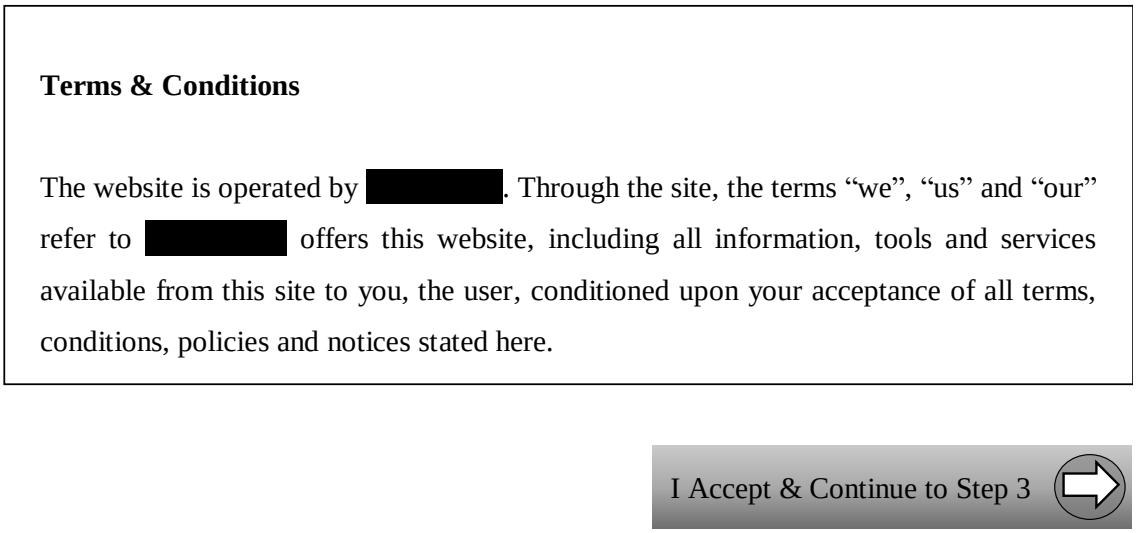

Figure 2.6: Sample of a clickwrap agreement

On the other hand, a browsewrap is one where the website presents terms which are commonly through accessing a hyperlink, not requiring any active expression of consent before undertaking any activities (Adams, 2004; Trakman, 2009; Weise, 2004). As reported by Powers (2015) that browsewrap agreement will be typically placed and linked at the bottom of the website in which for instance, by clicking 'Terms' link at the bottom of the website as seen in Figure 2.7, the 'Terms and Conditions of Use' which presents the language in the legal agreement will be readily accessed by the user as seen in Figure 2.8.

Research	Resources	Get to Know US	Services	Worth Knowing
Trends	Help	About [redacted]	Talent clouds	Site Map
Online Employment Report	[redacted] University	In the News	Referral program	API
Annual Impact Report	Terms of Service	Blog	Affiliate Program	Groups
Global Business Survey	Privacy Policy	Our Team	Payoff Services	Widgets
Global Freelancer Survey	Cookie Policy	Careers	Global Payments	Trust & Safety
Women Technology	Contact Us	Testimonials		

Figure 2.7: Sample of a browsewrap agreement

Terms of Service

Last Updated November 1, 2011

If you're looking for the terms for User Experience Research program, you can find them here.

These Terms of Services ("Terms") govern your access to and use of [redacted] ([redacted], 'we' or 'our') websites, services, and applications (collectively the 'services'). Your access to and use of the Services is conditioned on your acceptance of and compliance with thesis Terms. These Terms apply to all visitors, users and others who access or use the Services.

YOUR USE OF SERVICES

By accessing or using Services you agree to be bound by thesis Terms. If you are using the Services on behalf of an organization or entity ('Organization'), then you are agreeing to these Terms on behalf of that Organization and you represent and warrant that you have the authority to bind the organization to these Terms, In that case, 'you' and 'your' refers to and that Organization.

Figure 2.8: Sample of browsewrap language to a contractual agreement

Although the protection to users is provided by the approach of using clickwrap and browsewrap, it does not dilute the existence of some legal issues that have not been adequately addressed. Browsewrap, because of its nature of not drawing attention to the actual agreements and terms, the facilitators may resort in hiding the provisions of the terms and/or deflecting attention from the terms (i.e., use of graphics and small font sizes and use of complex searches through screens to find the terms) (Canino, 2016; Meinel, 2016; Werbin, 2016). According to Hillman (2017), responsible users may be described as *"...are likely to read and digest terms in a medium conducive to speed, instant*

gratification, and manipulation." (p.5) However, it is a usual case that the users exhibit reluctance to read the terms and/or appeal to unfair terms even if these are properly presented. As long as the terms are presented, and a notice was given to the user, it cannot be argued that a contract does not exist just because the user did not read it before proceeding. Therefore, even if clickwrap is similar to traditional paper transactions where solicitation of consent is required from users, it is at times an overstatement if the user didn't recognize their responsibility of reading and understanding the terms (Hillman, 2017).

An enforceable agreement can be characterized by whether the user was provided notice, whether the user gave consent and whether enforcing the agreement is fair. Blount (2008) reported that the United States of America Court of Appeal held that online contracts are reasonably clear about contractual terms, and unambiguous appearances of consumer consent to these terms are necessary. As a clickwrap may be in the form of a checkbox which will require a user to check and click 'I agree' or by a notification which can provide an increased notice of its legal agreement by stating 'By clicking the following button, you agree to…', this ensures that the user is given notice and the user is required to provide consent before proceeding further. Clickwrap is the total opposite of the browsewrap in which the mere act of access or usage of the webpage legally binds users to the contents of the agreement (de Beer et al., 2017). It entails that clickwrap is a more superior type of online agreement in maximizing the chances that the agreements were read, understood, and agreed to.

2.3.5 Structure and Components of the Guidelines

Since the structure is essential for the distribution of the entire components of the guideline in such a manner as to ensure that there is no misleading (Tu, Campbell, & Musen, 2003). This section summarizes the review of the selected guidelines in this study based on their structure and components to structure the components of the proposed guideline, as set out in table 2.7. In each of the guidelines, the structure can be divided into two domains, which firstly introduces the source of the IP and consequently presenting the IP sound practices in guiding the decision-making process. With this, it can be deduced that the structure of the guideline, which presents the design of the documents concerning its function is generally similar among the guidelines selected. It

is consistent with Tu, Campbell, and Musen (2003) in their recommendation that "... *guideline can be structured either as collections of decisions that are to be applied in specific situations or as processes that specify activities that take place over time."* Also affirmed by Peleg et al. (2003) stating that the overall flow of the guideline structure starts from the integrated description of the decision-making process and activity specification and ends with a description of the process of expression that allows for sequencing and repetition in decisions and activities.

The documents were looked into by reviewing each of the components of the four guidelines. As presented in Table 2.7, components were then grouped into the general components of the guideline and the components in presenting sound IP practices. From the review of the general components of each of the guidelines selected in this study, the context of the creation of the document is presented under Background for G1, G2, and G3 (Gruba & Zobel, 2017). Despite G4 not having a separate component to present the background of the guideline, it was briefly explained in another component, which is Purpose. Each of the guidelines presents the rationale on why the guideline was created under Purpose (Merriam Webster, 2018), provides the areas with which the guideline applies to under Scope and gives clarity and alignment of interpretation of terms that are being used throughout the guideline under Definitions (Navigli, 2009).

On the other hand, G1, G2, and G4 have a component which is Statement of Policy that provides the underlying philosophy of the guideline which can be related to the agencies' and or parties' mission and values which is rather a component tailored to the entities involved in the guidelines; the same applies to the G3, but the section called the Statement of Principles (Wheelen, Hunger, Hoffman, & Bamford, 2010). With regards to the review of the components of the specific sound IP practices, the guidelines were presented in a rational approach by initially introducing the description of the IP ownership position alongside with the enumeration of its applicable circumstances followed by the benefits for the use of the aforementioned option. As compared to the other guidelines in which the pre-condition or Anticipates of the position was clearly defined, G2 included the allocation processes to determining the ownership. In addition, G2 presented sound practices only by enumeration in contrast with G1, G3 and G4 whereby sound practices were summarized using a pre-determined decision flow process.

Table 2.7: Guidelines structure and components

		G1	G2	G3	G4
Structure of the guidelines		Foreground in ICT Contract Deliverables→ Sound Practices Guidelines	Foreground in Government Contract (GC) Deliverables → Sound Practices Guidelines	Foreground in Customer Software Development (CSD) Contracts Deliverables → Sound Practices Guidelines	Foreground arising in Crown Procurement Contracts (CPC) Deliverables→ Sound Practices Guidelines
Specific practices		• Right to Foreground in ICT contract Deliverables: Ownership and Commercialization	• Right to Foreground in GC Deliverables: Ownership and Commercialization	• Right to Foreground in CSD contract Deliverables: Granting and Retention of Foreground Ownership	• Right to Foreground in CPC Deliverables: Ownership and Exploitation
Sound practices guidelines for implementation (implement plan)		• Set out an approach to make appropriate decisions on foreground arising from contract deliverables between entities	• Best practices guidelines to assist Government Agencies to make appropriate decisions on foreground arising from contract deliverables between entities	• Provides a framework to make appropriate decisions on foreground arising from contract deliverables between entities	• Set out a policy to make appropriate decisions on foreground arising from contract deliverables between entities
Component of the guidelines	Introduction	• Definitions • Purpose • Scope • Background • Statement of Policy	• Background • Purpose • Scope • Definitions • Statement of Policy	• Background • Statement of Policy • Definitions • Purpose • Scope	• Purpose • Definitions • Scope
	Guideline	• Description • Circumstances • Anticipates • Benefits • Practical Examples	• Description • Default option • Exceptions Circumstances • Anticipates • Benefits	• Principles • Exceptions Circumstances • Anticipates • Benefits	• Description • Circumstances • Anticipates

Based on the review of the components in each of the guidelines selected as part of this study, it can be deduced that the essential guideline components are Introduction and Guidelines. The Introduction can be subdivided to Background which presents the context in the creation of the guideline, Purpose on what the guideline is for, Scope to present the extent to which the guideline is relevant, Definitions to provide definite meaning into the terms used in the guideline, and Statement of Policy as the formal declaration of acceptable behaviour and methods required to be adhered to in order to achieve the Purpose of the guideline. As for the components of the guideline to present the sound IP practices, the following components were proposed: Description which clearly describes the IP ownership positions including the scope of the management of the IP, Circumstances which presents the situations in which the IP ownership position is applicable and not applicable, Anticipates of the IP ownership position which describes the pre-condition of the IP which can either be Foreground or Background and Benefits to provide a line of sight in between the position and the objectives of the parties involved. These components are essential to set straight the structure of the guideline to provide direction to the end-user a logical decision-making sequence.

2.4 Review of Evaluation Criteria

Evaluation criteria are intended to provide a systematic methodology in the evaluation of the guideline quality (Consortium, 2009; Grimmer et al., 2014). A review of the literature was undertaken to identify available evaluation criteria for guidelines in the field of IP. However, the lack of availability thereof was identified. In this regard, it was ascertained that the guidelines which were reviewed in **Section 2.3.3** were published without prior evaluation. Although this is the case, this does not dispose of the validity of the guidelines since these are tailored fit for specific government agencies specific for their practices and have been in-place and in-use to support their purpose. As a result of this, comprehensive research was conducted to find the most recommended evaluation criteria being utilized for the assessment of the internal quality of the guideline applicable in various fields of practice. This section reviews the evaluation criteria in assessing practice guidelines critically selected based on the structure and components, as set out in **Section 2.3.5,** which may be of relevance to the evaluation of guidelines for the management of IP rights. Of which are AGREE II (Appraisal of Guideline, Research and Evaluation)

and iCAHE (International Centre for Allied Health Evidence) instruments presented in Table 2.8.

This section further discusses the consolidation conducted between these two evaluation criteria to identify the essential domains and their respective items to exemplify the dimensions applicable for the practical evaluation of guidelines intended for the governance of IP rights. After which, the quality of the IP management guidelines which were selected and reviewed in **Section 2.3.3** will be appraised using the consolidated criteria fit for purpose for the appraisal of proposed IP rights guideline.

Table 2.8: Instruments for guideline assessment

Instrument	Target group	Scope	Scale	Application	Reference
AGREE II	• Physicians • Guideline developers • Policy decision-makers • Educators	23 items/ 6 domains; 7-level scale; ≥2 assessors	• Strongly agree • Agree • More or less agree • Undecided • More or less disagree • Disagree • Strongly disagree	Detailed guideline assessment of quality and development (correctness & transparency of method)	(M. Brouwers, Michelle , George, Jako , Francoise, Gene, Béatrice, Ian, Jeremy, Steven 2010; Consortium, 2009)
iCAHE	• Guideline developers • Researchers • Educators • Policymakers	14 items/ 7 domains; Binary system (0,1)	• Yes • No	Detailed guideline assessment of quality and development (correctness & transparency of method)	(Grimmer et al., 2014; Grimmer et al., 2016)

2.4.1 AGREE II Appraisal Criteria

To assess the quality of guidelines, to provide a systematic approach for the development of guidelines, and to recommend necessary information critical to be reported in guidelines, an international team of guideline developers and researchers, known as the AGREE Collaboration, was established. Among the goals as mentioned earlier, the main objective considered is the assessment of guideline quality (i.e., ‘‘confidence that the potential biases of guideline development have been addressed adequately and that the recommendations are both internally and externally valid, and are feasible for practice’’) (Burgers, Cluzeau, Hanna, Hunt, & Grol, 2003; collaboration, 2001; Grol, Cluzeau, &

Burgers, 2003). Using thorough methodologies and cross-collaboration, the original AGREE instrument was established (Terrace, 2003). The revised version, AGREE II (Consortium, 2009), was published in 2009 and is currently the most universally utilized and comprehensively validated guideline appraisal tool (Melissa Brouwers et al., 2010a, 2010b, 2010c; Rodriguez, Sossa, & Cordero, 2015, 2017). It is recognized internationally as an essential instrument for health care providers and policy-makers dealing with a variety of clinical practice guidelines for decision making in a constant basis (Kredo, Gerritsen, Heerden, Conway, & Siegfried, 2012; Reis, Passos, & Santos, 2018; Wiseman et al., 2014).

AGREE II is intended to be used by health care providers who wish to undertake their assessment of a guideline before adopting its recommendations into their practice. This is also helpful for the evaluation of guidelines developed by other groups for potential adaptation to their context. For policymakers, the instrument shall be used in making decisions on which guidelines could be recommended for use in practice, while for educators, this enhances critical appraisal skills amongst health professionals and consequently be able to teach core competencies in guideline development and reporting. The instrument is also useful for guideline developers by providing a structured development methodology followed by an internal assessment to ensure the quality of the guidelines (Consortium, 2009; Cruz, Fahim, & Moore, 2015; Hoffmann et al., 2017). Moreover, in the context of ICT, AGREE II was also used to assess e-learning for two educational interventions on the Internet designed to improve self-efficacy and learner performance and well-being (M. C. Brouwers, Makarski, & Levinson, 2010).

As can be seen in Table 2.9, the AGREE II instrument is organized into six quality-related domains. These six domains are namely: 1) scope and purpose, 2) stakeholder involvement, 3) rigour of development, 4) clarity and presentation, 5) applicability and 6) editorial independence. Each of the domains "*captures a unique dimension of guideline quality*" in which each item in the checklist shall represent a requirement needed to be satisfied to capture the information and contribute to the quality of the guideline (Consortium, 2009; Hoffmann et al., 2017).

Table 2.9: Items and domains of AGREE II instruments

Items	Contents	Domains	Dimensions
1	The overall objectives of the guideline are specifically described	Scope & Purpose	"Is concerned with the overall aim of the guideline, the specific questions, and the target population"
2	The topic questions covered by the guideline are specifically described		
3	The population to whom the guideline is meant to apply is specifically described		
4	The guideline development group includes individuals from all the relevant professional groups	Stakeholder involvement	"Focuses on the extent to which the guideline was developed by the appropriate stakeholders and represents the views of its intended users"
5	The views and preferences of the target population (patients, public, etc.) have been sought		
6	The target users of the guideline are clearly defined		
7	Systematic methods were used to search for evidence	Rigour of development	"Relates to the process used to gather and synthesize the evidence, the methods to formulate the recommendations, and to update them"
8	The criteria for selecting the evidence are clearly described		
9	The strengths and limitations of the body of evidence are clearly described		
10	The methods for formulating the recommendations are clearly described		
11	The benefits and risks have been considered in formulating the recommendations		
12	There is an explicit link between the recommendations and the supporting evidence		
13	The guideline has been externally reviewed by experts prior to its publication		
14	A procedure for updating the guideline is provided		
15	The recommendations are specific and unambiguous.	Clarity of presentation	"Deals with the language, structure, and format of the guideline"
16	The different options for management of the situations or issues are clearly presented		
17	Key recommendations are easily identifiable		
18	The guideline describes facilitators and barriers to its application	Applicability	"Pertains to the likely barriers and facilitators to implementation, strategies to improve uptake, and resource implications of applying the guideline."
19	The guideline provides advice and/or tools on how the recommendations can be put into practice		
20	The potential resources implications of applying the recommendations have been considered		
21	The guideline presents monitoring and/or auditing criteria		
22	The views of the funding body have not influenced the content of the guideline	Editorial independence	"Is concerned with the formulation of recommendations not being unduly biased with competing interests"
23	Competing interests of guideline development group members have been recorded and addressed		

Each domain is scored using several items whereby the instrument consists of a total of 23 appraisal criteria (items), which shall be scored using a 7-point Likert scale by at least 2 (preferably 4) independent observers wherein users may take an average of 90 minutes to complete an evaluation. The score increases as more criteria are met. Therefore, a score of 1 (Strongly Disagree) is given when there is no information that is relevant to the AGREE II item or if the concept is very poorly reported. On the opposite side, a score of 7 (strongly agrees) is given for exceptional reporting where the full criteria and

considerations articulated in the guideline have been met. Consequently, a score between 2 and 6 is assigned when the reporting of the AGREE II item does not meet the full criteria or considerations and is dependent on the completeness and quality of reporting. Each item has a "How to Rate" section, which details the assessment criteria and considerations specific to the item (Consortium, 2009; Filippini, Minozzi, Giovane, & D'Amico, 2015; Machingaidze et al., 2017).

2.4.2 iCAHE Guideline Quality Checklist

With the first intent to have an efficient, simple tool for policymakers, administrators, consumers, researchers, and guideline developers to assess core elements of guideline construction and implementation, another appraisal instrument was developed by a team from International Centre for Allied Health Evidence (iCAHE), at University of South Australia (Grimmer et al., 2014). The iCAHE instrument was created in partnership with service managers, policymakers, and clinicians, who incorporated their considerations on which elements of practice guidelines are essential and are relevant to their circumstances. Since this instrument was designed specifically for busy end-users, a guideline can be rated by one person in approximately five minutes (Semlitsch, Blank, Kopp, Siering, & Siebenhofer, 2015). Although the target primary end-users are allied health clinicians, policymakers, and managers, the iCAHE instrument has been retrieved by other health disciplines, educators and researchers with the primary purpose of assessing the methodological quality of guidelines that are based highly in evidence (M. Cooper, McCutcheon, & Warland, 2017; Machingaidze et al., 2017).

The instrument assesses practice guidelines using seven domains which are namely: (1) availability, (2) summary, (3) date, (4) underlying evidence, (5) guideline developer, (6) guideline purpose, and users (7) ease of use. The implementation or applicability of the guideline was out of scope in the assessment and shall be considered independently after proving its quality using the appraisal instrument (Grimmer et al., 2014). In order to assess the characteristics mentioned above, 14 items were developed, each representing a particular domain needed to be addressed in the guideline presented in Table 2.10. The assessment uses binary scale whereby the evaluators score each item with a 'yes' or 'no' crediting a score of one or zero, respectively. A score of 'yes' is given if the criteria for the item was fulfilled by the guideline and a score of 'no' if it is not adequately addressed

or not addressed at all. It shall provide one overall score with 14 as the highest score a guideline can attain (Grimmer et al., 2014; Semlitsch et al., 2015; Siebenhofer et al., 2016). This scoring approach assumes equal credit for each question, reflecting the views held by the end-users who assisted in its development.

Table 2.10: Items and domains of iCAHE instruments

Items	Contents	Domains
1	Is the guideline readily available in full text?	Availability
2	Does the guideline provide a complete reference list?	
3	Does the guideline provide a summary of its recommendations?	Summary
4	Is there a date of completion available?	Date
5	Does the guideline provide an anticipated review date?	
6	Does the guideline provide dates for when literature was included?	
7	Does the guideline provide an outline of the strategy used to find underlying evidence?	Underlying evidence
8	Does the guideline use a hierarchy to rank the quality of the underlying evidence?	
9	Does the guideline appraise the quality of the evidence which underpins its recommendations?	
10	Does the guideline link the hierarchy and quality of underlying evidence to each recommendation?	
11	Are the developers clearly stated?	Guideline developer
12	Does the qualifications and expertise of the guideline developers link with the purpose of the guideline and its end users?	
13	Are the purpose and target users of the guideline stated?	Guideline purpose and users
14	Is the guideline readable and easy to navigate?	Ease of use

2.4.3 Consolidated Evaluation Criteria

Studies have recently shown the congruency of iCAHE guideline checklist to the AGREE II, whereby the psychometric properties of the iCAHE instrument were established by comparing with AGREE II which is a relatively more complex practice guideline critical appraisal instrument (Melissa Brouwers et al., 2010a; MacDermid et al., 2005; Semlitsch et al., 2015; Terrace, 2003). Grimmer et al. (2014) conducted a study to assess the correlation of the results of evaluation using these two instruments wherein the scores and utility of the iCAHE and AGREE II instruments were compared using six practices guidelines for mild traumatic brain injury. Overall, the iCAHE and AGREE II scores correlated moderately well (Pearson r=89 %).

On the other hand, Machingaidze, Kredo, Louw, Young, and Grimmer (2015) conducted a comparison study between several evaluation criteria. The domains of AGREE were used as the basis of comparison whereby each item of the evaluation criteria was

categorized based on the domain they are addressing. One of the evaluation criteria included in the study is the iCAHE Checklist whereby it is documented that there are five mutually shared domains in between AGREE II and iCAHE which are namely: 'scope & purpose,' 'stakeholder involvement,' 'underlying evidence,' 'date' and 'clarity of presentation' as presented in Table 2.11. As a result of this consolidation, two domains are, therefore, exclusive to the AGREE II instrument, which are Applicability and Editorial Independence, while for iCAHE, the only exclusive domain is Availability. Due to the limitation of evaluation criteria purposely created for IP rights guidelines, consolidation of these two widely used critical appraisal tools builds confidence for the significance of the evaluation criteria being built. It shall also include the inclusion and exclusion strategy for the domains and items relevant for IP rights guidelines as well as the revision of the dimension to define the measurable extent for each domain. The inclusion and exclusion of these domains are based primarily on the identified structure and components discussed earlier in **Section 2.3.5.**

For the domain Scope and Purpose, which is measured by the presentation of the overall objective, specific questions, and the target population, iCAHE translated it into a single item (Item No.1), giving query about the statement of the purpose and target users. On the other hand, AGREE II comprised it with three items (Items No.1, 2, and 3), each asking whether the objectives, topic questions, and population in which the guideline is applicable are accurately described. Therefore, for AGREE II, not only if the mandatory elements were stated, but there is a requirement of stating clearly and precisely. Thus, the three items from AGREE II shall be adopted into the consolidated evaluation criteria to provide specificity securing the requirement of a guideline having a detailed description of the objective aligned to the questions it was addressing for the population it was intended to.

The subsequent domain is the Stakeholder Involvement, where a guideline as a general rule must establish the credibility of the developer(s) to acquire engagement from the reader. Thus, it is obligatory for the guideline to clearly state the developers together with the target users, which is represented equivalently by Items 4 and 6 in AGREE II and Items 2 and 3 for iCAHE. For AGREE II, the involvement of the target users plays a role in the decision-making or the formulation of recommendations by the representation of the views of its intended users. In the interest of IP rights guideline appraisal, the

preferences of the target users don't need to be accurate as it may serve as a conflict of interest. While it is articulated by Grimmer et al. (2014) that Item No. 5 of AGREE II regarding the views and preferences of the user is represented by Item No. 3 in iCAHE, it is more appropriate representation if the latter item will be used for the evaluation criteria for IP rights guideline appraisal.

Table 2.11: Comparison between the domains of iCAHE and AGREE II instruments based on items

Domains	AGREE II	iCAHE
Scope & Purpose	**Item 1**. The overall objectives of the guideline are specifically described. **Item 2**. The topic questions covered by the guideline are specifically described. **Item 3**. The population to whom the guideline is meant to apply is specifically described.	**Item 13.** Are the purpose and target users of the guideline stated?
Stakeholder involvement	**Item 4.** The guideline development group includes individuals from all relevant professional groups. **Item 5.** The views and preferences of the target population have been sought. **Item 6.** The target users are clearly defined.	**Item 11.** Are the developers clearly stated? **Item 12.** Does the qualifications and expertise of the guideline developers link with the purpose of the guideline and its end users?
Rigour of Development	**Item 7.** Systematic methods were used to search for the evidence. **Item 8.** The criteria for selecting the evidence are clearly described. **Item 9.** The strengths and limitations of the body of evidence are clearly described. **Item 10.** The methods for formulating the recommendations are clearly described. **Item 12.** There is an explicit link between the recommendations and the supporting evidence. **Item 11.** The benefits, side effects and risks have been considered in formulating the recommendations.	**Item 7.** Does the guideline provide an outline of the strategy used to find underlying evidence? **Item 8.** Does the guideline use a hierarchy to rank the quality of the underlying evidence? **Item 9.** Dose the guideline apprise the quality of the underlying evidence which underpins its recommendation? **Item 10.** Does the guideline link the hierarchy and quality of underlying evidence to each recommendation? **Item 6**. Does the guideline provide dates for when literature was included?

Domains	AGREE II	iCAHE
Clarity of Presentation	**Item 15.** The recommendations are specific and unambiguous.	**Item 14.** Is the guideline readable and easy to navigate?
	Item 16. The different options for management of the condition or issues are clearly presented.	**Item 1.** Is the guideline readily available in full text?
	Item 17. Key recommendations are easily identifiable.	**Item 2.** Does the guideline provide a complete reference list?
		Item 3. Does the guideline provide a summary of its recommendations?
Date	**Item 14.** A procedure for updating the guideline is provided.	**Item 4.** Is there a date of completion available?
		Item 5. Does the guideline provide an anticipated review date?

Guidelines must be able to relate the strategy used to search for evidence to the methods to formulate the recommendations, and these are requisite for the domain Underlying evidence/Rigour of Development. Items 7 to 10 of AGREE II are equivalent with Items 7 to 10 of iCAHE whereby these items confirm the process of collecting and summarizing the evidence and the formulation of recommendations that are prioritized based on the body of evidence. The linkage between the two processes mentioned above is also considered in Item No. 12 of AGREE II and confirms the line of sight between the evidence and recommendations. Additionally, Item No. 11 in AGREE II presents the advantages and disadvantages of the recommendations, which provides transparency, giving the user a holistic view of the recommendation essential to the decision-making process. Thus, these two supplementary items of AGREE II, together with the four mentioned earlier, shall be included in the consolidated evaluation criteria. For this study, Item No. 13 of AGREE II will be disregarded as it is a prerequisite for the guidelines published and made available online, in other words, at the level of adaptation, which is not yet the case.

Clarity deals with the language and layout of the guideline in which a guideline needs to present a detailed and precise description of the positions/ recommendations appropriate for the situation. The clarity of the guideline provides readers with the confidence of the recommendations stated in the guideline (Machingaidze et al., 2015). The six items (Items No. 2, 3 and 11 from iCAHE and Items 15, 16 and 17 from AGREE II) shall be considered in the consolidated criteria for the reason that the item from iCAHE confirms the overall clarity of the guideline and it being user-friendly reduces the difficulties and

improves the turnout and implementation of the recommendations stated in the guideline (Steinberg, Greenfield, Wolman, Mancher, & Graham, 2011), while AGREE II is specific with the presentation of the recommendations and circumstances.

The last domain mutual to both AGREE II and iCAHE is Date. The requirement was presented as Item No. 14 in AGREE II to provide a procedure to update which shall give the information when and how the guideline entails revision, which is essential on how the guideline will remain valid. However, for this study, a trigger point, which can even be the emergence of new circumstances or potential change of stakeholder's interest, shall entail the revision. Thus the item which shall be part of the consolidated evaluation criteria shall be revised to reflect this. Item No. 4 of iCAHE confirms the completion date of the guideline for the necessity of the guideline to reflect current circumstances. Item No. 5 of iCAHE, which refers to the anticipated review date, shall not be considered as part of the consolidated evaluation criteria as the procedure to up version was already taken into account under the consideration of Item No. 14 of AGREE II mentioned above. Both of the items, the revised Item No. 14 of AGREE II and Item No. 4 of iCAHE, which were considered for this domain substantiate the requirement that the guideline must be based on current circumstances that are evidence of positions concerned and to presents real-time and relevant recommendations.

Exclusive to the iCAHE instrument is the domain Availability, which is not relevant for the study and in the appraisal of an IP ownership guideline. On the other hand, AGREE II has domains that are Applicability and Editorial Independence. The latter is concerned with the formulation of recommendations not being unduly biased with competing interests, which is also not applicable and will not be taken into account. Alternatively, Applicability shall be regarded as part of the consolidated evaluation criteria for IP rights guidelines as it pertains to the likely inhibitors and enablers of the implementation together with its suggested strategy and resource impact once the guideline is applied as represented by Items 18, 19 and 20 of AGREE II. It is translated to a proposed plan or suggestions for implementation for the guideline to become part of the ways of working of users and the probable hindrances for implementation to address it proactively. iCAHE checklist does not include in the assessment the applicability of the guideline and is only being considered after the evaluation (Grimmer et al., 2014). However, it is being included in the consolidated evaluation criteria to provide the users with clear guidance

and direction on the implementation strategy, especially for IP rights guidelines, whereby the lack thereof was already noted. It gives the developer of the guideline the increased confidence that the recommendations will be translated to users' appropriate utilization, thereby making the guideline embedded and in-use. On the other hand, Item No. 21 regarding auditing criteria for monitoring purposes of the guideline is out of the scope of this study, thus being excluded in the consolidated evaluation criteria.

Based on the discussions mentioned in the prior paragraphs, six domains are considered in the consolidation of the evaluation criteria consisting of 23 items for the appraisal of IP rights guidelines, as presented in Table 2.12.

Table 2.12: Domains and related items of the consolidated evaluation criteria

Domains	**Contents**
Scope & Purpose	• The overall objectives of the guideline are specifically described. • The topic questions covered by the guideline are specifically described. • The population to whom the guideline is meant to apply is specifically described.
Stakeholder involvement	• The guideline developers are clearly stated. • The target users of the guideline are clearly defined. • The qualifications and expertise of the guideline developers link with the purpose of the guideline and its end users.
Rigour of development	• Systematic methods were used to search for evidence. • The criteria for selecting the evidence are clearly described • The strengths and limitations of the body of evidence are clearly described. • The methods for formulating the recommendations are clearly described. • The benefits and risks have been considered in formulating the recommendations. • There is an explicit link between the recommendations and the supporting evidence.
Clarity of presentation	• The recommendations are specific and unambiguous. • The different options for management of the situations or issues are clearly presented. • Key recommendations are easily identifiable. • The guideline readable and easy to navigate. • The guideline provides a complete reference list. • The guideline provides a summary of its recommendations.
Date	• The date of completion is available. • A trigger point for the necessity of updating the guideline is provided.
Applicability	• The guideline describes facilitators and barriers to its application. • The guideline provides advice and/or tools on how the recommendations can be put into practice. • The potential resources implications of implementing the recommendations have been considered.

2.4.4 Assessment of the Quality of IP rights guidelines based on the Consolidated Evaluation Criteria

Using the consolidated criteria presented in Table 2.12, which was developed to assess the quality of IP rights guidelines, two evaluators evaluated the four guidelines preselected in **Section 2.3.3**, as recommended by AGREE II developers (Dans & Dans, 2010). The evaluation summary is contained in Table 2.13. Twenty-three items were evaluated using a 3-level scoring assessment for each item (*Successfully Meets*, an item fulfilled by the guideline, or *Partially Meets*, an item not adequately addressed, or *Does Not Meet*, an item not addressed at all). Similar to the scoring method used in iCAHE instrument discussed in **Section 2.4.2**. The purpose of the evaluation was not to verify the validity of these guidelines because these guidelines are currently valid and effective but to ascertain whether these consolidated evaluation criteria can assess by identifying strengths and weaknesses. Otherwise, it is an affirmative exercise for the presence and absence of the items and how these influence the fulfillment of the guideline's purpose. As a general observation, each Assessor has been able to understand the elements required to address them and assess their compliance with the guidelines. There were identical responses in each domain in the four guidelines, although there were some differences of opinion about the details, they were very close (i.e., an assessor assess the item as successfully met, the other assess it as partially met and so on). Assessor 1 and assessor 2 differ in their scores by 5% from the Item-level details, or by 7 items.

It was determined in **Section 2.4.3** that the quality of IP rights management guideline is based on six domains and first of which is Scope and Purpose, and among the domains, it was one wherein the items were mostly met. Furthermore, it is the only domain, which was entirely addressed by one of the guidelines, G4. Based on the evaluation, all the guidelines were able to present within expectations their objective, and the population it is meant to apply, which served as the strength of the guideline are the mandatory elements to be able to identify what the guideline wants to achieve and to whom it is addressed to. This domain requires another aspect: to present the questions covered by the guideline and could be considered as the weakness in which views differed on G1, G2, and G3 on how the questions could be achieved. Assessor 1 views on these guidelines that were not stated explicitly while Assessor 2 estimates that they partially met. The latter may have a more in-depth look at the details, and he was able to understand the

questions in part. This case outlined in Agree II, where questions covered by the guideline need not be formulated as questions in most cases (M. Brouwers, Kho, Browman, & Cluzeau, 2010).

Secondly, the Stakeholder Involvement, it was noted that there was no difference in the responses, reflecting the consensus among each assessor on the existence and absence of evidence, indicating each item involved in the domain. It is a good indicator of reliability, according to Schuler (2013), which indicated this as consistency and precision of assessment procedures. In this connection, he stated that different assessors at the same occasion – arrive at the same judgment. Concerning the items, based on the assessments, the requirement of identifying the target users is fully met by all the guidelines, but they failed to identify the individuals who took part in the development group, and therefore the qualifications and expertise of these cannot be confirmed. This observation weakens the terms of reference for the user to determine the link to guideline development ownership accurately and can only use the name of the organization for reference.

The domain Rigour of Development can be subdivided into two phases wherein the first half refers to the collection and synthesis of evidence, while the second half is the formulation of recommendations from that said evidence. Together, the four guidelines do not provide information on the systematic way to look for evidence and any selection criteria, but mainly provide strengths and limitations in evidence that support recommendations, and make recommendations using decision-making or through steps. Depending on the preceding, the different responses to the recommendations made in both G2 and G3 are likely to be due to how these recommendations are organized, despite some convergence. Since recognized organizations have developed and used the guidelines, assumptions can be made that the recommendations are based on conditions for future visibility and non-dissemination, and therefore no need for further lengthy details often considered on the adaption level by other organizations. There were identical responses from each assessor regarding the benefit and risk item, and the responses were successful to a partial meeting, where G1 and G3 explicitly stated it while G2 and G4 were provided it through the circumstances. The assessment was on the explicit link between the recommendations and evidence varied in G2, where the view of assessor 1 that it fully met and assessor 2 indicated that it was partially met, but was matched in G1, G3, and G4.

On the other hand, Clarity is one of the domains which was adequately addressed by the guidelines confirming the attention given by the guideline developers to the importance of language and layout to reach the understanding of the recommendations to the users. This individual attention was recommended by Guyatt et al. (2016), who stated that good practice statements represent recommendations conceptually to the end-user, should be considered by the developers' panel of the guideline. The key recommendations are identifiable. However, the degree of clarity and unambiguity varied among the guidelines, which was the basis of the appropriate scoring made by the assessors. An exemption to this as the item was not addressed at all by the guidelines is the provision of the reference list. It is aligned with the observations whereby these organizations who developed the guidelines are using their internal system as the basis for their standards without the requirement to solicit counsel outside the organization, which does not dissolve the validity.

With regards to the requirements of the domain Date, which consisted of two items are the date of completion and the procedure for updating. The former was scored by both assessors as thoroughly addressed by all the guidelines, and the latter was not addressed by any of the guidelines. The latter provides a weak point as guidelines are supposed to remain valid for use, and the absence of trigger point to update presents risk on the guideline being obsolete with the emergence of new circumstances. In this regard, Brouwers et al. (2010) stated that the guidelines should reflect ongoing research, a clear statement should be made on the procedure for updating the guideline (i.e., timescales of changes required).

Lastly, Applicability is one of the domains that were poorly addressed by the preselected guidelines. According to the assessment of both assessors as the domain relates to facilitators and barriers, strategies and resource implications of the implementation which are valuable information to create an appropriate mechanism to further enhance the uptake for the guideline and its recommendation by the users. This inadequacy hinders the rapid deployment of the guideline, which is supposed to be an enabler to achieve its objective quickly and to realize the benefits of its use. In support of that, Sabharwal, Patel, Gauher, Holloway, and Athansiou (2014) have discussed the high quality and poor applicability of the guidelines and stated that guidelines with poor applicability are unlikely to be implemented, and practices, therefore, will not improve.

The quality ranking of each of the guidelines using the consolidated evaluation criteria was finalized by summarizing the score with which the guidelines successfully met, partially met, or not met each of the items, as presented in Table 2.13. As a result, G1 is ranked best based on the total number of items with which the guideline successfully meets the criteria. Besides, it ranked first in domains Rigour of Development, Clarity of Presentation and Applicability, and Second in Domain Scope and Purpose. G2, G3, and G4, on the other hand, are relatively comparable in terms of the balance seen on successfully met, partially met, and not met criteria. Thus, there is no ranking concluded among the three.

Table 2.13: Summary of the guideline assessment

Domains	**Content**	**Assessor 1**				**Assessor 2**			
		G1	**G2**	**G3**	**G4**	**G1**	**G2**	**G3**	**G4**
Scope & Purpose	The overall objective(s) of the guideline is (are) specifically described.	●	●	●	●	●	●	●	●
	The topic question(s) covered by the guideline are specifically described.	**o**	**o**	**o**	●	ø	ø	ø	●
	The population to whom the guideline is meant to apply is specifically described.	●	●	●	●	●	●	●	●
Stakeholder involvement	The guideline developers are clearly stated.	ø	ø	ø	ø	ø	ø	ø	ø
	The target users of the guideline are clearly defined.	●	●	●	●	●	●	●	●
	The qualifications and expertise of the guideline developers link with the purpose of the guideline and its end users.	**o**	**o**	**o**	**o**	**o**	**o**	**o**	**o**
Rigour of development	Systematic methods were used to search for evidence.	**o**	o	o	o	**o**	o	o	o
	The criteria for selecting the evidence are clearly described.	o	o	o	o	o	o	o	o
	The strengths and limitations of the body of evidence are clearly described.	●	●	●	●	●	●	●	●
	The methods for formulating the recommendations are clearly described.	●	●	●	ø	●	ø	ø	ø
	The benefits and risks have been considered in formulating the recommendations.	●	ø	●	ø	●	ø	●	ø
	There is an explicit link between the recommendations and the supporting evidence.	●	●	●	ø	●	ø	●	ø
Clarity of presentation	The recommendations are specific and unambiguous.	●	ø	●	●	●	ø	●	●
	The different options for management of the situations or issues are clearly presented.	●	ø	ø	ø	●	ø	ø	ø
	Key recommendations are easily identifiable.	●	ø	●	●	●	●	●	●
	The guideline readable and easy to navigate.	●	**ø**	**ø**	●	●	**ø**	●	●
	The guideline provides a complete reference list.	o	o	o	o	o	o	o	o
	The guideline provides a summary of its recommendations.	●	●	o	o	●	●	o	ø

Domains	Content	Assessor 1				Assessor 2			
		G1	G2	G3	G4	G1	G2	G3	G4
Date	The date of completion is available.	●	●	●	●	●	●	●	●
	A trigger point for the necessity of updating the guideline is provided.	o	o	o	o	o	o	o	o
Applicability	The guideline describes facilitators and barriers to its application.	o	o	o	o	o	o	o	o
	The guideline provides advice and/or tools on how the recommendations can be put into practice.	●	ø	ø	ø	ø	ø	ø	ø
	The potential resources implications of applying the recommendations have been considered.	o	o	o	o	o	o	o	o

Legend: '●' successfully meets criteria 'o' does not meet criteria 'ø' partially meets criteria

Moreover, the rationale behind the evaluation was to carry out a preliminary test that builds confidence in the consolidation evaluation criteria in evaluating the quality of IP rights guidelines. It was observed generally that the four guidelines were able to strongly present their objectives, their target users, its completion date and the recommendations in a way understandable for the users while having the following weaknesses: limited discussion with regards to the evidence-based approach utilized to formulate recommendations, failure to present overall implementation strategy and inadequacy to provide a procedure for revision. The guidelines which were evaluated vary on the extent each one fulfilled each item as the basic requirements of a guideline. However, the consolidated evaluation criteria tailored explicitly for the assessment of IP rights management guidelines were able to assess the overall superiority of one guideline to another using the 23 items, whereby addressing each represents a requirement for the successful implementation of the recommendations of the guideline.

2.5 Summary

This chapter began with the definitions of the concept of crowdsourcing and the adoption of the crowdsourcing process to support software engineering activities, which from there arose the term Crowdsourced Software Engineering (CSE). This is followed by the discussion of the crowdsourcing process wherein a crowdsourcing platform acts as a mediator between the crowdsourcer who seeks online solutions for a software engineering task(s) and a crowd participant who takes part in developing software engineering task(s). After which, different CSE activities were introduced, and since these activities may constitute a potential emergence of a new or pre-existed IP, it was

further identified the existence of concern in IP rights management surrounding the decision on the acquisition level of ownership and the risk of confidentiality and originality in which recommendations and mitigation strategies were presented. Subsequently, a discussion on the online distributed nature of CSE, open-sourcing, and outsourcing models and associated IP rights. Following this was the comparison between the CSE as opposed to in-house employment in terms of the management and control of IP rights and the difference in the handling of rights and liabilities, which solidified the challenges related to the rights of IP management in crowdsourcing process. A table of 51 crowdsourcing platforms supporting CSE activities was subsequently developed, as well as detailed information revealed through the review of the literature to bridge the gap of the unexplored IP rights issue in CSE activities as discussed in Chapter 4 of this study.

In **Section 2.3**, the particular focus was with regards to the IP rights as a tool for necessary protection and further presenting the type of IP rights relevant to software engineering activities as it is a field considered requiring creativity. Consequently, the importance of managing IP rights was discussed together with the perceived consequences of poor IP rights management. Because of the established importance of IP rights management, a comprehensive review of the sound practices in four existing guidelines was progressed. This review revealed that three primary positions for the IP rights ownership and licensing provided by these guidelines and the identification of the thirteen circumstances supporting these three positions, which evolve in general around the value of the newly arising foreground and the pre-existing background. Additionally, this finalized position shall enable the identification of necessary provisions required in a contractual agreement in which in an online marketplace takes form as ‘clickwrap’ and ‘browsewrap.’ A review of the legal issues surrounding the use of these modes of adhesion, together with the characteristic of an enforceable agreement, entailed the superiority of ‘clickwrap’ over ‘browsewrap.’ Using the same guidelines to make known the sound practices, these were also used to structures and components essential to provide a logical decision-making sequence to the end-user, which serves as the basis for the outline of the proposed IP rights guideline.

This chapter also includes discussion on how the two widely-used appraisal criteria for practice guidelines were consolidated, revised, and adapted as a basis for the consolidated

evaluation criteria to appraise the proposed IP rights guideline mainly developed for CSE activities. Further to this, the consolidation evaluation criteria were initially tested through the evaluation of the IP rights guidelines previously selected in **Section 2.3.3**. The criteria were capable of exposing the strengths and weaknesses of the guidelines mentioned above and ranking them on a quality basis.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter outlines the research methods used in the study and the approach the researcher utilized to address the objectives and research questions through the collection, analysis, and presentation of necessary data and information. Figure 3.1 presents the data-flow diagram in which the research was conducted, which was primarily executed in three phases: Phase 1 - Preliminary Study, Phase 2 - Development and Phase 3 -Evaluation and Conclusion. The two main tasks performed in Phase 1 were a review of literature and analyses of IP rights issues and challenges. However, the review of the literature was iteratively implemented throughout the research study, although not shown in the diagram. The analysis of legal documents of crowdsourcing platforms supporting CSE activities directed into the strategies on how these individual platforms deal with IP rights and were able to provide clarity on the starting point of the issue. Also, the analysis revealed the significant similarities and differences in the presentation of the implementation mechanism used in between these platforms on various CSE activities. These inputs finalized the identification of the IP rights issues and challenges, which clarified the ambiguity articulated in previous literature, as detailed in **Section 2.2.3**.

For Phase 2, the three tasks involved were the development, review, and refinement of the proposed IP rights guideline. The first task was conducted through the analysis of existing IP rights guidelines to be able to abstract the sound practices which served as inputs for the recommendations based on the findings retrieved from the analysis of the legal documents as contained in **Section 4.2.6**. Furthermore, a framework for the proposed guideline was developed through the synthesis of the structure and components of these guidelines, which can be referred to in **Section 2.3.5**. After the completion of the first task, the research proceeded to the cyclical tasks, which were the review and refinement of the IP rights guideline conducted in two rounds before Phase 3 Evaluation and Conclusion. The review was performed by a number of expert panels whereby the first round was not only to test the IP rights guideline initially but also to be able to confirm the applicability of the consolidated evaluation criteria for the specific purpose

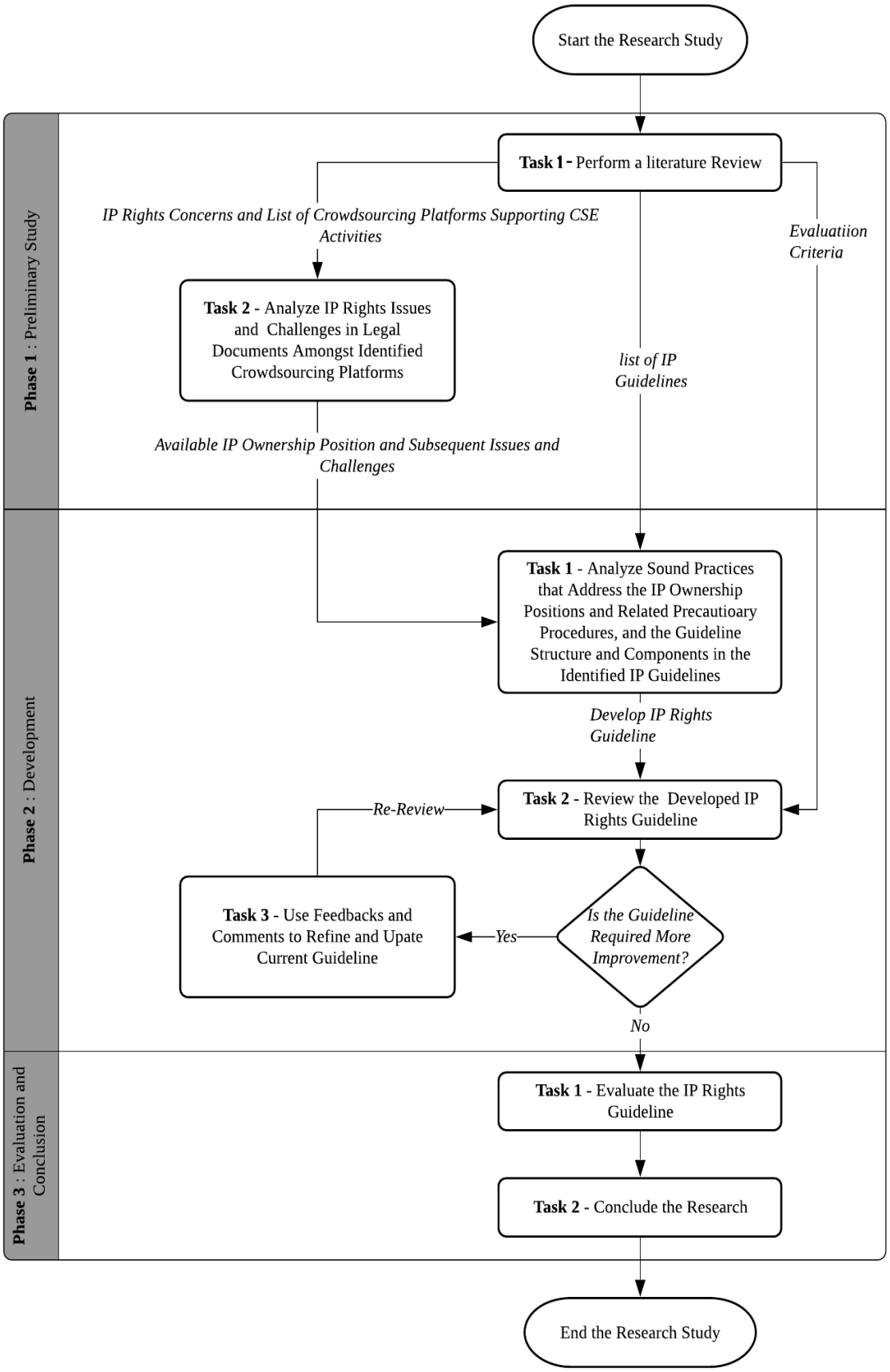

Figure 3.1: General research procedures

of appraising the proposed IP rights guideline. The comments and recommendations for improvement were used to refine the developed guideline and evaluation criteria and then subjected to the second round of review to confirm that the revisions required were done accordingly. After this, Phase 3 was initialized with the same objective as Phase 2 but additionally verifying the findings during the review with a larger sample size from both corporate and academia. After the completion of Phase 3, the research was concluded.

3.2 Phase 1: Preliminary Study

The two tasks undertaken at this phase were a review of literature and analysis of IP rights issues and challenges in crowdsourcing platforms supporting CSE activities. A detailed explanation of each of the tasks and the steps employed during Phase 1 are presented in the sections below.

3.2.1 Task 1: Review the Literature

The research commenced with a careful review of the various publications, which can be in the form of conference papers, journal papers, technical reports, and books to describe the search on crowdsourcing that dealt with at least one activity (directly or indirectly) involved in software engineering and IP rights. CSE activities can be in the form of software analysis, software design, software coding, software testing, software evolution, or software maintenance, as described by the IEEE Computer Society definition of software engineering (Bourque & Fairley, 2014). Literature was reviewed throughout the research to provide a list of crowdsourcing platforms supporting various CSE activities and acquiring information about the current state of IP rights management and control. Further to this was the identification of IP rights concerns in CSE activities. Also, the literature review was done to have a deeper understanding of IP rights in terms of protection tools utilized in software engineering activities and the importance of proper management and control of IP and the consequences of the poor or lack of it.

Furthermore, review of literature progressed to provide a list of IP rights guidelines intended for IP management and control of a number of organizations for the abstraction of sound practices, which served as a basis for the recommendations required for effective handling of IP rights among the stakeholders in crowdsourcing process. In addition to

this was to make known of online contractual agreement options available and which was typically employed by the crowdsourcing platforms. Moreover, literature was also reviewed to identify the evaluation criteria aids in appraising the overall quality of the proposed IP rights guideline. Furthermore, the literature was reviewed to determine evaluation criteria that aids in assessing the overall quality of the proposed IP rights guideline. Besides, a literature review was undertaken to identify primary methodologies in conducting document analysis particularly relevant in conducting the analysis required to be able to identify IP rights issues and challenges and sound practices of IP management and control.

3.2.2 Task 2: Analyse the IP Rights Issues and Challenges in Legal Documents amongst Crowdsourcing Platforms

An analysis was conducted in this research to investigate the current IP rights management and control strategy of existing crowdsourcing platforms that support various CSE activities to be able to identify IP rights issues and challenges prevailing in the mechanisms. As stated by Holliday (2007) and Corbin and Strauss (2008), document analysis is a systematic procedure conducted by reviewing documents available, which may be printed or electronic. After this, the data collected is subsequently analyzed and interpreted to draw out meaning and understanding, thereby developing empirical knowledge. Bowen (2009) defines a document analysis method as "…*a systematic procedure for reviewing or evaluating documents.*" (p.27) In addition to this definition, Wach and Ward (2013) reinforced that the qualitative document analysis, which is a method used to extensively analyze the contents of a written document in an organized manner, is particularly useful in the extraction of information about trends and gaps on policy and practice documents.

The document analysis process used in this study, as shown in Figure 3.2, was derived from Wach and Ward (2013), which is a reframed methodology based on Altheide and Schneider (2013) from their publication 'Process of Document Analysis.' Figure 3.2 illustrates the necessary steps and activities performed in the analysis. It includes five major steps that involve the following: (i) selecting documents, (ii) collecting documents, (iii) identifying themes for analysis, (iv) analysis of documents, and (v) finalization and overall analysis. As illustrated in Figure 3.2, particular steps may require completion of

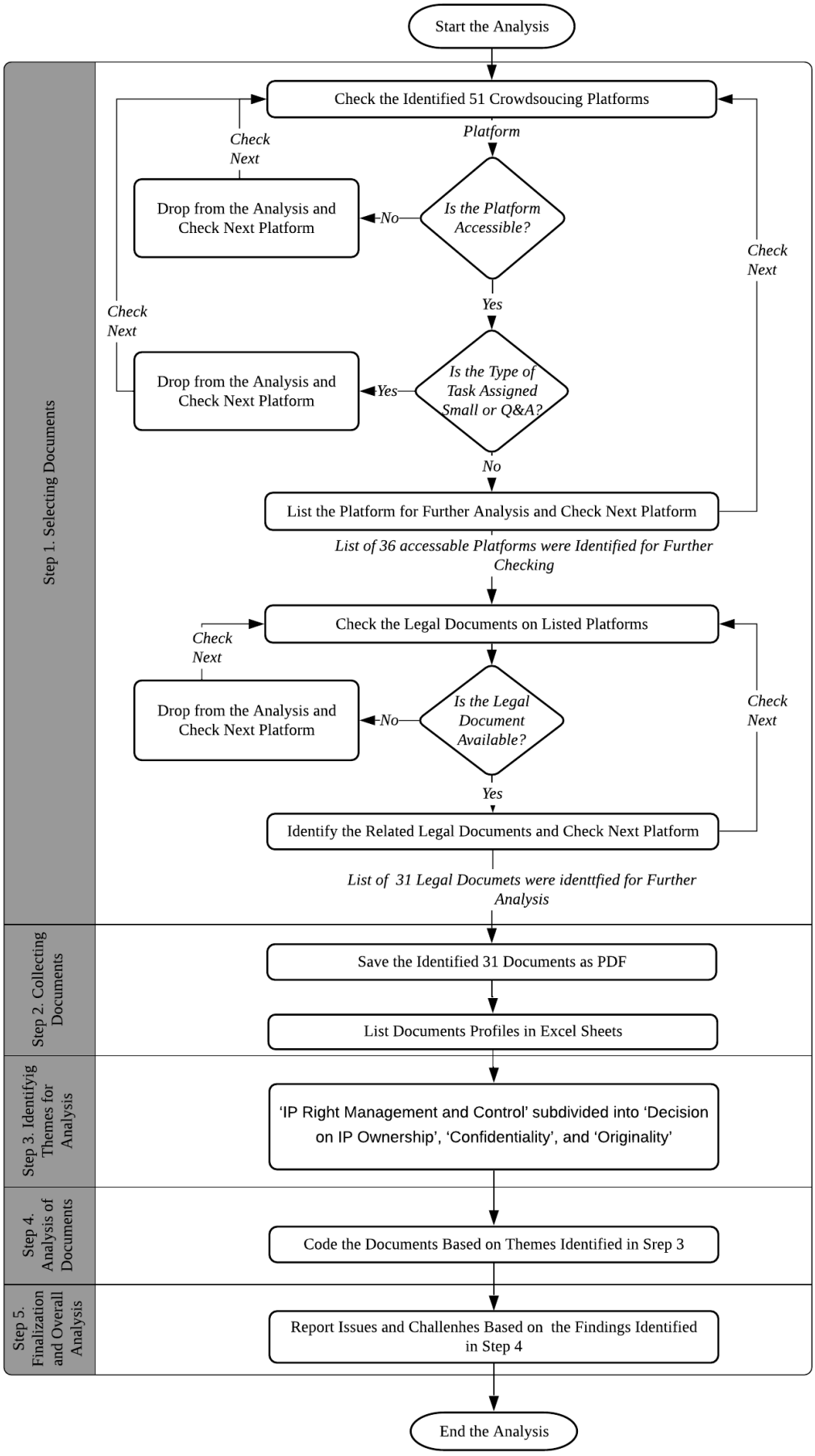

Figure 3.2: Diagram for phase 1- task 2 documents analysis

a series of activities which are implemented sequentially to yield deliverable(s). Such for instance, the step 'selecting documents' is consisted of activities beginning with the 'check the identified crowdsourcing platforms' listed in **Section 2.2.5,** followed by 'check platforms availability and accessibility' activity which will eliminate inactively and inaccessible platforms at the moment of conducting the study. An updated list shall be available as the result of this and shall be followed by the commencement of the activity 'check the task type provided by the platforms'. The last activity in the series, which is 'check legal documents available on platforms', will proceed after the exclusion of platforms not meeting the criteria. Further information on the activities involved for each of the main steps in conducting the analysis is expounded in the respective subsections.

3.2.2.1 Step 1: Setting Inclusion Criteria for Documents

As recommended by Wach and Ward (2013), during the selection of documents for analysis, the following should be considered: what organizations would be included, what types of documents would be reviewed, and when are these documents published and issued. In this analysis, from the crowdsourcing platforms available on the literature review, inclusion criterion for the first round (on 'software engineering') was that they support any software engineering activities (refers to 'software analysis,' 'software design,' 'software coding,' 'software testing,' 'software verification,' 'software evolution' and 'software maintenance'). In the first round of the selection process, 51 crowdsourcing platforms were included. For the second round (on 'availability'), crowdsourcing platforms must be currently available to the public online. In the second round of the selection process, 10 crowdsourcing platforms were eventually dropped as they were no longer available to the public, and 3 were excluded as they were linked to the same webpage. In the third round (on 'type of tasks'), it was set according to Stol and Fitzgerald (2014) because IP concern doesn't loom large in a small task (i.e., HITs), 2 of the identified online crowdsourcing platforms were excluded as they provide only small task services and question and answer. After the third round of selection, 36 platforms were available. These platforms support CSE activities, available and accessible, providing services to users. Final round (on 'available legal documents'), crowdsourcing platforms were looked into for the legal documents, which is a reflection of their current IP management strategy. Types of documents reviewed for the analysis included

platforms ‘terms and conditions’, ‘terms of use,’ ‘privacy policy,’ ‘terms of service,’ ‘terms and privacy,’ ‘policy,’ ‘copyright infringement policy,’ ‘legal,’ ‘user agreement’, ‘legal terms’ and ‘participation agreement.’ No information was found on 5 out of the 36 crowdsourcing platforms. Thus, a total of 31 crowdsourcing platforms were selected for further analysis using their legal documents.

The most recent publication date at the time of the conduct of the analysis was considered to provide a definite ringfence on the selected documents avoiding any changes or new updates in legal documents over time, which may influence the findings of the research. The information collected was analyzed using timeline analysis, which mainly focused on those which were available and published prior 2016, which is according to the year when the crowdsourcing platforms were selected, and the year the study was initiated.

3.2.2.2 Step 2: Collecting Documents

Legal documents were collected from the selected crowdsourcing platforms and were saved in PDF files to create their profiles. All documents were listed in an excel spreadsheet with label ID and were linked to the related crowdsourcing platforms. It was conducted to organize the data required before proceeding for further analysis.

3.2.2.3 Step 3: Identifying Themes for Analysis

Since the analysis tends to interpret more on the IP rights concerns identified from the literature review, a deductive approach was used to narrow the gap that needs to be addressed by analyzing the 31 legal documents filtered in Step 2 of the selected crowdsourcing platforms in Step 1. This type of document analysis tends to be more interpretative since analysis is shaped and informed by problem areas, research questions and/or key concepts brought by the researcher to the study (Braun & Clarke, 2006; Cruzes & Dyba, 2011). The deductive approach can involve seeking to identify themes identified in other research studies in the data set as a lens through which the data can be organized, coded, and interpreted the data (Cavanagh, 1997; Kondracki, Wellman, & Amundson, 2002). In other words, the deductive approach includes access to data with some preconceived themes you would expect to find reflected there, based on existing knowledge. Therefore, the legal documents were initially reviewed and analyzed by

reference to one central theme, ‘IP Right Management and Control’. It was divided into sperate sub-themes of ‘Decision on IP Ownership’, ‘Confidentiality’, and ‘Originality’ that literary researchers consider relevant in understanding current IP rights issues and challenges. However, with continued analysis, it was observed that the ‘Decision on IP ownership’ was not found in some documents, while ‘Confidentiality’ and ‘Originality’ were not found at all. It was also recognized during the analysis that the researcher needed to be more profound in understanding certain legal documents written in jargon languages in how they define ‘IP rights.’ It was set straight that the primary objective of this analysis is the presentation of the current state of IP rights management and control compared to the expectation on what the crowdsourcing platforms shall include in their legal documents and how they apply it to their practices (i.e., ‘IP ownership positions’).

As will be discussed in more detail in Step 4, after the completion of the rounds of review of legal documents, the selected theme previously mentioned enabled to have a comprehensive understanding of IP rights issues and challenges. This theme was considered critical in the scale of CSE activities amongst stakeholders studies and constituted the baseline in the development of new IP rights guidelines for crowdsourcing platforms, among these studies are (Ford et al., 2015; Mao et al., 2017; Peng et al., 2014; Vinaja, 2016).

3.2.2.4 Step 4: Analysis of Documents

Each legal document was analyzed to determine the considerations of the crowdsourcing platforms with regards to the sub-themes selected, which are ‘Decision on IP Ownership’, ‘Confidentiality,’ and ‘Originality.’ Texts which are relevant to the sub-themes were highlighted and coded using a data analysis software (NVivo). The analysis of the particular text of the three sub-themes was based on its meaning, relevance and context rather than relying on the frequency of keywords and after which, the crowdsourcing platform was classified as ‘crowdsourcer,’ ‘crowd,’ ‘platforms’ or ‘unknown’ using the following criteria:

- A platform which was categorized as ‘crowdsourcer’ would have to include clear and consistent references to a legal statement declaring that the crowdsourcer owns any foreground created by the crowd.

- A platform that was categorized as ‘crowd’ would have to include clear and consistent references to a legal statement declaring that the crowd owns any foreground created by them.
- A ‘platform’ category would indicate that the legal document includes statements wherein the platform owns any foreground created by the crowd, or in cases that the legal document does not include any statement to assign, grant or delegate the crowdsourcer or crowd any rights to own any foreground created by the crowd.
- A category ‘unknown’ signified the lack of information attributable to ownership rights of the foreground.

3.2.2.5 Step 5: Finalization and Overall Analysis

The resulting data from Step 4 were analyzed to classify crowdsourcing platforms into categories as crowdsourcer, crowd, platform, and unknown to assist in aggregation and data presentation. The categories were then compared to each other to identify their mechanisms in dealing with the foreground and to understand the existence of gaps in their mechanisms as compared to the expectation of proper management and control. This drove to the understanding and identifying specific IP rights issues and challenges whereby the presence was articulated by previous literature.

3.3 Phase 2: Development

There were three tasks undertaken at this phase of research. First was the development of the IP rights guideline and followed by the cyclical steps, which were review and refinement. The details of the methodology employed in the tasks mentioned above were as per the following sections.

3.3.1 Task 1: Develop the IP Rights guideline

This research proposes a concrete guideline encompassing the integrated CSE activities detailing evidence-based recommendations to the crowdsourcing platforms. Based on the proper management and control of IP rights to provide a definite direction to improve their process in broadcasting and assigning mechanisms. The input to build and define the recommendations in the guideline was mainly based on the review of literature and

document analysis. With the results of the review and the findings of the analysis, the research continued with the development of the guideline specific for the IP rights management and control. Figure 3.3 illustrates the Input-Process-Output (IPO) diagram detailing the development of the IP rights guideline and consolidated evaluation criteria.

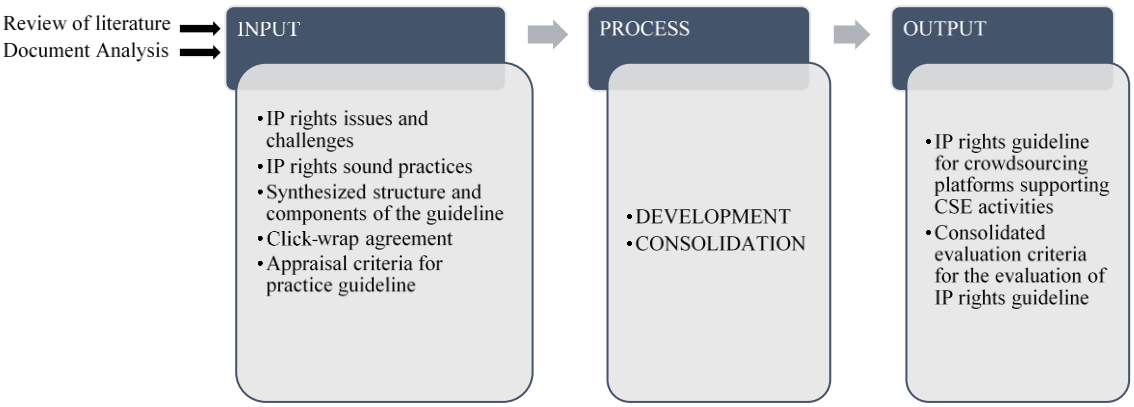

Figure 3.3: IPO diagram for the development of the IP rights guideline and consolidated evaluation criteria

In order to build the proposed IP rights guideline, the legal documents were analyzed, and the existing IP rights guideline were reviewed and was able to abstract the sound practices to be able to know the standard rules or instructions. Furthermore, the circumstances revolving around the value of the foreground to enable the creation of the decision-making process regarding the foreground ownership and licensing options were identified (**Section 2.3.3**). As part of the identification of sound practices, available online contractual agreements were also reviewed to be able to conclude which form is superior to deliver an enforceable agreement ensuring the delivery of transparency and fairness between entities (**Section 2.3.4**). Following this, the synthesis of the structure and component of the guideline was conducted to ensure that the logical presentation of the recommendations (**Section 2.3.5**). This is followed by the development of consolidated evaluation criteria as the lack of it specific for IP rights guidelines was identified through the use of two widely used appraisal criteria for practice guidelines. The domains essential to ensure the quality of the IP rights guideline and the items to provide a unique dimension for the domain were identified as part of the consolidation (**Section 2.4.3**). The IP rights guideline using the consolidated evaluation criteria proceeded to two rounds of review and refinement to improve the guideline, as discussed further in the next sections.

3.3.2 Task 2: Review the IP rights guideline

The main objective of the review task was to assess the extent to which the items of the consolidation evaluation criteria were addressed in the developed IP rights guideline and the ability to confirm their application. This task involved five experts selected as the primary data source to participate in the review-refinement-review rounds and to nominate other experts to participate in the evaluation task (see **Section 3.4.1**). Table 3.1 summarizes the information with regards to the expert panel's field of expertise, length of working experience, and origin. As shown in Table 3.1, each of the experts has minimum 5 years of experience in IP/IP rights, Cyber Law, Information and Communication Technology Policy, Cloud Data Protection, Technology Transfer, Information Technology Law, and Contract Law. It can suggest the reliability of the expert's opinion with regards to the developed guideline and the consolidated evaluation criteria specific for its appraisal. Also, the differences in the origin were to take into account the probable differences in the legal considerations as it may vary dramatically depending on the origin of the practice. In addition, it was ensured that this expert panel was available to complete the review-refinement-review process. Therefore, a commitment was requested at the beginning of the task to ensure that they have sufficient time for consideration.

Table 3.1: Experts' demographics of the evaluation phase

Info	Reviewer 1	Reviewer 2	Reviewer 3	Reviewer 4	Reviewer 5
Field of Practice	Cyberlaw, Information and Communication Technology Policy	IP law, Cyberlaw-Policy	Technology Transfer, IP Law	Cyberlaw, Data Protection	IP Law, Cloud Data Protection
Length of Work Experience	8 years	15 years	15 years	5 years	6 years
Origin	Jordan	Jordan	Malaysia	Philippines	Mauritania

The execution of Phase 2 Task 2: Review and Phase 3 Task 1 Evaluation (see **Section 3.4.1**) was designed using the Delphi method. According to (Skulmoski, Hartman, & Krahn, 2007), the Delphi method is *"an iterative process used to collect and distill the judgments of experts using a series of questionnaires interspersed with feedback."* One

of the distinct features of the method is that it exhibits flexibility with regards to the method of structuring the model concerning the number of rounds and sample size with an endpoint to achieve consensus. Delbecq, Van de Ven, and Gustafson (1975) suggested that a two or three round is sufficient for most research. A 3-round Delphi method is the most typical design as utilized by several studies conducted by (Brancheau, Janz, & Wetherbe, 1996; Brungs & Jamieson, 2005; Duncan, 1995; Niederman, Brancheau, & Wetherbe, 1991). While there are often several rounds of Delphi, Skulmoski et al. (2007) stated that the methodological orientation in the designated rounds must be determined whether qualitative, quantitative, or mixed methods, as appropriate. With this in mind, these options help to add precision to the method. Several research studies commenced with qualitative, followed by quantitative analysis of succeeding round Likert-style questions, among these studies are (Friend, 2001; Good, 1998; Prestamo, 2000; Richards, 2001; Rosenbaum, 1986). On the other hand, the sample size in Delphi studies has been on a case to case basis depending on the availability of experts and resources (Akins, Tolson, & Cole, 2005). Reid and professions (1988) noted that a sample of experts could vary from 10 to 1685. Less than 10 sample sizes are rarely conducted (Akins et al., 2005). However, a study conducted by Lam, Petri, and Smith (2000) was executed with only 3 participants. Thus, the Delphi technique can be effectively adjusted to meet the specific study needs (Rowe & Wright, 1999).

Based on the previous, the technique was modified for this study using a two-plus-one round process during the review and evaluation phases with the sizes of experts as 5 and 28, respectively with consensus which can be defined as ‘reviewed guideline’ after Round 2 of review task and ‘evaluated guideline’ after the evaluation task. Figure 3.4 represents the illustration of the modified Delphi technique utilized to achieve the purpose of this study. A qualitative Delphi method was approached during Round 1 and Round 2 of controlled comments and recommendations using consolidated evaluation criteria presented in **Appendix A**.

Moreover, in this qualitative approach, feedbacks of the expert panel were solicited on narrative statements using 3-ranks rated as ‘Yes,’ ‘Somewhat,’ and ‘No.’ Each of these ratings is described to enhance the consistency in the meaning of participants’ responses, which are inspired by (Thurstone & Chave, 1929). For example, the ‘Yes’ rating description refers to a full agreement with the item as written without any modifications

required. The description of a rating 'Somewhat' may be an agreement with a simple modification, but it is crucial. Finally, the 'no' rating could be completely disagreement and/or cannot fully understand the requirements of the item; thus, I can't evaluate. This qualitative Delphi process was described by Sekayi and Kennedy (2017), as *"quantitative results are presented on qualitative data."* (p.2756) On the other hand, a quantitative approach was used in Round 3 evaluation, using the modified consolidated evaluation criteria to verify the responses of the first two rounds of review task and calculate the overall quality assessment for each domain, the participants' responses were solicited inform of 6-likert scale along with feedback if further revision is required (see **Section 3.4.1.6).**

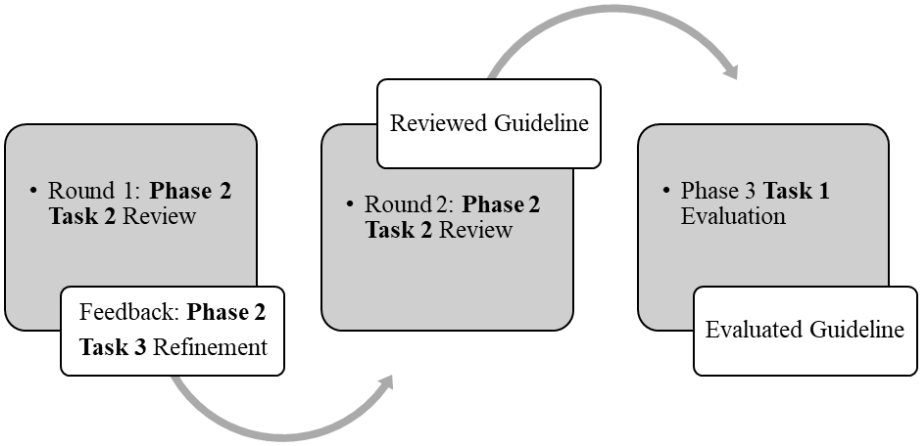

Figure 3.4: Two-plus-one Delphi rounds

As illustrated in Figure 3.4, two rounds of the review were conducted with specific tasks as follows:

- Round 1 – To test the developed IP rights guideline using the consolidated evaluation criteria to solicit comments and recommendations for improvement.
- Round 2 – To ensure that the comments and recommendations for improvement were addressed by the IP rights guideline and the consolidated evaluation criteria.

For the expert panel to be well aligned with the objectives of the review, the researcher and expert panel discussed the following:

- The researcher provided an introductory poster to present the crowdsourcing process during the discussion and highlight the mechanisms of broadcasting and

assigning to provide clarity on the subject matter, which was handed over to the expert panel throughout the evaluation.

- The expert panel was asked to write and express his/her comments and recommendations for improvement through the consolidated evaluation criteria provided.

3.3.3 Task 3: Refine the IP Rights Guideline

This task involved analyzing all changes and improvement recommendations as well as other comments and feedbacks collected in between the two rounds of review. The refinement process involved the implementation of changes in the guideline and the consolidated evaluation criteria from the solicited comments and recommendations from Task 2. Comments and recommendations from the expert panel were taken into account and were assessed by the author whether to proceed for 'Revision' or 'Response,' which was documented in a 'Table of Amendments,' presented in **Appendix B**. Whether a response or revision from either the guideline and/or in the consolidated evaluation criteria was entailed, the details were recorded accordingly. The 'Table of Amendments' was sent to the expert panel together with the revised guideline and/or consolidated evaluation criteria, if required. After the refinement, Round 2 of the review process was undertaken wherein the acknowledgment of the expert panel with regards to the acceptance of the revision or response was required and was given a field where they were able to put any other remarks.

Further to this, the reviewed guideline proceeded for the evaluation process. A detailed description of the materials and methods used in the last phase of the research is presented in the next section of the study.

3.4 Phase 3: Evaluation and Conclusion

The two tasks undertaken at this phase were the evaluation of the reviewed IP rights guideline and the conclusion of the study. The details of each of the tasks, including the steps which were completed during this final phase, are explained in further sections below.

3.4.1 Task 1: Evaluate the IP Rights Guideline

Six steps were taken during the evaluation process of the reviewed IP rights guideline, as shown in Figure 3.5. The steps included were done sequentially as follows: setting evaluation objectives, planning and scheduling the evaluation, preparing evaluation instruments, selecting the expert panel, administering the evaluation, and performing data analysis. A detailed description of the methods of each of the steps is presented in the sections below.

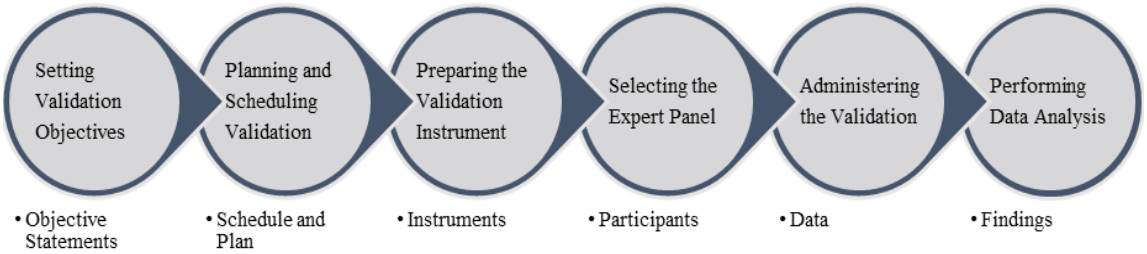

Figure 3.5: Phase 3 - task 1 steps in evaluating IP rights guideline

3.4.1.1 Step 1: Setting Evaluation Objectives

The main objective of this task was to assess the overall quality of the developed IP rights guideline and to be able to confirm the applicability of the consolidated evaluation criteria for the specific purpose of appraising IP rights guidelines using a larger expert panel. Step 4 detailed the selection process for the expert panel involved in this phase. Besides, it was performed in the research to verify the results of cyclical rounds of review and refinement of the guideline, which were conducted during Phase 2 of this research methodology.

In order to assess the quality of the guideline, the guideline was evaluated based on six domains: scope and purpose, stakeholders' involvement, rigour of development, clarity of presentation, date, and applicability.

3.4.1.2 Step 2: Planning and scheduling the Evaluation

The evaluation task was planned to be completed in the 4-week time, given the demographics of the expert panel involved in this phase (See Step 4). The lead time was

set based on the time it was taken for the feedback from the reviewers were finalized, but taking into account that two rounds of review-refinement cyclical tasks were undertaken. This lead time was expected to be sufficient even with the expected increase in the number of the expert panel involved in this phase of the study.

3.4.1.3 Step 3: Preparing Evaluation Instruments

In order to achieve the objectives of this task, soft and hard copies of the following documents were prepared: (1) reviewed IP rights guideline for evaluation; (2) introductory poster regarding the general crowdsourcing process; and (3) consolidated evaluation criteria for the assessment of the IP rights guideline.

The reviewed IP rights guideline was comprised of 3 sections. The first section was an overview of the guideline, which detailed the content of the guideline in the form of a diagram. The second was the introductory section which included the Background which served as the basis of the context, Definitions of the key terms introduced in the guideline for a uniform understanding, Purpose, Scope which detailed the applicability of the guideline in terms of circumstances, category, intended users and the targeted population for which the guideline can be applied and Statement of Policy which represented the principles governed the content of the guidelines. Lastly was the Guidelines, which included the ownership and licensing positions wherein the scope of the ownership, benefits, and risks of the position in consideration and the circumstances which support the rationale behind the specific position were explicitly detailed. In addition, a Step-by-Step Guide to the Ownership and License Agreement consisting of a logic flowchart, a repeated pseudocode format for ease of use, and a detailed procedure to be performed to achieve the ownership and license agreement. Along with this procedure were examples of circumstances and recommendations for the easy understanding of the reader and to increase the uptake and confidence in the use of the guideline. Moreover, the section of the guideline presenting its development process was included to exemplify the body of evidence utilized for the proposed recommendations.

The introductory poster contains a diagram of the interaction among the three stakeholders involved in the general crowdsourcing process, which are the crowdsourcer, crowd, and crowdsourcing platform facilitator. Together with these are the sequential

steps of the crowdsourcing process that each of the stakeholders must be undertaking for seamless process flow. These mainly focus on the mechanisms which were considered essential for IP rights management in CSE activities, which are the task broadcast mechanism and task assignment mechanism. The introductory poster was utilized to align the concept of the general crowdsourcing process to the expert panel involved in the evaluation activity.

Lastly, the consolidated evaluation criteria during this task were composed of a 23-item list to represent the 6 domains that were finalized as essential for appraising IP rights guidelines, as presented in **Appendix D**. The items in the consolidated evaluation criteria were arranged to be able to individually assess each domain as part of the objective of Phase 3 of this study. During the assessment, the expert panel used the reference section of the guideline indicated in each of the items with the expectation that this section is addressing the requirement of the specific item to achieve the fulfillment of the domain. The consolidated evaluation criteria utilized a 6-point Likert scale depending on the degree of the agreement or disagreement of the expert panel with regards to the satisfaction of the guideline section references provided to the expectation of the item representing a particular domain. For easy navigation, the expert panel simply placed a tick mark on the box from Strongly Agree as the highest degree of the agreement until Strongly Disagree to express the opposite. Also, a section was provided for Remarks as the expert panel was required to specify on the given space any remarks regarding the disagreement to the item in this criteria. In addition to this, a section to place the details of the demographics of the expert panel during the evaluation, which they individually recorded, was provided in this document.

3.4.1.4 Step 4: Selecting the Expert Panel

This evaluation task employed a Delphi method, as discussed in **Section 3.3.2**. Therefore, since the outcome of the Delphi method is based on the opinions of experts, the selection of research participants is a crucial element of Delphi's research (Ashton, 1986; Bolger & Wright, 1994; Parente, Anderson, Myers, & O'brien, 1984). As experts opinions are required, a purposive sample is essential where experts are nominated not to represent the general population, but rather their ability as experts to answer questions of inquiry (Fink, 2015). Thus, the selected expert panel may be identified through a nomination

process as this shall lead to the identification and selection of individuals specific aligned for the study based on their characteristics and qualifications (Jones & Twiss, 1978). Ludwig (1997), stating that "*solicitation of nominations of well-known and respected individuals from the members within the target groups of experts was recommended*." (p.52) To identify the experts in a particular field, this can be achieved through the type of non-probability sampling, which is a snowball technique or chain referral process (Habibi, Sarafrazi, & Izadyar, 2014). This process was therefore initiated by the five experts' panel, which was involved in participating in the review round as primary data sources (as specified in **Section 3.3.2**), and these experts nominated another potential primary data source to generate an additional expert panel for the participants in the evaluation round. The process was conducted repetitively until the selected experts do not propose any other nomination, or no response was received from the nominated experts.

Regarding setting the criterion in selected participants of this evaluation task, there is no exact standard in literature stating a particular method (Hsu & Sandford, 2007). However, this does not dilute the importance of the careful selection of expert panel as this is considered as the 'keystone to a successful Delphi study'(Stitt-Gohdes & Crews, 2004). Aspect for consideration includes the areas of discipline a particular individual is considered an expert as Delphi is a method whereby expert opinion is extracted (Hsu & Sandford, 2007). In selecting the expert panel, eligible individuals must have not only related background and experience regarding the subject matter but also the capability to impart inputs through an active communication skill with sufficient time to spend throughout the whole exercise is a requirement (Adler & Ziglio, 1996; Pill, 1971; Skulmoski et al., 2007).

Taking into account the above considerations and ensuring the credibility of the sample of a selected expert panel for this study, an expert panel was defined as a person who has a minimum 5 years of experience in IP/IP rights, Cyber Law, Information and Communication Technology Policy, Cloud Data Protection, Technology Transfer, Information Technology Law, Contract Law, and any other relevant fields'. In order to ensure the adequacy of the immersion of the expert panel in the field. After which, the identified 30 expert panel was then approached through personal visit or e-mail to get their commitment to participate and to ensure that effective communication exists

between the researcher and the expert panel. Once the identified expert panel provided consent, the evaluation task proceeded to the next step, which was to administer the Evaluation.

3.4.1.5 Step 5: Administering the Evaluation

The approaching strategy was based on the demographics of the expert panel to increase the response rate from the selected expert panel. If the selected expert panel is based in Malaysia, the approach undertaken was by on-site visit at the time of the panel's convenience and distribution of a hard copy of the evaluation instruments. If the selected expert panel is based overseas, the approach was by either handing over a hard copy of the evaluation instrument through a middleman or by sending over soft copies via e-mail. Then, sufficient time was given to the panel for the review of the document by requesting a follow-through date that was requested to avoid unnecessary follow-ups. Once the committed follow-through date approached, an on-site visit or an email depending on the circumstances, was done.

The execution of the Evaluation task spanned for 8 weeks, which was an extended schedule as compared to the anticipated 4-week timeline initially planned. The turnout percentage of the expert panel is 93%, with 28 participated from the 30 who were initially planned to participate. 2 of which were unable to participate due to time constraints. Table 3.2 presents the summary of the 28 expert panel who participated in Phase 3, Task1: Evaluation.

Based on the field of practice, as can be seen in Table 3.2, the expertise of the expert panel cannot be aggregated to categories as one-panel experts may be experts in a lot of fields. Thus, an analysis of exclusivity cannot be conducted. A panel expert, as defined in **Section 3.4.1.4**, is a person who has a minimum 5 years of experience in IP/IP rights, Cyber Law, Information and Communication Technology Policy, Cloud Data Protection, Technology Transfer, Information Technology Law, Contract Law, and any other relevant fields' and is met as per Table 3.2. In addition, as snowball sampling was used for this research study, it serves as a confirmation since an initial expert panel nominated their fellow expert. Figure 3.6 presented the distribution of experts concerning their length of experience and origin of the practice.

Table 3.2: Experts' demographics of the evaluation task

ID	Filed of practice	Length of work experience	Origin
E1	Cyber Law, Information Technology Law, IP Law	9 years	Malaysia
E2	Cyber Law, Security	7 years+	Philippines
E3	Cyber Law, Data Protection	6 years	Philippines
E4	Cyber Law, Computer Law, IP Law	12 years	Philippines
E5	Cyber Law, Computer Law, Information technology Law	7 years	Philippines
E6	Cyber Law, Computer Law, Information Technology Law, Administrative Law, Law of Evidence, Constitutional Law	13 years	United State
E7	Technology Transfer, IP Law, Cyber Law	19 years	Philippines
E8	Contract Law, IP Law	10 Years	Iraq
E9	Cyber Law, Privacy	10 years+	United State
E10	IP Law, Technology Transfer	15 years	United Kingdom
E11	Cyber Law	8 years	Nigeria
E12	Cyber Law, IP Law, Privacy	6 years+	Syria
E13	Cyber Law, knowledge Transfer	15 years	Malaysia
E14	Cyber Law, Technology Transfer	13 years	Malaysia
E15	Cyber Law, Commercial Law, Language Law	9 years	Jordan
E16	IP Law, Information Technology Law	23 years	Jordan
E17	Cyber Law, IP Law Privacy	6 years	Jordan
E18	Cyber Law	8 years	Jordan
E19	Cyber Law, Data Protection	10 years	Jordan
E20	IP Law, Online Dispute Resolution	8 years	Jordan
E21	Cyber Law, Data Protection	12 years+	Jordan
E22	Cyber Law, Security	7 years+	Malaysia
E23	Cyber law, Data Protection	6 year	Malaysia
E24	Cyber Law, Computer Law, Intellectual Property	12 years	Iraq
E25	Cyber Law, Computer law, Information Technology Law	7 years	Nigeria
E26	IP Law	15 years	Jordan
E27	Cyber Law, Commercial Law, Language Law	9 years	Jordan
E28	Cyberlaw, Information Technology Law, IP Law	9 years	Malaysia

On the basis of length of experience, 54% (15 out of 28) members of the expert panel have 6 to 9 years of experience, while 39% (11 out of 28) has 10 to 15 years of experience. A small proportion (2 out of 28) has experience of >15years. This demographic analysis is to be able to ensure that not only a particular group of the length of expertise takes the majority of the sample population and to ensure that the criteria for an expert panel are met.

Lastly is the distribution based on the origin of the practice. This is of particular relevance to confirm the general acceptance of the IP rights guideline given the probable differences in the legal considerations of different countries. 43% (12 out of 28) represented Middle East Asia, 39% (11 out of 28) were from Southeast Asia, while the remaining were from the US, UK, and other countries the expert panel has been practicing.

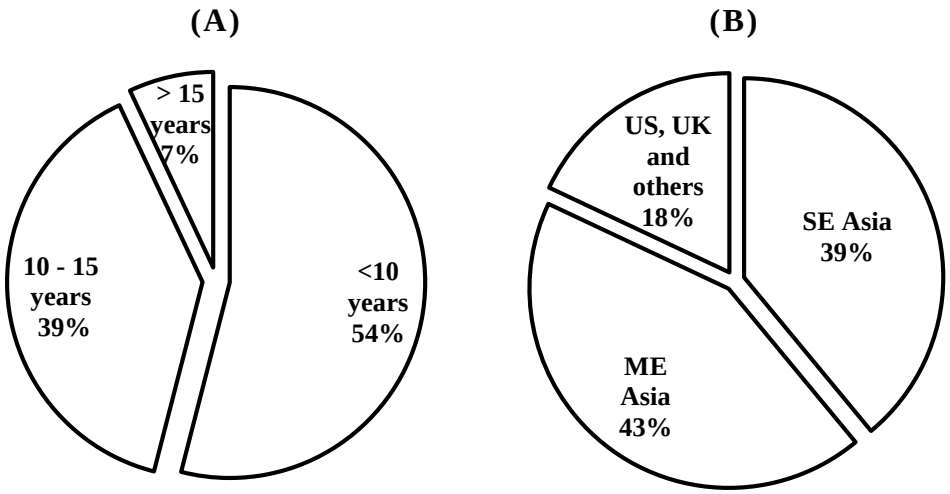

Figure 3.6: Pie chart illustration of a length of experience and origin of the practice

3.4.1.6 Step 6: Performing Data Analysis

As mentioned in **Section 3.4.1.3**, a 6-point scale was adapted from the 7-point Likert scale of AGREE II, one of the chosen evaluation criteria for guidelines utilized for the consolidation conducted in **Section 2.4**. The 6-point scale gives more specificity compared with a binary or 2-point scale used by the iCAHE checklist as it provides more granularity to the responses of the evaluators. Besides, a study conducted by Diefenbach, Weinstein, and O'reilly (1993) to investigate the variability between different Likert point scales which included 2-point, 5-point, 7-point, 9-point, 11-point, 12-point, and

percentage (100-point) varieties and concluded that the increase in number does not necessarily improve the performance of scale. Moreover, it identified that a 7-point Likert scale performed well, among others. Confirming this study was Lewis (1993) pointing out that the mean difference and t-test results of a 7-point scale has stronger correlation than that of a 5-point scale, therefore, recommending the use of it for research purposes.

In this evaluation task, a 6-point scale was utilized by removing the mid-point "Neither Agree nor Disagree" or "No opinion" of a 7-point Likert scale. To avoid cognitive workload as part of 'Theory of Survey Satisficing' whereby respondents have to create a judgment on a question that translated to the response. However, when the amount of cognitive work goes beyond the motivation or ability, respondents tend to look for a way to dodge the question and opting for the midpoint (Krosnick, 1991). Therefore, this does not improve the readability of the data. It can be argued that a respondent may not have an opinion for a given item; thus, a mid-point is required. However, **Section 3.4.1.4** established that, as part of the expert panel of this evaluation activity, the minimum requirements were met. It is presumed that the expert panel possesses an adequate amount of knowledge on the topic, which means that the expert panel can possess opinions to render appropriate judgment using evaluation criteria.

The expert panel involved in this study comprised a sample size of 30 selected through a non-probability snowball sampling technique meeting the characteristics of an expert panel, as discussed in **Section 3.4.1.4**. The experts rated the content of the proposed guideline in terms of relevance, clarity, comprehensiveness, and appropriateness using the Consolidated Evaluation Criteria as set out in **Section 2.4.3**. The Consolidation Evaluation Criteria contains six domains with a total of 23 items; each scored 1–6 (Strongly Disagree through to Strongly Agree). Each domain seizes a discrete dimension of the quality of the guideline. The scores of each domain were totaled, and then the scores of the individual items were divided by the maximum possible score and voiced in a percentage using the formula recommended by AGREE II developers (Marciano, Merlin, Bessen, & Street, 2014). Domain scores within the AGREE II formula are suitable to determine whether the guideline-recommended for use. However, no minimum scores or scores patterns are determined across a domain that can be used to distinguish high-quality or poor quality guidelines at present (Brouwers, 2009). The discussion of the results is presented in **Section 4.5**.

The scaled domain score was calculated using the AGREE II formula, as shown below in Figure 3.7:

$$\left(\frac{Obtained\ score - Minimum\ possible\ score}{Maximum\ possible\ score - Minimum\ possible\ score}\right) \times 100$$

Figure 3.7: AGREE II scaled domain scores formula

Where Obtained score = sum of all scores of all evaluators within the domain, Maximum possible score = 6 (Strongly agree) x # (Number of items in a domain) x # (Number of evaluators), Minimum possible score = 1 (strongly disagree) x # (Number of items in a domain) x # (Number of evaluators).

3.4.2 Task 2: Conclude the Research

This task concluded the research study by providing an assessment of the research objectives were achieved. It also included statements of the significant contributions of the research. Furthermore, the limitations of the study were identified, and recommendations were stated for new areas for future research.

3.5 Summary

This chapter began with a general introduction of the methodology used in the research, which was conducted in three phases: Phase 1 - Preliminary Study, Phase 2 - Development and Phase 3 -Evaluation and Conclusion. The two main tasks which were performed in Phase 1 were a review of literature and analyses of IP ownership issues and challenges. On the other hand, Phase 2 involved 3 main tasks that involved the development, review, and refinement of the IP rights guideline, which was conducted in two rounds before Phase 3 Evaluation and Conclusion. After the completion of Phase 3, the research was concluded. The chapter included the discussion of the methods, the basis of the justification of the methods employed, and the precautions undertaken in each of the phases, tasks, and steps. The findings and results of the methodology conducted for this research, which was detailed in this chapter are presented in the succeeding sections of this study.

CHAPTER 4

ANALYSIS AND DEVELOPMENT

4.1 Introduction

This chapter commences with the presentation of the analysis conducted on the legal documents of the crowdsourcing platforms to identify the issues and challenges in IP rights management and control. These findings were organized to answer the RQ1 of this study. The first section lists the 31 available and accessible crowdsourcing platforms retrieved from 51 crowdsourcing platforms supporting CSE activities, mainly identified from the review of the literature presented in **Section 2.2.5**. These 31 crowdsourcing platforms were utilized for the document analysis, and current positions taken for IP ownership rights were identified. These findings were used further to summarize the current state of IP rights management and control and finally revealing the issues and challenges surrounding the crowdsourcing process. The development of the IP rights guideline was conducted based on this analysis, together with the former research scholars' allegations.

Following the development was Task 2: Review involved five members of the expert panel who underwent execution of the cyclical tasks of review-refinement-review wherein the endpoint of achieving consensus using a modified Delphi technique must be completed prior to proceeding to Phase 3: Evaluation.

4.2 Analysis

This section presents the results that provided answers to the Research Question 1 (RQ1): 'What are the current issues and challenges in dealing with IP rights in the legal documents of the crowdsourcing platforms supporting CSE activities?'. With this, it commenced with Round 2 - the identification of available and accessible crowdsourcing platforms based on the inclusion criteria, as mentioned in **Section 3.2.2.1,** which were retrieved from the list of crowdsourcing platforms support CSE activities identified in Round 1 presented in **Section 2.2.5**. As part of the inclusion criteria, Round 3 - timeline analysis was also conducted based on the creation of the crowdsourcing platform and the

availability of the latest available update of their legal document. After the selection of the crowdsourcing platforms, the analysis of their legal documents was initiated under the deductive approach. Wherein texts meaning, relevance, and context to the 3 derivative sub-themes of the central theme 'Decision on IP ownership,' 'Confidentiality,' and 'Originality' were analyzed. The process of qualitative document analysis was conducted using 'NVivo' software. It was undertaken to derive a full understanding of available IP ownership positions and related obligations, which further determine related IP issues and challenges surrounding CSE activities, which were ambiguously mentioned by existing literature.

4.2.1 Round 2: Available and Accessible Crowdsourcing Platforms

The 51 crowdsourcing platforms identified through the review of literature were looked into individually to confirm their availability and accessibility. Through the employment of this step, 10 crowdsourcing platforms were excluded as these were unavailable at the conduct of the analysis. Among these are GetACoder (P2), CrowdTesters (P15), TestFlight (P16), Testin (P18), Ce.WooYun (P19), Tackcn(23), Askville-Amaz (P28), CGILance.com (P35), LiveWork (P46), and AppStori (51). Five of these platforms (P2, P15, P16, P18, and P19) have been reported in various articles (Mao et al., 2017; Mao et al., 2015). On the other hand, P23 was also reported in specific references in (Geiger, Seedorf, Schulze, Nickerson, & Schader, 2011; Leeper, 2016), but during the analysis, there was no longer a website supporting the platform. Askville-Amazon(P28), a user-driven research site founded by Amazon.com, was opened to the public in December 2006 but was shut down on October 2013 (Kosinski, Bachrach, Kasneci, Gael, & Graepel, 2014). However, it is still reported as available by Thuan et al. (2016). Additional to this, 4 crowdsourcing platforms were accessible through the same link, and these were Eufreelance (P37), Limeexchange (P39), Rent A Coder (P41), and Scriptlance (P42). From this observation, 3 crowdsourcing platforms were also dropped as these were considered as only one platform. As a result of this criterion, 38 crowdsourcing platforms were available for the next round of selection.

4.2.2 Round 3: Crowdsourcing Platforms Based on Primary Tasks

The third round of selection was based on the nature of primary tasks the crowdsourcing platforms deal with. This selection was based on the expectation that small tasks done by

general-purpose platforms are relatively simple, where the concern with regards to IP rights is negligible (Stol & Fitzgerald, 2014). Based on this criterion, AMT (P25) was removed from the selection as it has a project marketplace as the primary work category but can only provide small task services. On the other hand, Fixya (P32) only provided question and answer tasks and was also excluded. As 2 platforms were excluded from this round, 36 moved forward for the last criterion for document selection.

4.2.3 Round 4: Crowdsourcing Platforms with Available Legal Documents

The final criterion for the document selection was the availability of legal documents as these reflect the current IP management strategy of the respective crowdsourcing platform. During the analysis, no information was found for 5 out of 36 platforms: Freelance Web Programming(P38), Programming bids(P40), Programmermeet Desiner.com(P44), Project for HIREFreelance Marketplace(P45) and Zintro(P50). Thus, after the completion of the document selection process based on the inclusion criteria identified, there were 31 crowdsourcing platforms for further analysis, as presented in Table 4.1.

Table 4.1: List of selected crowdsourcing platforms for further analysis

ID	Name	URL	Primary Work Category
P1	TopCoder	http://www.topcoder.com/	Software Development
P3	Innocentive	http://www.innocentive.com/	Problem Solving
P4	Geniusrocket	http://geniusrocket.com/	Graphic Design
P5	TryMyUI	http://www.trymyui.com/	Software Testing
P6	Usertesting	http://www.usertesting.com/	Software Testing
P7	99designs	http://99designs.com/	Graphic Design
P8	uTest	http://www.utest.com/	Software Testing
P9	Stackoverflow	http://stackoverflow.com/	Software Development
P10	Passbrains	http://www.passbrains.com/	Software Testing
P11	99Tests	http://www.99tests.com/	Software Testing
P12	TestBirds	http://www.testbirds.com/	Software Testing
P13	TestBats	http://www.testbats.com/	Software Testing
P14	Pay4Bugs	http://www.pay4bugs.com/	Software Testing
P17	Mob4hire	http://www.mob4hire.com/	Mobile App Testing
P20	BugCrowd	http://www.bugcrowd.com/	Software Security Testing
P21	Guru	http://www.theknowledgeguru.com/	Software Security Testing
P22	Freelancer	http://www.freelancer.com/	Project Marketplace
P24	Upwork	https://www.upwork.com/	Project Marketplace
P26	Fiverr	https://www.fiverr.com/	Project Marketplace

ID	Name	URL	Primary Work Category
P27	Crowdflower	http://www.crowdflower.com/	Data Mining
P29	PeoplePerHour	http://www.peopleperhour.com/	Project Marketplace
P30	Crowdspirit	http://www.crowdsourcing.org/	Graphic Design
P31	GetSatisfaction	https://getsatisfaction.com/	Technical Support
P33	Getfriday	https://getfriday.com/	Project Marketplace
P34	BizReef	http://www.bizreef.com/	Project Marketplace
P36	Chaordix Inc.	http://www.chaordix.com/	Problem Solving
P42	Scriptlance	http://www.scriptlance.com/	Software Development
P43	DesignQuote	http://www.designquote.net/	Graphic Design
P47	MobileWorks	http://www.mobileworks.com/	Any Tasks
P48	Witmart	http://www.witmart.com/	Project Marketplace
P49	CrowdSpring	http://www.crowdspring.com/	Graphic Design

4.2.4 Timeline Analysis

After the document selection, timeline analysis was conducted to present the timeframe based on the launch of the crowdsourcing platforms and on the last updated version of their respective legal documents accessed during the time of the conduct of the analysis. The timeframe is a useful process in answering questions on when and what events occurred before or after a particular time (Claes et al., 2015; Lohiya, John, & Shah, 2015). Since the information contained in the legal documents is provisional. Alonso, Gertz, and Baeza-Yates (2009) recommended that the extraction of provisional information from the contents of the documents and the integration of documents into a well-defined timeline is a crucial step for any task of exploring relevant documents at the time. This step has helped to establish a specific boundary line when existing issues and challenges relating to IP rights are presented, grouped, and already explored using the analysis of the latest legal document published from the crowdsourcing platform. It was also utilized to be able to visualize whether there is any indication that the platform intends to improve further their IP rights management approach using legal documents publish date as compared to the platform's launch date.

As can be seen from Figure 4.1, the number of CSE platforms' establishment varies from one year to another. However, there was a marked increase in the number of crowdsourcing platforms starting 2007 with new crowdsourcing platforms created year on year after the perceived increase in the demand for crowdsourcing as a solution model

via online open call format in 2006. Along the same vein, Stol and Fitzgerald (2014), stated that *"Companies are increasingly using crowdsourcing to accomplish specific software development tasks."* Further added, crowdsourcing works best to develop software tasks that are less complex and independent. However, challenges to software engineering tasks that are complex and not stand-alone with interdependencies continue to persist due to IP rights issues (Mao et al., 2017) and are discussed in this chapter.

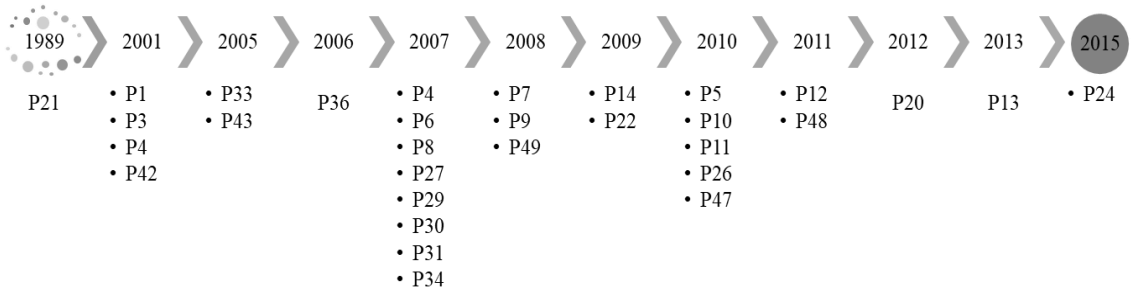

Figure 4.1: Timeline diagram of the establishment of crowdsourcing platforms

Figure 4.2 presents the timeline diagram of the latest update of the legal documents of the crowdsourcing platforms. It can be observed that the majority update of the legal documents of the crowdsourcing platforms was made in the years 2015 and 2016, which was one year prior and even the same year of the ringfence created for the conduct of the study. It was the case even for crowdsourcing platforms launched at a prior date. For instance, TopCoder (P1), which was established in 2001 and updated the legal document in 2016. This observation indicated that crowdsourcing platforms strive for continuous development of the legal documents, and this confirmed their clear intention to reach the level to achieve sound practices of IP rights and to ensure the balance of right between the crowdsourcers and the crowd participants. A FAQs is a case in point, one of these questions is *"how do you protect intellectual property?"* which was recorded in the forum of TopCoder platform, for their part, they said: "*we understand that for the vast majority of potential users, you have baseline questions and concerns about surrounding legal topics such as intellectual property."* Followed this promise that the facilitator of the TopCoder platform would conduct further investigation of appropriate actions to achieve best practice.

Figure 4.2: Timeline diagram of the last update of the legal documents

Further findings of the analysis of the legal documents were presented in the succeeding sections: **Section 4.2.5** and **Section 4.2.6**. These sections provided an answer to RQ1 using the 31 crowdsourcing platforms carefully selected through an identified inclusion criteria. This analysis aimed at the identification of specific IP rights issues and challenges to be able to carefully strategize the approach which can be undertaken to address them.

4.2.5 Available IP Ownership Positions

As previously mentioned in **Section 4.2.1**, 51 crowdsourcing platforms supporting CSE activities were identified. However, along with the selection process, 31 platforms were finalized to be available, and accessible crowdsourcing platforms deal with primary tasks and available legal documents. These 31 platforms proceeded for further analysis using 'NVivo' software. Based on the analysis of the legal documents using the deductive sub-themes selected, which are 'Decision on IP ownership,' 'Confidentiality,' and 'Originality.' It was observed that 'Decision on IP ownership' was not found in some documents, while 'Confidentiality' and 'Originality' were not found at all. This section, therefore, only outlines the classification of crowdsourcing platforms based on the IP ownership decision. While the following section seeks to highlight the IP rights issues that remain to be resolved and illustrate challenges to achieve compromise solution of such issues, based on the result of the analysis. Based on the information available, crowdsourcing platforms can be classified into four leading positions according to on who would own the foreground submitted by the crowd: (1) the crowdsourcer, (2) the crowd, (3) the platform, or (4) none of the above (in the absence of a direct or indirect statement of who should have the ownership of IP rights). Figure 4.3 summarizes the distribution of IP ownership positions of the crowdsourcing platforms based on these four categories.

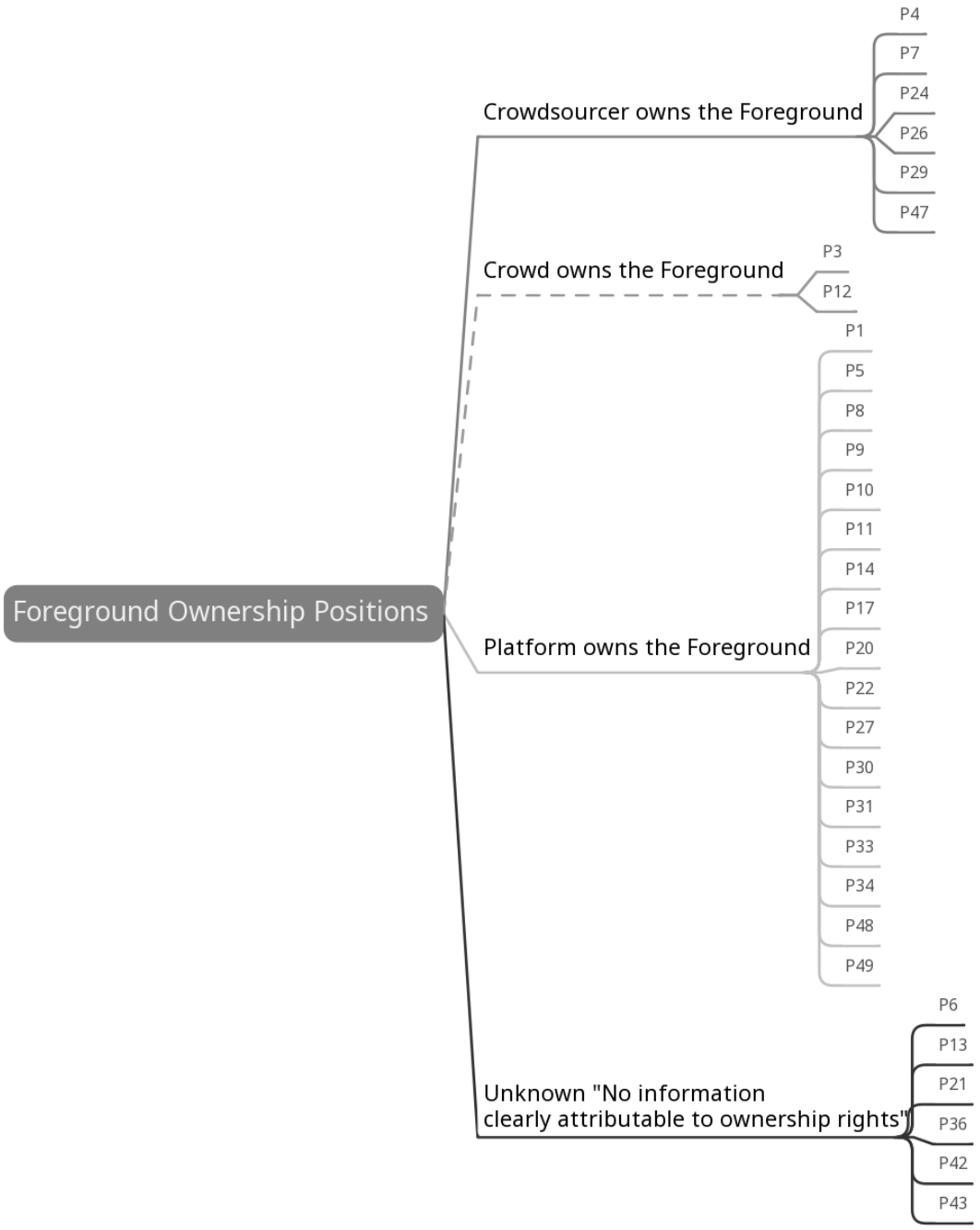

Figure 4.3: Classification diagram of platforms based on IP ownership categories

Figure 4.4 presents that the majority of 55% of the crowdsourcing platforms are observed to acquire the IP ownership rights for the foreground as a result of a CSE activity. 19% of the crowdsourcing platforms directly assign grant and transfer the actual IP ownership rights of foreground to the crowdsourcer, while the other 19% of the crowdsourcing platforms do not contain a clear statement to describe the position of the actual IP rights. The remaining 7% give the freedom of choice to their crowd participants regarding the

IP ownership rights, whether to agree directly with the crowdsourcer regarding retaining IP rights, to transfer ownership, or to grant the licenses for the exploitation of the foreground for financial or non-financial purposes.

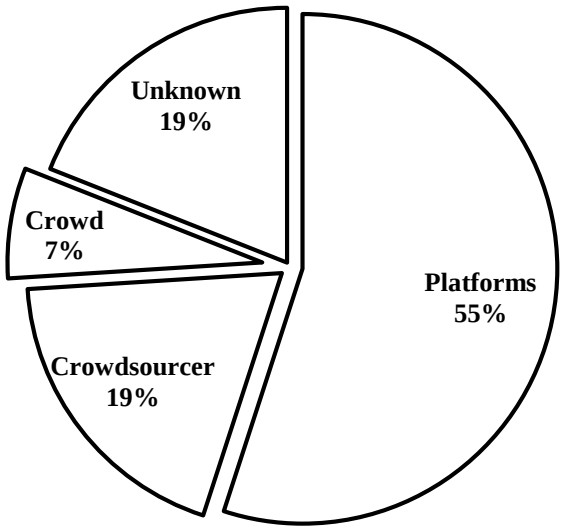

Figure 4.4: Distribution of IP ownership of CSE platforms

4.2.6 IP Rights Issues and Challenges in CSE Platform

Given the significance of the legal documents as a critical reference in organizing the process of crowdsourcing, Alexy, Salter, and Criscuolo (2011) emphasized that the legal documents of crowdsourcing platforms should address the stipulations about the ownership, originality, and use of IP generated by the crowd. The formulation of legal documents in simplified language and the proper recognition of participants' contributions through equitable recognition were said to be significant (Scassa & Chung, 2015). In line with the preceding, and as noted during the analysis, several legal documents written in an incomprehensible language (jargon), which raises concerns about the possibilities to safeguard their impartiality. Given the missing stipulations and the great importance of these legal documents governing the process of crowdsourcing, this section will discuss in depth the issues of IP rights and the challenges that must be overcome to achieve a compromise for all stakeholders.

One of the main issues in IP rights management and control is the position of ownership available within the crowdsourcing platforms (as specified in **Section 4.2.6**). It has been recognized that this lack of diversity in IP ownership positions is a cause for serious

concern, especially when deciding the level at which to obtain rights from the crowd participants and the impact of this decision on the performance of crowdsourcing work (Mazzola et al., 2018). Moreover, since most platforms grant themselves IP rights, this violates the definition of crowdsourcing that the platform acts as a facilitator, mediator, and coordinator between the crowdsourcers and the crowd participants (Hosseini et al., 2014; Mao et al., 2017). This position was taken regardless of the risks that may accrue from circumstances such as when the crowdsourcer is interested in the IP rights (Ford et al., 2015), or when the crowd wishes to be given a licensing opportunity (Franke et al., 2013). However, under current practices, this position may be advantageous as a solution for transferring deliverables to crowdsourcers and prevent any future claims, but it is not considered to be sound practices and may expose the platform to legal cases. This position is the default position taken by TopCoder (P1), which is reflected not only in its legal documents but also in its contractual agreement to be agreed between parties. Although it is a sound practice to ensure agreement of the provisions prior to execution of the crowdsourcing activity through a contractual agreement, this ownership position still poses challenges because of deficiencies in the retention of ownership and failure to safeguard the rights of both the crowdsourcers and crowd participants.

On the other hand, a percentage of these crowdsourcing platforms allows for assignments and grants of foreground directly to the crowdsourcer. This position was taken even without taking into consideration whether the submitted content is original and whether it may be a part of a background owned by another party. These instances impose a risk to the crowdsourcer by infringing third-party rights and risks associated with the ownership of contaminated content. As already mentioned in the previous section, none of the legal documents analyzed contained stipulations to ensure that the crowd was obliged to provide the original content. The risk of contaminated content was confirmed by several studies that emphasized the need to legally protect the crowdsourcer against contaminated content (Jouret, 2009; Singh & Chi, 2019; Stol & Fitzgerald, 2014). Besides, this position does not take into account whether the crowd wishes to be given a licensing opportunity, which is a form of motivation to increase their level of participation. In the context of managing crowd expectations as a motivational approach, de Beer et al. (2017) pointed to these expectations: "*Participants can be extrinsically motivated, expecting financial rewards that include cash prizes, some share of the value of a winning solution."* (p.2015)

For the platforms, it is recognized as a sound practice that they facilitate direct communication between crowdsourcer and crowd, although it only represents 7%. However, the arrangement should not be limited to assigning and granting exploitation rights, but these must be documented using a contractual agreement that ensures the credibility of productive work and avoids any future claims, which can cost a lot of fines and probability of imprisonment (Reuters, 2018). Thus, agreement on the arrangement of the ownership and licensing position is critical to be agreed upon at the initial phase of the crowdsourcing activity and before the execution. In this regard, Wolfson and Lease (2011) stressed the need to adopt a contractual agreement and stated: "*Still such contracts can help resolve many problems in advance and help to clarify the relationship boundaries between crowdsourcer and crowdworker."* (p.9)

In addition, the results of the analysis wherein it was revealed that a number of platforms did not provide any information with regards to IP rights in their legal documents. In this respect, it has been argued that acquiring appropriate IP rights and limiting associated risks are depend heavily on the legal documents as the primary legal mechanism for the crowdsourcing platform (Alexy et al., 2011; Scassa & Chung, 2015). It suggests that the crowdsourcing platform must perform its primary responsibility for ensuring fairness and transparency for the parties involved in the crowdsourcing activity accordingly by making the first step to establish such.

Together with this review conducted regarding the platforms' legal documents, it was identified 100% of the platforms are utilizing browsewrap agreements to bind the users to the legal terms of the platform wherein it has been reviewed the legal issues surrounding it **(see Section 2.3.4)**. Again, position the crowdsourcers and crowd participants in risks whereby they are bound to legal terms of the platform without their acknowledgment (i.e., implied consent). The risk is that the browsewrap is much less noticeable, and is designed merely by using or accessing the website containing a link to the relevant legal documents (Dasteel, 2017), which isn't a best practice for crowdsourcing platforms. By the fact that they are dealing with various tasks, especially complex ones with many interdependencies and competitive advantages, just like in-house software development and outsourcing model that requires dynamic provisions updates based on the circumstance and expectation associated with each task that is agreed upon before the execution (Ford et al., 2015; Mao et al., 2017; Stol & Fitzgerald,

2014). For this reason, the characteristics and requirements of each CSE tasks should be carefully considered, and the necessary adjustments should be made to suit the circumstances and expectations of both crowdsourcers and crowd participants.

Additionally, the critical mechanisms during the crowdsourcing activity to ensure appropriate management and control of IP rights were looked into. The Task Broadcast Mechanism, which is the first mechanism governing the crowdsourcing process. It was recommended to be deemed taken into careful consideration as proposed by de Beer et al. (2017), articulating that *"...organizations need to consider intellectual property-related risks when sourcing solutions from the Crowd."* (p.208) This consideration has to be taken by the crowdsourcer when dealing with an IP, whether foreground or background, in CSE activity even before the decision to broadcast the task. Confirming this essential position for IP rights management taken by task broadcast mechanism is the problem-solving model, dealing with IP rights concerns with particular focus on the perspective of the crowdsourcer as presented by Chanal and Caron-Fasan (2010). This model consists of two phases: Phase one - A choice phase which has an objective to motivate the crowdsourcer using the advantages and disadvantages of crowdsourcing model to decide whether to crowdsource the tasks or not, where the IP consideration is at the first level of concern. Phase Two - Implementation phase which deals with the question on how the crowdsourcing platform intends to protect the IP and whether they have a default position in dealing with IP rights. This model aimed to clarify the CSE landscape to the crowdsourcer wherein IP consideration was dealt with even before the decision to initiate a crowdsourcing activity.

Furthermore, as presented in **Section 4.2.5**, there has been seen variability of the IP rights management and control between the crowdsourcing platforms. The IP rights management strategy of the crowdsourcing platform is essential because of its core responsibility to ensure crowdsourcing success. Simula (2013) stressed the nature of the crowdsourcing process and the facilitator's role in dealing with IP rights issues, stating that *"delicate handling of IPR issues is highly relevant for intermediaries."* (p.2788) However, because of the seen variability, this confirms the precaution stated by de Beer et al. (2017), stating that *"Not all platforms provide the same protection, care should be taken when choosing one."* (p.216) It provides objective evidence that because of the seen criticality of the role of the crowdsourcing platform, appropriate management, and

control of IP rights is ensured when the crowdsourcer decides to broadcast the task through an appropriate platform governed by Task Broadcast Mechanism.

The efficient handling of IP encompasses managing the risks, focusing on the acquisition of ownership rights, and limitation of liabilities. Using the perspective of the crowd, this can be managed by the platform by managing the crowd expectations, which can be done more appropriately by documenting the provisions clearly in terms and conditions. The agreement on the terms and conditions by the crowd must be ensured to be taken by the platform as it's their responsibility not only to engage the crowdsourcer but also to look for a crowd willing to execute the task. It also secures transparency and fairness of the crowdsourcing activity, and this was mainly derived from the results of the study conducted on the TopCoder platform by Stol and Fitzgerald (2014). The result of the study showed that almost 90% of registered participants did not submit anything, and in this regard was noted: *"…there is no single supplier as would be the case in a traditional outsourcing scenario, any intellectual property relating to specifications and product knowledge is more widely exposed simply by virtue of its being viewed by the 'crowd' of potential developers."* (p.8) The latter activity is governed by the Task Assignment Mechanism. It confirms that the crowd participants must be in full alignment and must be agreed upon before the execution of the task. To ensure IP rights management and control in crowdsourcing tasks and crowdsourced contents.

Based on the above, four IP rights issues in CSE activities revealed from the analysis lie in the researchers' allegations specified in **Section 2.2.3**. First, a lack of divers IP ownership positions, which control the identification of IP ownership and level of acquisition. Second, the absence of stipulations prevents IP leakage of crowdsourcing tasks. Third, the absence of stipulations prevents contaminated content in the soliciting deliverables from the crowd. Last, the absence of the contractual agreement that ensures full compliance of crowdsourcers and crowd participants. However, the compromise solution of these issues lies in the challenge of enabling both the broadcasting and assigning mechanisms based on a priority orientation approach, which involves a contractual agreement in the form of clickwrap. To ensure the active engagement of stakeholders in the decision-making process on ownership and level of acquisition based on circumstances and expectations, as well as safeguarding confidentiality and originality. The issues and a challenge are listed separately, as shown in Figure 4.5.

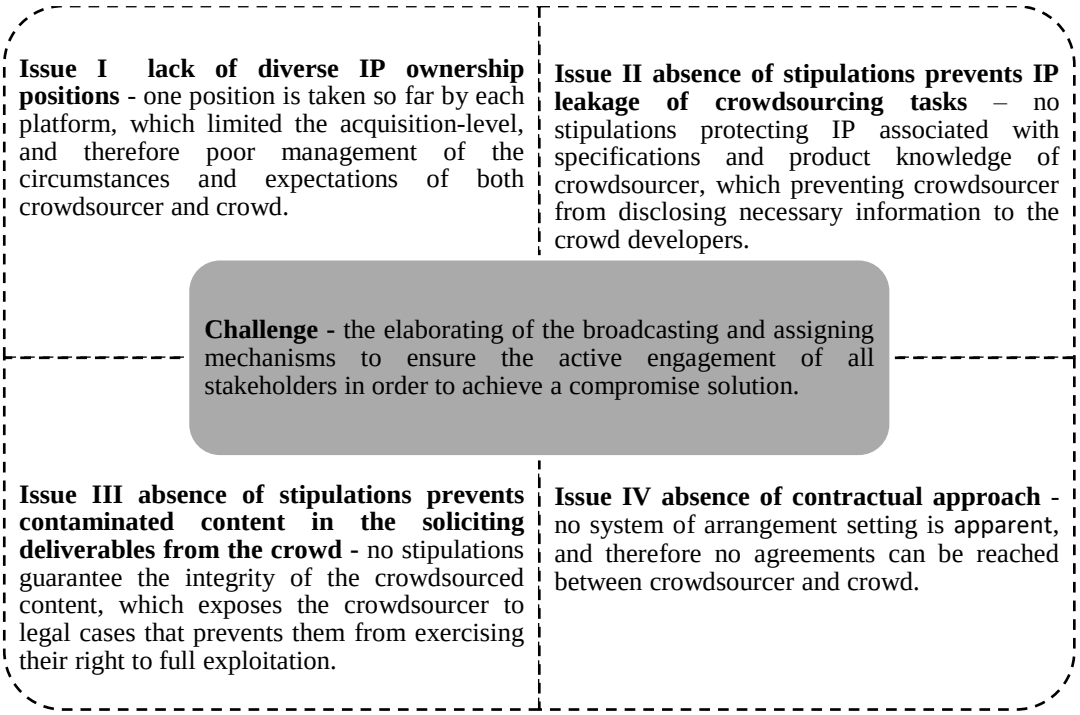

Figure 4.5: Matrix of IP rights issues and a challenge in CSE activities

As effective management and control of IP rights depend primarily on the engagement between stakeholders in crowdsourcing activity, both the broadcast and assignment mechanisms that governing this engagement must be done on total precaution (as defined in **Section 2.2.2**). The Task Broadcast Mechanism involves the engagement of crowdsourcers and crowdsourcing platform facilitators. On the other hand, Task Assignment Mechanism involves the engagement of the crowdsourcing platform facilitators and the crowd participants. The diagram which illustrates this relationship is presented in Figure 4.6. The recommendations provided to ensure the success of the mechanisms are the "look before you leap" concept for the crowdsourcer's perspective before broadcasting the tasks. Also, the assurance of full alignment of the crowd before execution, through the explicit provisions in terms and conditions before assigning the tasks. These mechanisms, when managed appropriately, shall strike a balance between crowdsourcers protection and crowd participation maximization, ensuring crowdsourcing success.

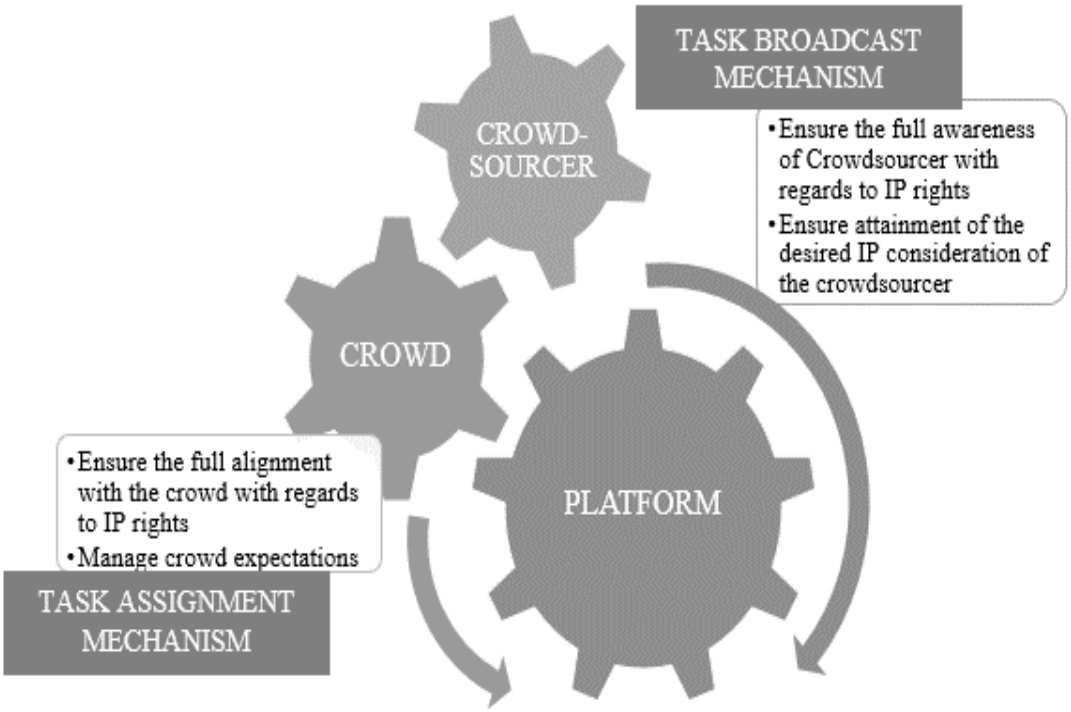

Figure 4.6: Illustration of the full engagement of crowdsourcing stakeholders

Since the issue of IP rights has been classified as an unexplored issue in the CSE context (Mao et al., 2017), the findings from the analysis will fill the gap and contribute to the expansion of existing literature. Moreover, it should be noted that there is no guideline covering the management and control of IP rights that can support crowdsourcing platforms to facilitate CSE activities (Peng et al., 2014). Given the complexity of managing the triangular relationship of three stakeholders in the crowdsourcing process, the use of a guideline is advantageous (see **Section 4.4**). The next section provides a discussion on trustworthiness issues related to document analysis.

4.2.7 Issues of Trustworthiness

Trustworthiness indicates how confident the researcher is in the accuracy of the search results (Anney, 2014; Korstjens & Moser, 2018; Morse, 2015). Issues of trustworthiness were addressed by adhering to the four strategies established by Lincoln and Guba (1985), which are credibility, transferability, dependability, and confirmability. These strategies are crucial to ensuring the validity of the data obtained and to eliminating the opportunities for conflict or inconsistency, as discussed in the following subsections.

4.2.7.1 Credibility

Credibility indicates the extent to which the research results are reliable, valid, and confirmable (Anney, 2014; Ravitch & Carl, 2016). A detailed description can be an essential provision for enhancing credibility because it helps to convey the actual cases investigated and, to some extent, the surrounding contexts (Shenton, 2004). Triangulation is a method that enhances the credibility of the findings (Anney, 2014). Triangulation refers to data collection and comparison from multiple sources that help develop a comprehensive understanding of phenomena (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014). For this study, the credibility was achieved through triangulation by using multiple data-collection sources, which included legal documents collected from different crowdsourcing platforms located in different countries and reflective journals, contributing to the identifications of IP rights issues and challenges, and the validation of the results. The results indicate that most of the documents reviewed set similar results, regardless of the settings, primary work or country of practice. The results of the analysis of these documents are described in **Section 4.2.5** and **Section 4.2.6**, which corresponds to previous research findings.

4.2.7.2 Transferability

Transferability indicates the degree to which results from a research study can be applied or generalizable to other contexts or settings (Korstjens & Moser, 2018; Yilmaz, 2013). The use of a detailed description and explanation, called thick descriptions, in data-gathering and analytical procedures, strengthens the transferability of results from a research study, in other words, its external validity (Brooks & Normore, 2015; Morse, 2015). It was done by providing a detailed description of the data available in the selected legal documents from various crowdsourcing platforms and a detailed explanation of how the conclusion reached during the data analysis process which was presented throughout the **Section 4.2**. This thick description provides a context for the information being provided to assist in the transferability. Therefore, future researchers seeking to repeat this study can determine whether the results of this study are transferable.

4.2.7.3 Dependability

Dependability emphases on how another researcher can replicate the study process to draw the same findings (Cope, 2014; Ravitch & Carl, 2016). It entails tracking each step taken during the research to collect and analyze data (Yilmaz, 2013). For this study, a step-by-step process was used to maintain the dependability as outlined in **Section 3.2.2**, which other researchers can utilize to repeat the study. All changes were documented in detail during the analysis, including the absence of crowdsourcing platforms and legal documents. Also, a timeline of the latest update date for the documents involved in the analysis, as any changes will undoubtedly affect the results. It was done by documenting the steps once the selection of crowdsourcing platforms began.

4.2.7.4 Confirmability

Confirmability is the last strategy addressing the issues of trustworthiness. Guba and Lincoln (1989) indicated that once credibility, transferability, and dependability have been revealed, confirmability is proven. Nevertheless, other researchers argue that confirmability is proven when researchers can demonstrate the basis of their interpretations and conclusions (Korstjens & Moser, 2018; Lietz & Zayas, 2010; Tobin & Begley, 2004). Confirmability is the *"extent to which the characteristics of the data, as posted by the researcher, can be confirmed by others who read or review the research results"* (Bradley, 1993, p. 437). The data reported from the analysis shows characteristics and similarities with the research studies reported in the literature, as detailed in **Section 4.2.6**. The data does not generate extreme outliers and conforms to the literature surrounding the area of this topic.

4.3 Development of the IP Rights Guideline for Platforms Supporting CSE Activities

This section provides the context of the essential output of this study, which is the IP rights guideline specific for the platforms supporting CSE activities as a result of the execution of Phase 2 Development involving 3 tasks which were namely: development, review, and refinement. The development of the guideline was through analysis of IP rights issues and challenges in legal documents of CSE platforms **(**as discussed in **Section**

4.2) and literature review**.** Using a modified Delphi method for this research as presented in **Section 3.3.2**, the tasks, review, and refinement, were executed cyclically to take into account the remarks of recommendations of the expert panel on Round 1 before executing Round 2. The section details the results of the execution of the methodology to result in the final version of the IP rights guideline and evaluation criteria, which was proceeded to Phase 3 Evaluation and Conclusion.

4.3.1 Round 1: Expert Panel Review Results

As mentioned earlier in **Section 3.3.2**, a panel of five experts who participated in this task have sufficient experience in the field required for this study. It can suggest the reliability of the expert's opinion with regards to the developed guideline and the consolidated evaluation criteria specific for its appraisal. The differences in the origin were to take into account the probable differences in the legal considerations as it may vary dramatically depending on the origin of the practice.

The expert panel was asked about their opinion on the degree of their agreement and disagreement on each of the item's expectations on the specified guideline section to address it. By using 3-scale criteria whereby full agreement by ticking "Yes', partially agree and disagree by ticking 'Somewhat,' or not at all agreeing by ticking 'No.' After Round 1 of the review, the data collected from the experts based on the domains, which were scope and purpose, stakeholder involvement, rigour of development, clarity of presentation, date, and applicability. The comments and recommendations given by each of the expert panels, which was used for the analysis were presented in **Appendix B**. The summary of results was presented as follows:

- Domain Scope and Purpose (Items 1-3): All of the experts agree that the overall objective (Item 1) of the guideline is wholly met. For this domain, Item 2 required response as a result of the comment of one reviewer whereby the comment has surrounded the differences in the legal systems in different countries. It was acknowledged by the author of the guideline through the Notes provided that a legal counsel or IP expert is recommended to be consulted, which was already in the initial version of the guideline. On the other hand, for Item 3, which pertains to the target population, 3 out of the 5 evaluators required clarification on the

meaning of the target population. Thus, for this item, the author revised the guideline accordingly to "*Target Population to Whom This Guideline is Applicable to: crowdsourcers and crowd participants.*"

- Domain Stakeholder Involvement (Items 4-6): This domain entailed 2 minor revisions and 1 response. The response was regarding the users of the guideline (Item 5) being too limited and can be expanded to other fields in which the author responded that the delimitation of the guideline was specific for the use of managing and controlling IP in platforms supporting CSE activities and the conclusions of the study were limited to this scope. On the other hand, the 2 minor revisions were for the Items 4 and 6 of the consolidation evaluation criteria, which was mistakenly indicating 'Page I' instead of referring to 'Page i' in the guideline.
- Domain Rigour of Development (7-12): In order to address the comments and recommendations regarding this domain, 1 response was given, and 2 revisions were entailed. After the review, 1 expert panel commented in Item 8 that *"Legal documents have multiple meanings."* However, this was already bridged by the section of the guideline, which is Definitions to ensure alignment of the terms used throughout the guideline, which solidified the requirement of such a section in the guideline as per **Section 2.3.5**. The first revision done for this domain was on Item 11, which is the consideration of benefits and risks of the recommendations. It was highlighted that there was no reference to the risks. As a result of this, the comment was acknowledged, and the sections regarding the ownership and licensing positions were revised to present their risks. On the other hand, the other revision is for Item 12 regarding the explicit link between the recommendations and the supporting evidence in which comment of that the link was not established while another expert panel was not clear on what supporting evidence means. To address these, the author revised the required section to provide more clarity by revising the statement to *"directed to the identification of the three positions together with the respective circumstances supporting each as the body of evidence to support the recommendations this guideline presents for the treatment of Foreground and Background.*" Additionally, Items 7 and 10 required no revision nor response.
- Domain Clarity of Presentation (Item 13-18): This domain did not require any revision, and there was only one comment received among the 6 items

representing this domain, which entailed a response from the author. In Item 17 wherein the requirement of reference list was presented, one member of the expert panel placed a comment to refer to one published article: The Future of the Digital Millennium Copyright Act: How Automation and Crowdsourcing can Protect Fair Use. The response was given to the recommendation of the evaluator that initially the reference was shortlisted, however using the inclusion and exclusion criteria that were used during the rounds of review of literature, the paper was found to be not specific for the study. Based on the results of the review, the experts coherently projected the impression that the guideline consistently provided a clear layout and language, even on the first version of the guideline.

- Domain Date (Item 19-20): The 2 items involved in this domain entailed 2 minor revisions based on the consistent feedback observed from the expert panel during the evaluation. First was to specify the exact date instead of merely stating the year of the guideline development (Item 19), which was pointed out by 2 out of 5 experts in which the author addressed adequately in the guideline. While the other one was for Item 20 also commented by 2 of the experts whereby initially a procedure for revision was stated as part of the requirement of the guideline. Although it was addressed by the author in one of the sections of the guideline as specified in the consolidation evaluation criteria, the terminology 'procedure' was changed to 'trigger point' (Item 20) to provide more specificity and clarity in the expectations of the evaluation criteria with regards to the sections of the guideline.
- Domain Applicability (Item 21-23): There was no revision and response to any of the items of this domain. Thus, the experts are all in agreement that the requirements and expectations in each of the items were fully met by the guideline.

In summary, there were 4 feedbacks in which the authors responded while there are 2 minor revisions on the consolidation evaluation criteria and 5 minor revisions on the guideline which were implemented to address the expert panel's recommendations. The revisions done in the IP rights guideline and consolidation evaluation criteria to address the comments were provided to the specific expert panel who gave such comments as presented in **Appendix B** for which s/he shall agree or not in Round 2 Review. Figure 4.7 provides the distribution of these based on the domains required for the assessment of IP rights guidelines.

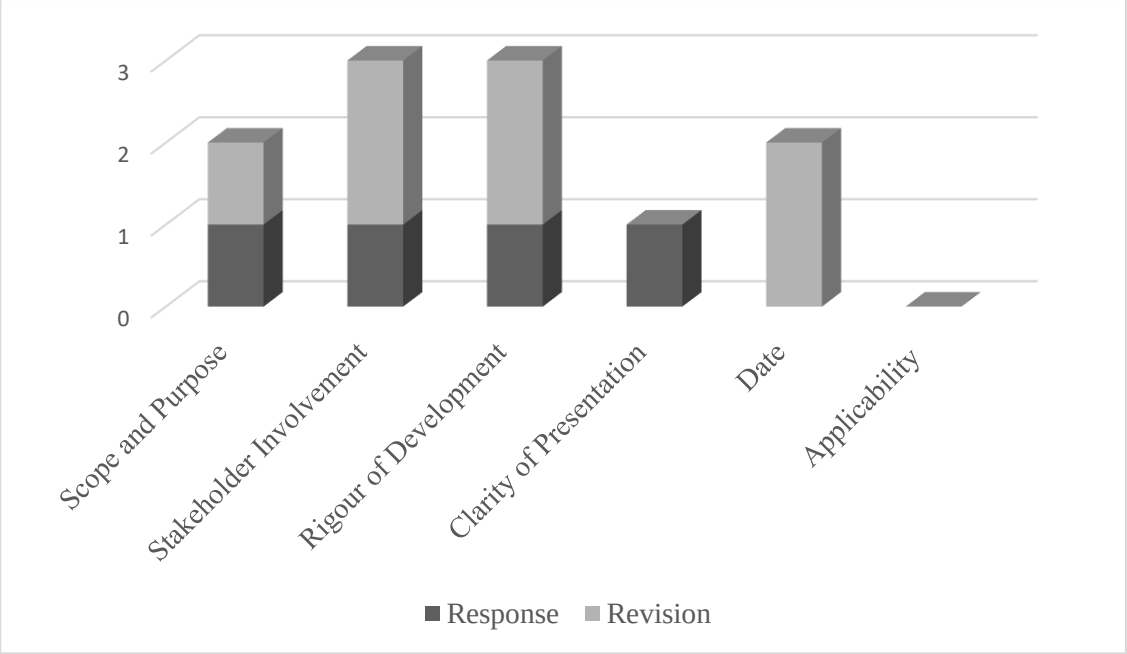

Figure 4.7: Revision-Response distribution after Round 1 Review based on the IP rights guideline domains and consolidation evaluation criteria items

Based on Figure 4.7, it can be deduced that the strengths of the initial version of the guideline were for the domains Applicability and Clarity of Presentation. Observed weak points may be Stakeholder Involvement and Rigour of Development domains as each required 1 response and 2 revisions. It was an essential analysis to provide a line of sight with regards to the required domains of focus to ensure the full requirement is met.

After the Round 1 Review, the revisions were implemented during the Task 3 Refinement and was progressed to Round 2 Review.

4.3.2 Round 2: Expert Panel Review Results

All the expert panel involved in the Round 1 Review participated in the ensuing Round 2 Review involving the refined version of IP rights guideline and consolidated evaluation criteria. These were provided to the participating expert panel and were requested to go through the complete assessment of the IP rights guideline using the revised 23-item evaluation criteria. Additionally, they were consulted with regards to the response and revisions given to address the prior comments and recommendations given using a table of amendments. **Appendix B and C** presented the consensus which was received for the Round 2 Review, whereby there are no further comments given based on the revised IP

rights guideline and consolidated evaluation criteria, which means that the IP rights guideline may proceed to Phase 3 Evaluation and Conclusion.

During this round of review, there were no additional comments received, which signified the agreement of all the expert panel in the content not only of the IP rights guideline but also of the consolidated evaluation criteria. Thus, the endpoint of the evaluation was achieved through the consensus of all the participants and was therefore progressed to Phase 3: Evaluation and Conclusion.

4.4 Overview of the Proposed IP Rights Guideline

The proposed IP rights guideline is intended to be recognized as a viable approach to crowdsourcing platforms that support CSE activities. As shown in figure 4.8, the structure of the proposed guideline consists of two main components, namely the introduction and the guidelines. Each of the components containing a set of sub-components that are focusing on context, key terms, questions, objectives, application, principles, positions, circumstances, decision-making, steps, and other aspects of the context. The structure and components of the proposed guideline are based primarily on **Section 2.3.5**.

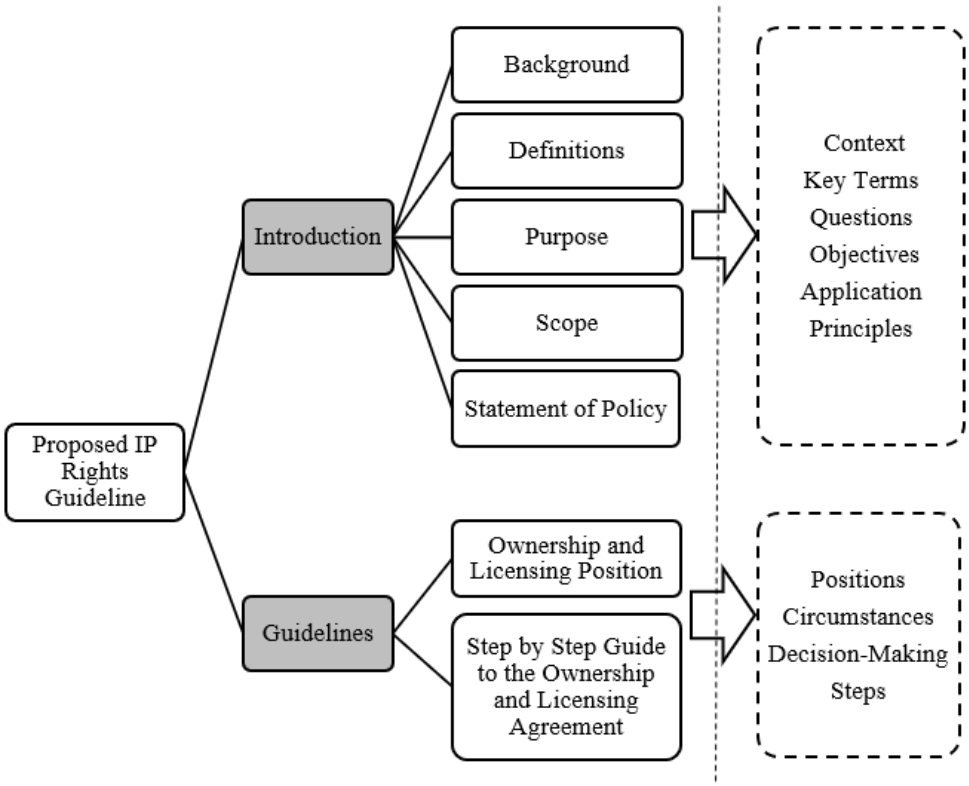

Figure 4.8: Components of the proposed IP rights guideline

The Introduction section contains all the information needed to prepare the platform facilitators, to put the facilitators in the picture in terms of specifics of the proposed guideline where the rationality lies. The basis of the section is a review of the literature (as described in **Section 2.2**) and the results of the analysis of legal documents (as described in **Section 4.2**), where the researchers' allegations in current IP rights practices are strictly interpreted. It, therefore, adequately reflects the synthesis recommendations being addressed through the guidelines and puts the recommendations towards the handling of IP rights within the CSE activities. The Introduction section also provides a set of principles developed based on the recommendations contained in the guidelines (see **Section 4.4.2**), which facilitators should observe in implementing the guidelines to give them appropriate effectiveness.

Meanwhile, the Guidelines section describes the decision-making process at the level of acquisition of IP rights, concerning any risks that may impede this process. The Guidelines are designed to be specific and eminently trackable using a step-by-step approach. There are three steps outlined based on the identification of the level of acquisitions, development of the contractual agreement, and the approval process. The level of acquisition initially established based on several circumstances identified from the review of existing guidelines (as outlined in **Section 2.3.3)**, which categorized on three positions served the basis of the findings identified from the analysis of legal documents (as described in **Section 4.2.5)**. Moreover, the contractual agreement and approval process established based on a series of constructive recommendations and suggestions made by researchers' (as described in **Chapter 2**). The rationality of the development of the guidelines lies in the bridge the researchers' allegations identified in **Section 2.2.3** and the findings identified from the analysis of the legal documents in **Section 4.2.6.**

4.4.1 Introduction

This section provides a more in-depth insight into the guideline introduction. The section commenced with a background of the guideline, which shows the importance and related studies of IP rights within the context of current practices on crowdsourcing platforms. Following this, the definitions of key terms provide simplicity to the text. After that, the issues clarified the allegations around the IP rights in CSE activities and guidelines

objectives. The scope of application of the guidelines was then described. Subsequently, a set of principles governing the implementation of the recommendations contained in the guidelines was included.

4.4.1.1 Background of Proposed Guideline

This section intended to introduce the facilitators to the IP rights issues that appeared as a major weakness in the crowdsourcing process by providing context to the information discussed throughout the guideline. Background information includes critical and related studies discussed in six paragraphs 1 to 6, each of which constitutes a set of multilevel clauses. The discussion began with a particular focus on the IP rights concern associated with the arise foreground and pre-existing background. Subsequently, an essential discussion on the rights of foreground ownership, originality, and confidentiality, compared with the in-house development in terms of actions and the crucial role played by the platform facilitator in handling these rights, was followed. The discussion then extends to highlight current practices on the crowdsourcing platforms that supporting CSE activities, as a result of the analysis conducted on the legal documents of these platforms. Besides, the preventive actions documented in previous literature that made recommendations to the crowdsourcer. After this, a set of proposed sound practices for appropriate management of IP rights and the importance of contractual agreement were discussed as an essential part of such practices. After that, the necessity of drafting the provisions in understandable language and the avoiding of jargon in the agreement was approached, as well as manifesting the superiority of click-wrap agreement. Lastly, the intention of the guideline on addressing the current IP rights issues in CSE activities and the consequent need for the necessary update was presented.

1. ‘foreground,’ ‘background,’ ‘IP rights concern.’

    1.1. The field of software engineering is a highly creative process, and the crowdsourcing model certainly provides creativity in the form of ideas, work and content which help generate new products or solutions to problems, which may constitute a potential emergence of Foreground (Ford et al., 2015; Mao et al., 2017; Stol & Fitzgerald, 2014).

1.2. Given that these activities interdependent, complex, and heterogeneous, they may require cognitive effort and different types of expertise (Kittur et al., 2013). Thus, sufficient detail in specifications is necessary for crowd developers to understand what crowdsourcers demand, which often leads to IP leakage in the background owned by the crowdsourcer (i.e., module or component) (de Beer et al., 2017; Ford et al., 2015; Stol & Fitzgerald, 2014).

1.3. With this circumstance, it is not surprising that IP protection is considered critical, and the necessity to manage protection is recognized. However, this emerged a particular concern surrounding the IP rights management and control in CSE activities, which was confirmed by several scholars, including (Ford et al., 2015; Mao et al., 2017; Peng et al., 2014; Stol & Fitzgerald, 2014). Taking into account the perspective of the Crowdsourcer, Chanal and Caron-Fasan (2010) acknowledged the concern stating that " ...*this of course appeared a major weak point in the crowdsourcing model as corporate customer would be interested in the platform in so far as they could obtain ownership of the property rights."*

2. ‘concerns about ownership, originality, and confidentiality,’ ‘comparison with in-house development,’ ‘role of the facilitator.’

2.1. With the highlighted concerns mentioned above, a particular focus on the context of crowdsourcing recommends that activities must be crowdsourced only if the IP rights can be specified (de Beer et al., 2017; Mao et al., 2017; Vinaja, 2016). These IP rights concern lies in the identification of the foreground ownership; originality of the crowdsourced content and the confidentiality of task being crowdsourced (**Section 2.2.3**).

2.2. The IP rights and commitments in crowdsourcing situations are contrary to the normal recruitment process (i.e., in-house employment) since crowds are not governed by employment laws that might stipulate employer rights of ownership for employees' creative works (de Beer et al., 2017). Furthermore, an employer has liability for their employees, but this liability does not extend to their contractors or solution providers coming from an independent crowd. Besides, the employers have both rights and liabilities for employee-sourced content, which is not the case for a crowdsourced content (Bently & Sherman, 2014;

Graham, 2014; Stim, 2016, 2017). The crowdsourcers are therefore excluded from these rights nor liabilities, and this creates a scenario that poses challenges related to the management of IP rights associated with the crowdsourced content that must be acknowledged before entering crowdsourcing arrangements.

2.3. Given the fact that the triangular relationship in the crowdsourcing process, Simula (2013) highlighted the role of the facilitator in handling the IP rights by stating that *"delicate handling of IPR issues is highly relevant for intermediaries."* (p.2788)

3. 'recommendation to crowdsourcer,' 'current practices.'

3.1. Recommendations for crowdsourcers to alleviate the concerns mentioned above have been documented in several studies. De Beer et al. (2017) stated that: *"...organizations need to consider intellectual property-related risks when sourcing solutions from the Crowd"* as a precaution to be taken by the crowdsourcer when dealing with foreground ownership, originality, and confidentiality concern. Using the similar perspective of the crowdsourcer, Chanal and Caron-Fasan (2010), provided a problem-solving model which includes several questions in two different phases revolving around the concept of 'look before you leap.' These questions focus on guiding the crowdsourcer in the decision-making process based on the importance of the absolute ownership on any arising foreground together with the management of the concerned platform to the protection needed, which must serve their best interest.

3.2. Currently, there are three IP rights positions applied for crowdsourced foreground on crowdsourcing platforms with no stipulations attributed to originality and confidentiality (as discussed in **Section 4.2.5**). The first position is that the platform has the right to own any foreground regardless of the risks that may accrue from circumstances. For instance, when the crowdsourcer is interested in the IP rights or when the crowd participant wishes to be given a licensing opportunity. Secondly, the crowdsourcer has been granted absolute ownership rights of the foreground. This option does not take into account if the crowd participant wishes to be given a licensing opportunity, which is a form of motivation to increase their level of participation. And lastly, the crowd is considered as the owner of the foreground with the given freedom to negotiate a

licensing option with the crowdsourcer, which can be disadvantageous if not agreed at the initial phase.

4. ‘sound practices,’ ‘contractual agreement.’

    4.1. Additionally, it is recommended by Mazzola et al. (2018) that efficient handling of IP, which encompasses managing the risks, focusing on the level of acquisition of IP rights and limitation of liabilities. Meanwhile, managing the crowd participant expectations is done more appropriately by clearly documenting the provisions in the terms and conditions. It is mandatory that the crowd participant is in full alignment and must be agreed upon in a manner clearly understood by all parties.

    4.2. Peng et al. (2014) also emphasized this necessity of documentation in the form of a contractual agreement as a mechanism to coordinate various IP rights issues between crowdsourcers and crowd participants.

5. ‘understanding language and avoiding jargon,’ ‘clickwrap vs. browsewrap.’

    5.1. The extent of crowd participation depends on the understanding of legal rights and responsibilities. It is impacted significantly by the language and form of the contractual agreement. There are a number of modes of adhesion that can bind the crowd participants effectively to manage their expectations and to legally safeguard the crowdsourcers from the disclosure of confidential information and contaminated content (i.e., content owned by third parties). Meanwhile, maximizing contributions from the crowd participants as these factors can significantly influence their decision to participate and, in return, taking full advantage of the crowdsourcing process (Franke et al., 2013).

    5.2. Among these that are commonly used online agreements are ‘clickwrap’ wherein ‘signing’ the contract is by clicking to agree, and the other is the most utilized method by the platforms which is ‘browsewrap’ in which access or use of the web page/platform legally binds users to the contents of the agreement. However, risks have been identified due to the characteristic of ‘browsewrap’ to automatically acquire approval by clicking through a link even without any user’s awareness (**Section 2.3.4**). Thus, making this mode of adhesion inappropriate and unfair, which dilutes its supposedly crucial role to establish

transparency(Brehm & Lee, 2015; Salmons, 2017). Therefore, it is recommended to utilize ‘clickwrap’ whereby the user can make decisions accordingly together with legal/court acknowledgment.

6. ‘cognitive,’ ‘trigger point.’

6.1. This guideline recognizes the need to appropriately manage the decision on IP ownership, level of acquisition, confidentiality, and originality before entering into crowdsourcing arrangements. Thus, this guideline is intended to guide the crowdsourcing platforms, facilitators, for the effective management and control of IP rights in CSE activities.

6.2. If there are significant circumstances that may be new or this guideline failed to recognize, an update of the guideline may be necessitated.

4.4.1.2 Definitions of Terms

Definitions of terms is a crucial section as it gives the facilitators an understanding of the key terminology and concepts discussed throughout the guideline, as well as contextual information as to how these concepts being used. To ensure that all parties concerned in this guideline will understand the components as presented because readers often have their understanding of the terms or are not at all aware of them. Therefore, this section introduced in the proposed guideline as *‘Unless the context otherwise requires, the following terms whenever used in these guidelines shall have the following meanings.’* These terms are Activities, Background, Content, Contractual Agreement, Crowd, Crowdsourced Software Engineering, Crowdsourcer, Crowdsourcing Platform, Foreground, Intellectual Property, Ownership, Legal Document, and Licensing, as described below.

- **“Activities”** in relation to Crowdsourced Software Engineering (CSE) means software analysis, software design, software coding, software testing, software evolution, or software maintenance. This definition is drawn mainly from **Section 2.2.3**, which retrieved from the literature review. To indicate that all software engineering activities can be crowdsourced regardless of the complexity

and interdependencies since the guideline offer the necessary protection as cases arise.

- **"Background"** means Intellectual Property (IP) that existed or came into existence outside of the Contractual Agreement and excluding Foreground. This definition is derived from the claims of researchers that lie in the pre-existing IP either in the Crowdsourcer product or provided by the Crowd as part of the solution, but not in a Foreground (as described in **Section 2.2.3**). Background stationed in the description of each position to be detailed in the provisions of the Contractual Agreement for the protection of the Crowdsourcer confidentiality and the circumstances as evidence that shaped the body of each position specified in **Section 2.3.3**, for the acquisition-level in the decision-making process.
- **"Content"** means all intangible property, including software, documentation, and any other information or materials that a Crowdsourcer receives from a Crowd under a Contractual Agreement. This definition is derived from the comprehensiveness of the software engineering activities that can be crowdsourced (as described in **Section 2.2.3**). The definition of Crowdsourced Software Engineering (CSE) provided by Mao et al. (2017) as defined in **Section 2.2.1**). To distinguish between the Content broadcast by Crowdsourcer and the Content submit by the Crowd as deliverables where the Foreground may appear.
- **"Contractual Agreement"** in relation to Crowdsourcer and Crowd, means a legally enforceable agreement binding the two entities relating to a transaction for Crowdsourced Software Engineering (CSE) activities. This definition is derived mainly from the Oxford Law Dictionary, with particular emphasis on the Crowdsourcer and the Crowd. It shows that the practices set out in the proposed guideline are aimed at the active participation of stakeholders in the decision-making process but in their respective roles. For example, the Platform facilitator oversees the provisions documented in the agreement and facilitates final approval but is excluded from the agreement.
- **"Crowd"** means the engineers or experts in the domain of software engineering recruited by the Crowdsourcing Platform to accomplish tasks requested by the Crowdsourcer. This definition is based on Howe (2006a) and Mao et al. (2017) definition, with particular focus on Crowd (both defined in **Section 2.2.1**). To ensure readability of the guideline, particularly for those who participate in the

review (Round 1 and Round 2, as described in **Section 3.3.2**) and evaluation (Round 3, as described in **Section 3.4.1**) and those who make provisions in a contractual agreement, for example, IP experts.

- **"Crowdsourced Software Engineering" (CSE)** in relation to the general crowdsourcing principles, means the use of Crowdsourcing Platforms to recruit software engineering experts from a large pool of Crowd to complete software engineering-related tasks. This term was coined and defined by Mao et al. (2017), as documented in **Section 2.2.1**. Since the term is not shared outside of science research, it is expected that it will be difficult for platform facilitators and others to understand it, and therefore this definition is appropriate and ensures readability.
- **"Crowdsourcer"** means individuals or organizations which seek to utilize the participation of Crowds in order to accomplish requested tasks via the Crowdsourcing Platform. This definition is based on Howe (2006a) and Mao et al. (2017) definition, with particular focus on Crowdsourcer (both defined in **Section 2.2.1**). This term is not widespread and is referred to in different terms, such as the customer, organization, requester, etc. Therefore, to ensure that the guideline is readable and to avoid any misunderstanding, this definition meets the purpose.
- **"Crowdsourcing Platform"** and **"Platform"** means a website that facilitates the posting of the Crowdsourcer's task to be selected and accomplished by interested Crowds in which the activity is bound by strict Legal Documents. This definition is based on Howe (2006a) and Mao et al. (2017) definition, with particular focus on Platform (both defined in **Section 2.2.1**). To ensure the readability of the guideline, particularly for those involved in the review (Round 1 and Round 2, as described in **Section 3.3.2**) and evaluation (Round 3, as described in **Section 3.4.1**) and those who make provisions in a Contractual Agreement, for example, IP experts.
- **"Foreground"** means Intellectual Property (IP) that is newly developed by the Crowd as part of the task under a Contractual Agreement. This definition is derived from the claims of researchers that lie in the newly created IP by the Crowd and excluded from the Background, which may arise in deliverables with different levels of importance depending on the circumstances (as described in

Section 2.2.3). It is constituting a major pillar stationed in the three positions identified in **Section 2.3.3**, which should be decided upon it.

- **"Intellectual Property" (IP)** means any rights resulting from intellectual activity including all intellectual creativity legally protected through patents, copyright, industrial design, trademarks, trade secrets, and database rights. This definition is drawn primarily from **Section 2.2.1**, which was recovered from the review of the literature. It refers to all IP rights, whether about the Foreground or the Background, that would typically appear in or be influenced by software engineering activities.
- **"Intellectual Property Owner"** and **"Ownership"** in relation to an entity, means having absolute legal control over a specific Foreground. This definition is derived mainly from the Oxford Dictionary of Law, to limit the ownership to the Foreground and distinguish it from the Background license.
- **"Legal Documents"** means rules by which one must agree to abide to be able to use the service of Crowdsourcing Platforms and can be referred to as any of the following: 'terms and conditions,' 'terms of use,' 'privacy policy,' 'terms of service,' 'terms and privacy,' 'policy,' 'copyright infringement policy,' 'legal,' 'user agreement,' 'legal terms' or 'participation agreement.' This definition is drawn primarily from the Round of legal documents identification for analysis (as described in **section 3.2.2.1**). To ensure consistency and readability by indicating all types of documents covered under this term. Therefore, to avoid any misunderstanding, this definition is adequate and meets the purpose.
- **"Licensing"** in relation to the Foreground and Background means the granting of permission for the exploitation of Intellectual Property (IP), whether for use, modification and/or commercialization. This definition is drawn primarily from the Oxford Law Dictionary, taking full account of the circumstances set out in **Section 2.3.3**. To demonstrate the type of exploitation, whether from Crowdsourcer to Crowd or vice versa, depending on the circumstances provided in each position, which must be documented in the provisions of the license agreement.

4.4.1.3 Purpose

This section summarizes the researchers' allegations, the specific issues in the legal document, the objectives of the guideline, anticipation, and necessary declaration. It gives the facilitators a precise and concrete understanding of what the guideline might achieve and what they might gain from reading it. This section placed in paragraphs 1 and 2, each of which constitutes a set of multilevel clauses sorted as following:

1. 'allegations,' 'issues,' 'objectives.'

    1.1. This guideline was developed in response to allegations by several researchers that focused on uncertainty about 'how should crowdsourcing platforms deal with the identification of IP ownership and level of acquisition, the confidentiality of the crowdsourcing task, and originality of the crowdsourced content?' (as detailed in **Section 2.2.3**).

    1.2. These allegations lie in the lack of diverse IP ownership positions available on each of the crowdsourcing platforms and stipulations that protect confidentiality and ensure originality. Also, the absence of a contractual agreement governing obligations between the crowdsourcers and the crowd participants as detailed in **Section 4.2.5** and **Section 4.2.6**.

    1.3. In order to address that, this guideline sets out advice on a priority-based approach to facilitate specific, actionable decisions using a step-by-step process together with a flowchart and pseudocode summarizing the decision-making process. This guideline assists the facilitators in managing the ownership of foreground arising in CSE activities, controlling the level of acquisition using the licensing position, and recommending necessary provisions to the confidentiality and originality.

2. 'anticipation,' 'declaration.'

    2.1. It is anticipated that this guideline shall establish equity on the treatment of IP rights among the entities involved, as the provisions with regards to each others' expectations are required to be outlined clearly in the contractual agreement. To align with the constructed goals of the crowdsourcing process in balancing

crowdsourcers' protection while maximizing crowd participation, thus increasing the success of the crowdsourcing process.

2.2. In the legal documents (i.e., terms and conditions), facilitators should declare a transparent approach that reflects the way of dealing with IP rights based on the proposed guideline.

4.4.1.4 Scope

This section simply specifies the circumstances of foreground and background under which the recommendations in the guidelines can be based on IP ownership, licensing, confidentiality, and originality. This category of recommendation is to manage and control the IP rights on crowdsourcing platforms supporting CSE activities. The recommendations formulated based on the triangular relationship between the intended users (platform facilitators) and the targeted populations (crowdsourcers and crowd participants). The following five bullets summarized the scope of the guideline in principle to ensure the simplicity in identification.

- Circumstance(s): IP ownership, licensing, confidentiality, and originality.
- Guideline Category: management and control.
- Platform Specialty: software engineering activities, including software development, software design, software testing, among others (as listed in **Section 2.2.5**).
- Intended Users Who Can Utilize This Guideline: facilitators of crowdsourcing platforms supporting Crowdsourced Software Engineering (CSE) activities.
- Target Population to Whom This Guideline is Applicable to: crowdsourcer and crowd.

4.4.1.5 Statement of Policy

The purpose of this section is primarily to determine the direction of the platform facilitators to ensure the successful implementation of the guidelines contained in **Section 4.4.2**. Each of the following principles includes precise instructions that should be applied by the platform facilitator based on the guidelines when the crowdsourcer and crowd

enter into CSE activities. The first principle states the role of the platform facilitator that must adhere to it. While the second principle substantiated the previous one by showing the core function of the platform, the service provider. Concerning the remaining five principles, each has a basic rule that explains and controls how Step 1, Step 2, and Step 3 are implemented (as contained in **Section 4.4.2.2**). It focused on the facilitator's commitment to mandated priorities, risk management, monitoring and verification of the contractual agreement, ensuring acceptance before implementation, and controlling and follow-up of expected accomplishments. This section introduced in the proposed guideline as: "*When Crowdsourcer and Crowd enter into a CSE activity, Platforms based on this guideline should apply the following principles*:"

1. 'Role of the platform facilitator' - Effective management and control of the foreground and background lies in the ability of the platform facilitators to ensure that a mutually beneficial arrangement exists between crowdsourcer and crowd.
2. 'Core function of the platform is service provider' - The ownership and licensing of the foreground is not a core business activity of the platform.
3. 'Commitment to mandated priorities' - The decisions to be undertaken for the ownership and licensing of the foreground should be based on the crowdsourcers' circumstances supporting their desired position.
4. 'Risk management involving foreground and background' - The platform should include risk management provisions with regards to the confidentiality of the crowdsourcing task by the crowdsourcer and content submitted by the crowd to ensure that any perceived risk to the crowdsourcer is mitigated and accepted.
5. 'Monitoring and verifying the contractual agreement' - Contractual agreement binds both the crowd and crowdsourcer with the terms and conditions of the agreement. The acceptance signifies absolute compliance, and any non-conformance to any of the provisions of any entities shall be managed accordingly by the platform facilitator.
6. 'An explicit agreement prior to the execution' - The platform should facilitate the crowdsourcing activities through contractual agreement mutually agreed by the crowdsourcer and the crowd before the execution of the task.
7. 'Control and follow-up' - The platform should operate with consistency and with a high degree of assurance to appropriately manage and control the foreground.

4.4.2 Guidelines

This section provides a descriptive overview of the guidelines, with a particular focus on the facilitators of their application, advice on how to put the recommendations into practice and the possible resource implications of implementing the recommendations, which are described in the following paragraph as a set of multilevel clauses from 1.1 to 1.4.

1. ‘role of facilitators,’ ‘positions,’ ‘advice,’ ‘implication resources.’

    1.1. In considering how to deal with foreground and background in CSE activities, the platform facilitators must take the responsibility to be able to illustrate the crowdsourcing process accordingly and apply the best practices serving the interest of the crowdsourcers and the crowd participants.
    1.2. To deal with the management of the foreground and background, this guideline presents three ownership and licensing positions which shall fully meet the requirements and accounting for the circumstances of the crowdsourcers. Meanwhile, ensuring the motivation of the crowd participation in the crowdsourcing task (as detailed in **Section 2.3.3**). It shall also mitigate the associated risks when dealing with (crowdsourcing task) without the safeguarding that the task does not leak any necessary information, and when dealing with (crowdsourced content) without the safeguard that the content does not infringe any other parties.
    1.3. Once the platform and crowdsourcer decided the ownership position, which accounts for the circumstance(s) of the crowdsourcer, the assurance will be put into context through a contractual agreement. The contractual agreement must deals accurately with the level of acquisition, foreground, background, confidentiality, and originality. The contractual agreement shall be made available to the crowd wherein a “clickwrap” shall bind them to the agreement before the execution of the crowdsourcing task.
    1.4. In the implementation of this guideline, resources such as legal counsel, IP expert(s) and/or front-end developer(s) may be consulted as necessary, especially in the development of the contractual agreement and the establishment of broadcasting and assigning mechanism.

4.4.2.1 Ownership and Licensing Positions

Three ownership positions are recommended for the treatment of foreground and background in this guideline. Each of the following positions is described below, which is inclusive of the scope of the ownership, the benefits, and risks of the position in consideration. Also, the circumstances which shall support the rationale behind the position (as outlined in **Section 2.3.3**). These positions arranged from 1 to 3 based on the level of acquisition of ownership, each position divided into 3 parts, the first two of which contained multilevel clauses, and the last part contained a list of circumstances with multilevel items.

1) Position A: The Crowdsourcer Owns the Foreground, with No License Given to the Crowd

1. ‘level of acquisition of ownership.’

    1.1. This position states that the crowdsourcer owns the foreground and therefore has absolute discretion to use, modify, and commercialize the foreground in scope. It shall imply that the crowd participant and any other parties have no right to exploit the foreground either by use, modification to create new derivative works, or commercialization without prior authorization issued by the crowdsourcer. Whether any exploitation is agreed with a third-party(s) at a later stage, this shall be done under a license based on the crowdsourcer's choice.

2. ‘benefits,’ ‘risks.’

    2.1. This position shall enable the crowdsourcer to impose full management and control on the use, modification, and commercialization of the foreground, where appropriate. It can also allow the crowdsourcer to share the foreground with any affiliated third-party(s) acting for them without licensing together with the opportunity to commercialize the foreground to third-party(s) under an appropriate licensing agreement. This position shall also avoid claims in the future from the crowd participants and/or third-party(s).

2.2. This position must be taken with full safeguards against any IP leakage of the crowdsourcer background, and the content provided by the crowd participant is original and not part of a third party's background. These instances impose a risk to the crowdsourcer as the owner of the foreground by losing the competitive advantages and/or infringing third-party rights associated with the ownership of contaminated content.

3. The circumstances which support this position are as follows but are not limited to:

3.1. The foreground applies to a critical system. It is appropriate to avoid dependency on a crowd for knowledge and/or control of such a system with known criticality.
3.2. The crowdsourcer has prior obligations to a third-party(s), which preclude crowd participants form the foreground ownership.
3.3. The foreground is part of a partially developed component or subsystem which can either be incorporated into a complete system at a later date or may be transferred to a complete system to the market through licensing for exploitation.
3.4. The foreground expands upon an existing background. The crowdsourcer should own the foreground to maintain the integrity of the resulting IP package and/or to avoid the fragmentation of the IP package (i.e., multiple ownership of the various pieces of IP) and/or to simplify the transfer of the resulting IP package for exploitation.
3.5. The crowdsourcer only considers third-party(s) for any exploitation of the foreground.
3.6. The crowdsourcer intends to enforce any violations of the foreground against infringers.
3.7. The crowdsourcer wishes to allow free use of the foreground on open source terms.
3.8. There are other reasons that the crowdsourcer wishes to own the foreground.

2) Position B: The Crowdsourcer Owns the Foreground, with License Given to the Crowd

1. ‘level of acquisition of ownership.’

1.1. This position states that the crowdsourcer owns the foreground while providing the crowd a granted exploitation license for use, modification and/or commercialization of the foreground. The crowdsourcer's ownership implies that any other affiliated party(s) acting in their name can use, modify, and commercialize the foreground as the crowdsourcer seems fit. The licensing agreement given to the crowd participant must include provisions depending on the type of licensing agreement between the two parties, which can either be non-exclusive, exclusive, or sole (as outlined in **Section 2.3.3**). It can be in the form that the crowd participant does not attempt to commercialize the foreground in the same targeted market as that of the crowdsourcer or that the crowd shall not commercialize derivative work from the original foreground to third-party(s) without prior notification to the crowdsourcer which all depends on the type of licensing agreement and limitations agreed upon it.

2. ‘license,’ ‘benefits,’ ‘risks.’

2.1. This position requires the crowdsourcer to make a conscious decision on which type of license to grant the crowd participant and is an enabler to promote if there is any affiliated party(s) involved to exploit the foreground without a doubt in their entitlement.

2.2. As the agreement gives the crowd licensing opportunities on the foreground, this encourages the crowd to maximize their contribution and potential in addition to the opportunity of the crowdsourcer to leverage for a lower price for the completion of the task. Additionally, as the parties involved in this position can modify the foreground depending on the type of licensing agreement taken, this avoids and eliminates the barrier for continuous innovation.

2.3. This position must be taken with full safeguards against any IP leakage of the crowdsourcer background, and the content provided by the crowd is original and not part of a third party's background. These instances impose a risk to the crowdsourcer as the owner of the foreground by losing the competitive advantages and/or infringing third-party rights associated with the ownership of contaminated content.

3. The circumstances which support this position are as follows but are not limited to:

3.1. The crowdsourcer wishes to use or share the foreground with other party(s) but having the accountability of being the owner of the foreground to relieve any doubt from the party(s) who wish to exploit the foreground and at the same time providing this equal opportunity to the crowd participant.

3.2. As the owner of the foreground, the crowdsourcer intends to enforce any violations against infringers but is willing to grant exploitation rights to the crowd participant.

3.3. In cases where the foreground is part of a critical system, the appropriateness of the ownership shall fall to the crowdsourcer; however, they do not intend to undertake the commercialization of the foreground. With this intention and with the potential of the foreground to be commercialized, the crowdsourcer shall grant a license to the crowd participant but keeping the ownership to avoid dependency with regards to the knowledge and control of such system given the criticality.

3) Position C: The Crowd Owns the Foreground, with License Given to the Crowdsourcer

1. ‘ownership,’ ‘license.’

1.1. This position states that the crowd owns the foreground while providing the crowdsourcer and all its affiliated party(s) a granted exploitation license of foreground for the purpose of use, modification and/or commercialization. Depending on the type of licensing agreement, the crowdsourcer can exercise the right to exploit the foreground as appropriate. Given the crowdsourcer a license to exploit, it is recommended to set out the inclusion rights of the crowdsourcer, its affiliated party(s) and/or third-party(s) acting for them.

2. ‘benefits,’ ‘risks.’

2.1. With the ownership given to the crowd, the crowdsourcer increases participation for the task encouraging them to maximize their creativity and contribution. Crowd participants shall be granted the capability to protect the foreground against infringers, which in return protects the exploitation value and preserves

competitive advantages. In addition, depending on the licensing option agreed upon, this position may encourage the crowd to exploit the foreground by eliminating potential obstacles to non-ownership of the foreground in dealing with crowdsourcers and may also have an opportunity to exploit the Foreground in a way that it serves its present and future operational needs together with the ability to create derivative work for continuous innovation. This position could also release the crowdsourcer from the responsibility of the crowdsourced content from any associated risk if any.

2.2. This position must be taken with precaution and consideration must be undertaken, otherwise, risks arising from crowdsourcer losing its competitive advantage when the agreement does not include provisions limiting the crowd from some activities such as granting a license to commercialize the foreground in the same targeted market as of the crowdsourcer.

3. The circumstances which support this position are as follows but are not limited to:

3.1. Crowdsourcer is expecting that the foreground will be delivered with the use of background, which is owned by the crowd participant.

3.2. There is no need for the crowdsourcer to retain ownership of the foreground.

4.4.2.2 Step by Step Guide to the Ownership and Licensing Agreement

This section commenced with an informative introduction of two main aspects that need to be considered by the platform facilitators in the adaption of these guidelines. The first is to prepare or update the necessary information in the platform's terms and conditions that determine the adaptation of the new approach towards settlement among the crowdsourcer and crowd, which will facilitate decision-making and acceptance. It was mainly derived from the researchers' allegations and confirmed by the analysis of the legal documents lied in the lack of information concerning ownership, confidentiality, and originality (as detailed in **Section 2.2.3** and **Section 4.2**). The second is the critical considerations of the specific priorities and protections that must be undertaken in determining the appropriate ownership and licensing position, which will ensure that all the necessary provisions are stipulated in the contractual agreement and approved by the crowdsourcer then accepted by the crowd participant. These considerations were based

on the recommendation provided by (Chanal & Caron-Fasan, 2010; de Beer et al., 2017), where the crowdsourcers circumstances should be considered at the first stage of the crowdsourcing process that satisfied their expectations and ensures appropriate protections (as detailed in **Section 2.2.3**). As for the contractual agreements was based on the recommendation by (Peng et al., 2014), this is to ensure the approval of crowdsourcers and acceptance of the crowd participants before the execution of the crowdsourcing task (as detailed in **Section 2.2.3**). The aspects are contained in two-level clauses as follows:

1. ‘necessary declaration,’ ‘key consideration.’

    1.1. The platform facilitators shall use this guideline to explicitly draft the terms & conditions in their legal documents to provide clarity to the crowdsourcers and crowd participants that the platform’s adapted mechanism in the management and control of IP rights.
    1.2. The following steps must be undertaken with its critical considerations to achieve a fair agreement among the entities involved in the crowdsourcing process. The following flowchart illustrating the step-by-step guide towards the ownership and licensing agreement as presented below in Figure 4.9 and repeated respectively in pseudocode format to facilitate the tracking process.

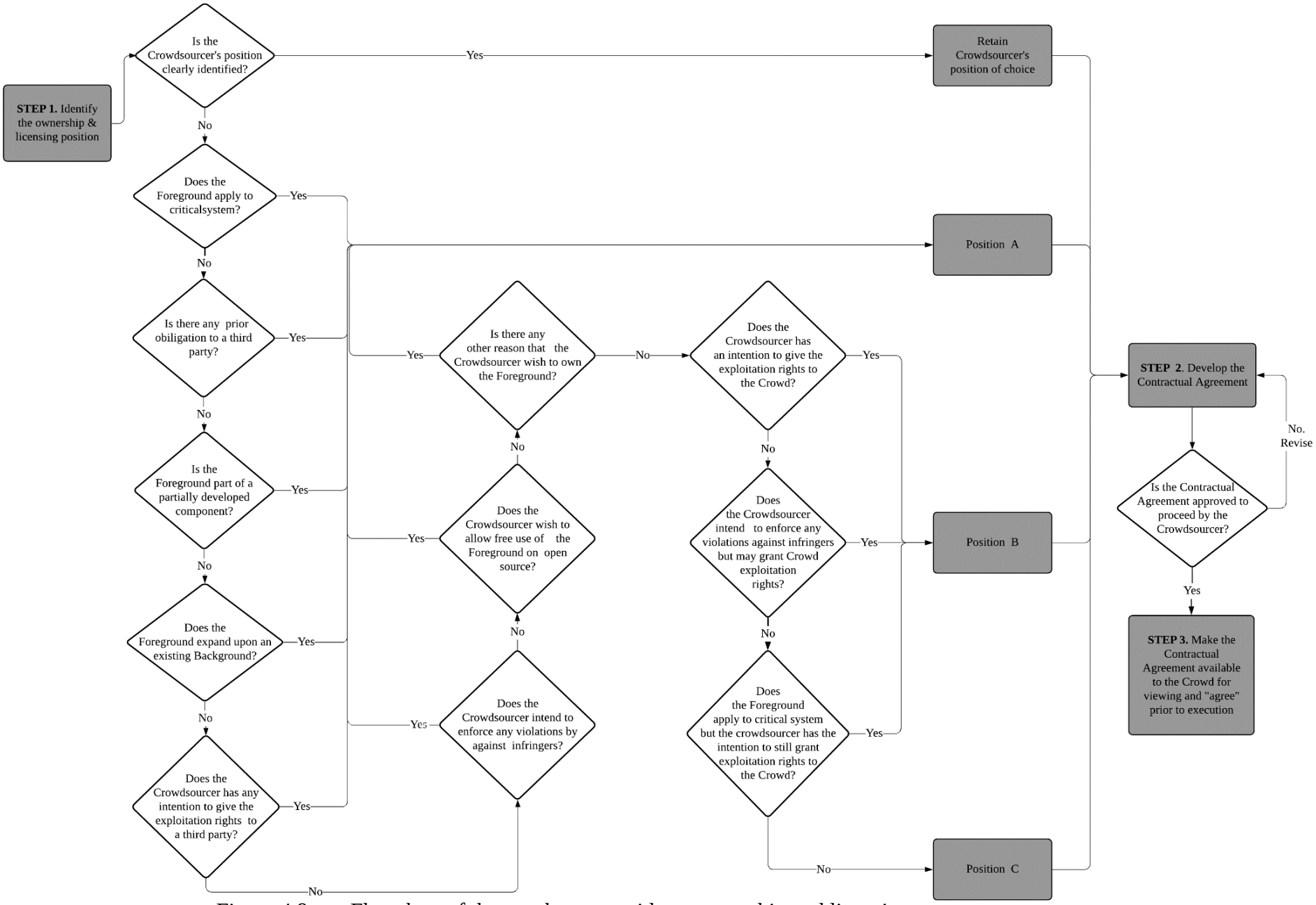

Figure 4.9: Flowchart of the step by step guide to ownership and licensing agreement

The logic of the flowchart above is repeated below in pseudocode format.

- STEP 1: Identify the ownership and licensing position

1. **If** the crowdsourcer's position clearly identify, **Then**
2. "Retain crowdsourcer's position of choice" and move to "**Step 2.**"
3. **Else**
4. ***If*** *the foreground applies to a critical system,* ***Then***
5. Take "**Position A**" and move to "**Step 2.**"
6. **Else**
7. ***If*** *there any prior obligation to a third party,* ***Then***
8. Take "**Position A**" and move to "**Step 2.**"
9. **Else**
10. ***If*** *the foreground part of a partially developed component,* ***Then***
11. Take "**Position A**" and move to "**Step 2.**"
12. **Else**
13. ***If*** *the foreground expands upon an existing background,* ***Then***
14. Take "**Position A**" and move to "**Step 2.**"
15. **Else**
16. ***If*** *the crowdsourcer has any intention to give the exploitation rights to a third party,* ***Then***
17. Take "**Position A**" and move to "**Step 2.**"
18. **Else**
19. ***If*** *the crowdsourcer intend to enforce any violations by against infringers,* ***Then***
20. Take "**Position A**" and move to "**Step 2.**"
21. **Else**
22. ***If*** *the crowdsourcer wish to allow free use of the foreground on open source,* ***Then***
23. Take "**Position A**" and move to "**Step 2.**"
24. **Else**
25. ***If*** *there any other reason that the crowdsourcer wish to own the foreground,* ***Then***
26. Take "**Position A**" and move to "**Step 2.**"
27. **Else**

28. ***If*** *the crowdsourcer has any intention to give the exploitation rights to the crowd,* ***Then***
29. Take "**Position B**" and move to "**Step 2.**"
30. **Else**
31. ***If*** *the crowdsourcer intend to enforce any violations against infringers but may grant crowd exploitation rights,* ***Then***
32. Take "**Position B**" and move to "**Step 2.**"
33. **Else**
34. ***If*** *the foreground applies to the critical system but has the intention to still grant exploitation rights to the crowd,* ***Then***
35. Take "**Position B**" and move to "**Step 2.**"
36. **Else**
37. Take "**Position C**" and move to "**Step 2.**"

- STEP 2: Develop the contractual agreement.

38. **If** the contractual agreement approved to proceed by the crowdsourcer, **Then**
39. Proceed to "**Step 3.**"
40. **Else**
41. Repeat "**Step 2**" and revise accordingly

- STEP 3: Make the contractual agreement available to the crowd for viewing and "agree" before execution.

Each of the above steps is combined into a practical example designed to ensure simplicity, better understanding, and proper implementation of these guidelines by platform facilitators. Concerning the sequence of steps, the first step involved a tracking process of the circumstances listed in the flowchart and repeated in the pseudocode based on the circumstance given in the example. To illustrate how the appropriate position is defined, along with directives to engage legal counsel and/or IP experts in the case of new or ambiguous circumstances. The second step was then to develop the contractual agreement based on the position set out in Step 1, illustration provided on how the necessary clauses of the agreement identified, along with directives in ensuring the acceptance of the crowdsourcer on clauses stipulated in the contractual agreement prior proceeding to step 3. As well as the engagement of legal counsel and/or IP experts

in the development of contractual agreement as necessary. After the contractual agreement approved to proceed by the crowdsourcer, step 3 made it available to the potential crowd for review. Illustration provided on how to make the agreement available to the crowd participants to be agreed upon before the execution, along with directives to engage front-end developers to attach the agreement in the broadcasting and assigning mechanism. Each of the three steps, along with detailed discussion, are provided as follows:

1) Step 1: Identify the Ownership and Licensing Position

In this step, the platform facilitator is required to understand the position the crowdsourcer wish to undertake clearly. It includes the position of the ownership and licensing that best serves the interest of the crowdsourcer. The decision to be taken in this step is based on whether the crowdsourcer's position of choice is clearly identified.

If no, the platform facilitators shall make a comparison on the crowdsourcer's case and propose a position that best fits their circumstances. Refer to the flowchart or pseudocode on the decision-making process.

Note: If the circumstance of the crowdsourcer does not match any of the circumstances listed in the flowchart or pseudocode, a legal counsel and/or IP expert should be consulted to help in identifying the appropriate position.

If yes, proceed to Step 2.

Example: C*rowdsourcer A* (Automobile Company) puts up a task request for an *upgraded vehicle movement system with built-in novel features* that must be exclusively developed for them. The novel feature(s) will be part of an existing Background owned by the C*rowdsourcer A* with the main purpose of commercialization. C*rowdsourcer A* seeks to advise from the Platform Facilitator for appropriate decisions to be taken.

In this case, the Platform Facilitator shall be assisted with the identification of circumstances by walking through the series of decision points in the

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flowchart or table depending on their preference. The platform will be able to identify that the appropriate circumstance is *"Does the Foreground expand upon an existing Background?"* and answering this question with Yes puts the ownership and licensing in **Position A**.

2) Step 2: Develop the Contractual Agreement

The platform facilitators must develop contractual agreements stipulating the appropriate clauses of the chosen position in Step 1.

If Position A, state in the contractual agreement, the following provisions:

- The crowdsourcer shall own the foreground with no license given to the crowd.
- The rationale for the crowdsourcer's ownership must be stated. To provide transparency, which shall gain the crowd participant confidence and shall encourage the crowd to agree and participate in the execution.
- There is a clear statement stating that the crowd is bound to maintain the confidentiality of the crowdsourcer's task and the work provided by the crowd is new and original and is not violating any works from third party(s) and if otherwise, the crowd participant will take the responsibility of any claim on the future and the crowdsourcer is free from any responsibilities.

If Position B, state in the contractual agreement, the following provisions:

- The crowdsourcer shall own the foreground with a license given to the crowd participant.
- State the type and specify the terms to be exercised by the crowd depending on the type of licensing option granted by the crowdsourcer (as outlined in **Section 2.3.3**).
- There is a clear statement stating that the work provided by the crowd participant is new and original and is not violating any works from a third party(s), and if otherwise, the crowd will take the responsibility of any claim on the future and the crowdsourcer is free from any responsibilities.

If Position C, state in the contractual agreement, the following provisions:

- The crowd participant shall own the foreground with a license given to the crowdsourcer.
- State the type and specify the terms to be exercised by the crowdsourcer depending on the type of licensing option they wish to undertake (as outlined in **Section 2.3.3**).

In this step, the clauses stated in the contractual agreement are compulsory to be agreed upon by the crowdsourcer before proceeding to the next step. To ensure that the agreement is accepted by the crowdsourcer, the platform shall request approval to proceed and make amendments if deemed required.

If no, revise and refine the clauses stated in the contractual agreement as necessary.

Note: Legal counsel and/or IP experts should be consulted as necessary to help in developing the contractual agreement.

If yes, proceed to Step 3.

Following the example in Step 1: Based on the circumstance of *Crowdsourcer A*, the ownership and licensing position which shall be taken is **Position A** whereby the Crowdsourcer owns the Foreground with no license given to the Crowd. The contractual agreement is advised to include the provisions as follows:

1. **Rationale.** Crowdsourcer A shall own the Foreground to maintain the integrity of the resulting IP package avoiding the fragmentation of ownership to ascertain effective management and control of Foreground arising from the task.
2. **Ownership of Foreground.** The IP Rights related to any part of the ***upgrade of the vehicle movement system with built-in novel features,*** including any Foreground and entitlement to all development

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documentation and other technical information relating to any part of the task, shall be owned as follows:

- Crowdsourcer A shall own all Foreground exclusively;
- Crowd shall deliver all models, instructions, protocols, development documentation and all other technical information related to all parts of the task to upgrade of the vehicle movement system with built-in novel features associated with Foreground to Crowdsourcer A; *and*
- Crowd participant hereby transfer (or shall cause to be transferred) all Foreground to Crowdsourcer A to the extent required under applicable laws.

3. **Licensing of Foreground.**
    - Crowdsourcer A shall be granted the absolute discretion of exploitation to use, modify and commercialize the Foreground; *and*
    - By virtue of ownership and licensing rights of Crowdsourcer A, the Crowd is not entitled to any licensing opportunity.
4. **Infringement of Foreground.** Crowd shall take the responsibility and defend Crowdsourcer A against all claims and indemnify Crowdsourcer A from any damages and expenses incurred by Crowdsourcer A, which arise out of or in connection with a claim alleging that the submitted content infringes IP rights of a third party.

3) Step 3: Make the Contractual Agreement Available to the Crowd for Viewing and "Agree" Prior to Execution

With the contractual agreement approved to proceed by the crowdsourcer, the platform facilitator shall progress with the search for crowd participants willing to execute the task as per agreement with the prerequisite that it is made available to the potential crowd for review. The crowd must agree to the clauses of the contractual agreement with the

acceptance or decline decision be made through a ‘clickwrap’ agreement before the execution of the task.

Note: This step may require a front-end developer to attach the agreement in the broadcasting and assigning mechanism.

Following the example in Step 1 and Step 2: Based on the circumstance of c*rowdsourcer A*, the ownership and licensing position which shall be taken is **Position A** as per Step 1 and the provisions required to be included in the Contractual Agreement as per Step 2 was approved to proceed by the crowdsourcer. After this, the platform was able to post the task, ***upgrade of the vehicle movement system with built-in novel features***, making it available for any crowd willing to execute. Any crowd paticipants interested shall use the ‘clickwrap’ agreement below in Figure 4.10 to accept or decline the Contractual Agreement alongside the task requested.

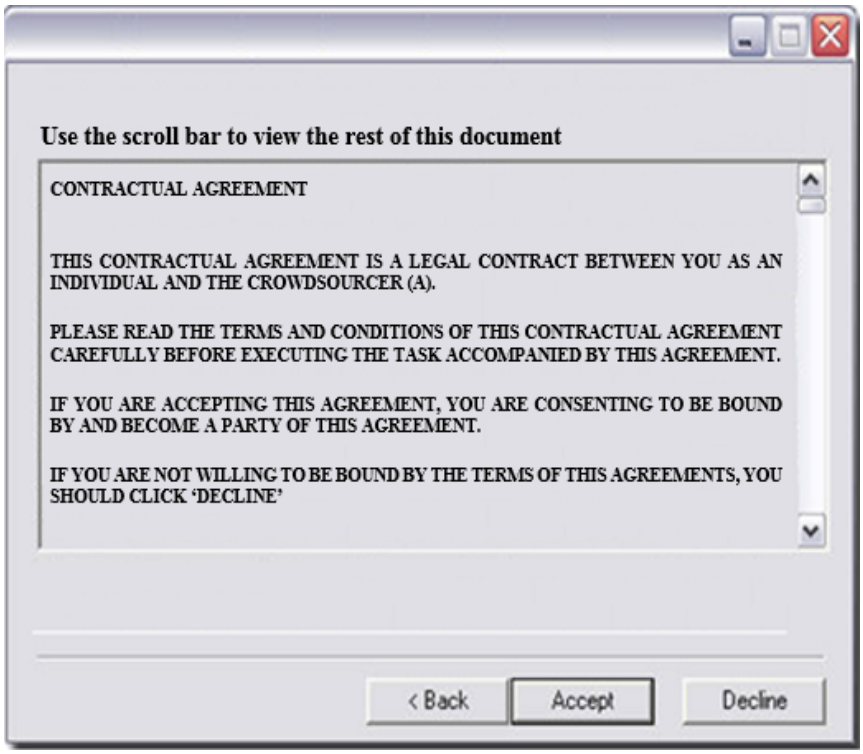

Figure 4.10: Illustration of accepting or decline clicks

4.5 Summary

This chapter presented the results of the analysis conducted on the legal documents of the crowdsourcing platforms supporting CSE activities to identify the issues and challenges in IP rights management and control, which lie in the researchers' allegations. The findings revealed four IP rights issues and one challenge. These issues are surrounding the crowdsourcing process, which were addressed in the proposed IP rights guideline. The proposed guideline involved recommendations for actions needed for the decision-making process on ownership and level of acquisition, appropriate protection of the confidentiality of the crowdsourcing task, and ensuring the originality of crowdsourced content. This chapter also presents the results of Task 2: Review whereby 5 expert panel using a modified Delphi technique achieved a consensus of the applicability of the evaluation criteria and the approval of the guideline, which provided the signal to proceed to the evaluation task.

CHAPTER 5

EVALUATION OF THE IP RIGHTS GUIDELINE FOR PLATFORM SUPPORTING CSE ACTIVITIES

5.1 Introduction

In this study, the initially developed IP rights guideline for the platform supporting CSE activities underwent two cyclical rounds of review and refinement before the evaluation. This chapter addresses the evaluation of the proposed guideline using the consolidation evaluation criteria, as contained in **Section 2.4.3**. Initially, a panel of thirty experts had agreed to be involved in the evaluation task to verify the findings from the previous review task, which involved only five experts. However, only 28 evaluators have viewed and evaluated the proposed guideline. The consolidation criteria after the review and refinement, as discussed in Chapter 4, is reliable criteria for evaluating IP rights guidelines. The consolidation evaluation criteria will be revisited in this chapter, along with the overall and individual results from the evaluators. Finally, the chapter ends with a discussion on the strengths and weaknesses of the evaluated IP rights guideline and the threats of validity.

5.2 Analysis of the Items of the Consolidated Evaluation Criteria

This research enables the IP rights guideline to be developed entirely, reviewed, and evaluated to safeguard the IP rights in CSE activities adequately. And, the process of using an expert panel with relevant experience from the industry and academia after Task 2: Review was a practical approach not only to test the quality of the IP rights guideline but also, to be able to highlight its strengths and weaknesses in alignment with the expectation of the evaluation criteria.

As per **Section 2.4.3** Consolidated Evaluation Criteria, six domains are considered essential in the appraisal of the quality of the IP rights guideline. These domains were translated to evaluation criteria consisting of 23 items, which was administered using a 6-Likert scale questionnaire to the expert panel as the evaluation instrument for this study. After the data collection from the 28 expert panel involved in this evaluation task using

the consolidated evaluation criteria, the Likert scales were interpreted as follows: Strongly Agree was assigned as 6; Agree as 5; Somewhat Agree as 4; Somewhat Disagree as 3, Disagree as 2 and Strongly Disagree as 1. The summary is presented in Table 5.1.

The data were then analyzed through Statistica software using a data description, and summary tool, which is boxplot wherein the central tendency chosen for the study is median (Bertram, 2007). The range of variation was computed for each item of the consolidated evaluation criteria. As presented in Figure 5.11, it shows that there were no responses received for Likert Scale 1 – 3, which means that all the results are supportive. Besides, the boxplots for each of the items represented by the vertical line show similar ranges of response from Likert scale 4 – 6, except for Item No. 1 and 10 in which range was from Likert scale 5 – 6. Thus, it can be deduced that the variability between the items is relatively similar to Item No.1 and 10 having the least variability among all the items. Therefore, this can be interpreted as the similarity of the responses, even with a sample population with a variable length of work experience, fields of practice, and origin of the practice.

Based on which items regarded highly by the expert panel. The results could show that a high median value can be observed for Items No. 4 and 6 of domain 'stakeholder involvement,' Item No. 10 of domain 'rigour of development,' Items No. 16 and 17 of the domain 'clarity of presentation' and Item No. 19 of the domain 'date.' As the median denotes the midpoint of the frequency of distribution, it can be interpreted that for these items, Likert scale 6 has the same distance from the highest and lowest value in the responses. It can, therefore, be deduced from this information that the strength of the IP rights guideline was mainly for the domain stakeholder involvement given that the observation was accounted for the 2 out of the 3 items of the domain. That means the engagement of the guideline developers to the target users was adequately established as per the expert panel perspective involved in the task. Clarity of presentation domain, on the other hand, follows this domain because of the perceived agreement for Item No. 16 wherein the guideline satisfies the requirement in terms of readability and layout. Another strength perceived surrounding this domain is the provision of references (Item No. 17) used in the development of the guideline. Also, the guideline's ability to present the

Table 5.1: Summary of experts' responses in the evaluation of the IP rights guideline

Domains	Items	Number of Responses	Number of Valid Responses	Expert Panel Responses					
				(6) Strongly Agree	(5) Agree	(4) Somewhat Agree	(3) Somewhat Disagree	(2) Disagree	(1) Strongly Disagree
Scope & Purpose	The overall objective(s) of the guideline is (are) specifically described	28	28	15 (53.6%)	13 (46.4%)	0	0	0	0
	The topic question(s) covered by the guideline is (are) specifically described	28	28	10 (35.7%)	17 (60.7%)	1 (3.6%)	0	0	0
	The population to whom the guideline is meant to apply is specifically described	28	28	5 (17.9%)	18 (64.3%)	5 (17.9%)	0	0	0
Stakeholder involvement	The guideline developers are clearly stated	28	28	17 (60.7%)	10 (35.7%)	1 (3.5%)	0	0	0
	The target users of the guideline are clearly defined	28	28	8 (28.6%)	18 (64.3%)	2 (7.1%)	0	0	0
	The qualifications and expertise of the guideline developers link with the purpose of the guideline and its end users	28	28	16 (57.1%)	11 (39.3%)	1 (3.6%)	0	0	0
	Systematic methods were used to search for evidence	28	28	8 (28.6%)	15 (53.6%)	5 (17.9%)	0	0	0
Rigour of development	The criteria for selecting the evidence are clearly described	28	28	8 (28.6%)	18 (64.3%)	2 (7.1%)	0	0	0
	The strengths and limitations of the body of evidence are clearly described	28	28	8 (28.6%)	18 (64.3%)	2 (7.1%)	0	0	0
	The methods for formulating the recommendations are clearly described	28	28	14 (50%)	14 (50%)	0	0	0	0
	The benefits and risks have been considered in formulating the recommendations	28	28	6 (21.4%)	18 (64.3%)	4 (14%)	0	0	0

Domains	Items	Number of Responses	Number of Valid Responses	Expert Panel Responses					
				(6) Strongly Agree	(5) Agree	(4) Somewhat Agree	(3) Somewhat Disagree	(2) Disagree	(1) Strongly Disagree
	There is an explicit link between the recommendations and the supporting evidence	28	28	10 (35.7%)	15 (53.6%)	3 (10.7%)	0	0	0
Clarity of presentation	The recommendations are specific and unambiguous.	28	28	4 (14.3%)	22 (78.6%)	2 (7.1%)	0	0	0
	The different position for management of the situations or issues are clearly presented	28	28	11 (39.3%)	14 (50%)	3 (10.7%)	0	0	0
	Key recommendations are easily identifiable	28	28	9 (32.1%)	15 (53.6%)	4 (14.3%)	0	0	0
	The guideline is readable and easy to navigate	28	28	15 (53.6%)	9 (32.1%)	4 (14.3%)	0	0	0
	The guideline provides a complete reference list	28	28	16 (57.1%)	9 (32.1%)	3 (10.7%)	0	0	0
	Does the guideline provide a summary of its recommendations	28	28	8 (28.6%)	14 (50 %	6 (21.4%)	0	0	0
Date	The date of completion is available	28	28	13 (46.4%)	10 (35.7%)	5 (17.9%)	0	0	0
	A trigger point for the necessity to update the guideline is provided	28	28	5 (17.9%)	9 (32.1%)	14 (50%)	0	0	0
Applicability	The guideline describes facilitators and barriers to its application	28	28	7 (25%)	20 (71.4%)	1 (3.6%)	0	0	0
	The guideline provides advice and/or tools on how the recommendations can be put into practice	28	28	8 (28.6%)	18 (64.3%)	2 (7.1%)	0	0	0
	The potential resources implications of implementing the recommendations have been considered	28	28	9 (32.1%)	15 (53.6%)	4 (14.3%)	0	0	0

methods of formulating recommendation (Item No. 10) based on a methodological approach under the domain ‘rigour of development’ and the completion ‘date’ (Item No. 19) to be able to reflect that the recommendations presented are based on real-time circumstances relevant to the field of practice.

It can be observed that for Item No. 13, there is no vertical line as the 2nd and 3rd quartile coincides with the median, which can be interpreted that most of the responses received for this item were Likert scale 5. On the other hand, all other items have a median of scale 5, which indicates that the proposed guideline developed and reviewed complies with the specific requirements of the quality of an IP rights guideline by the expert panel on this evaluation function.

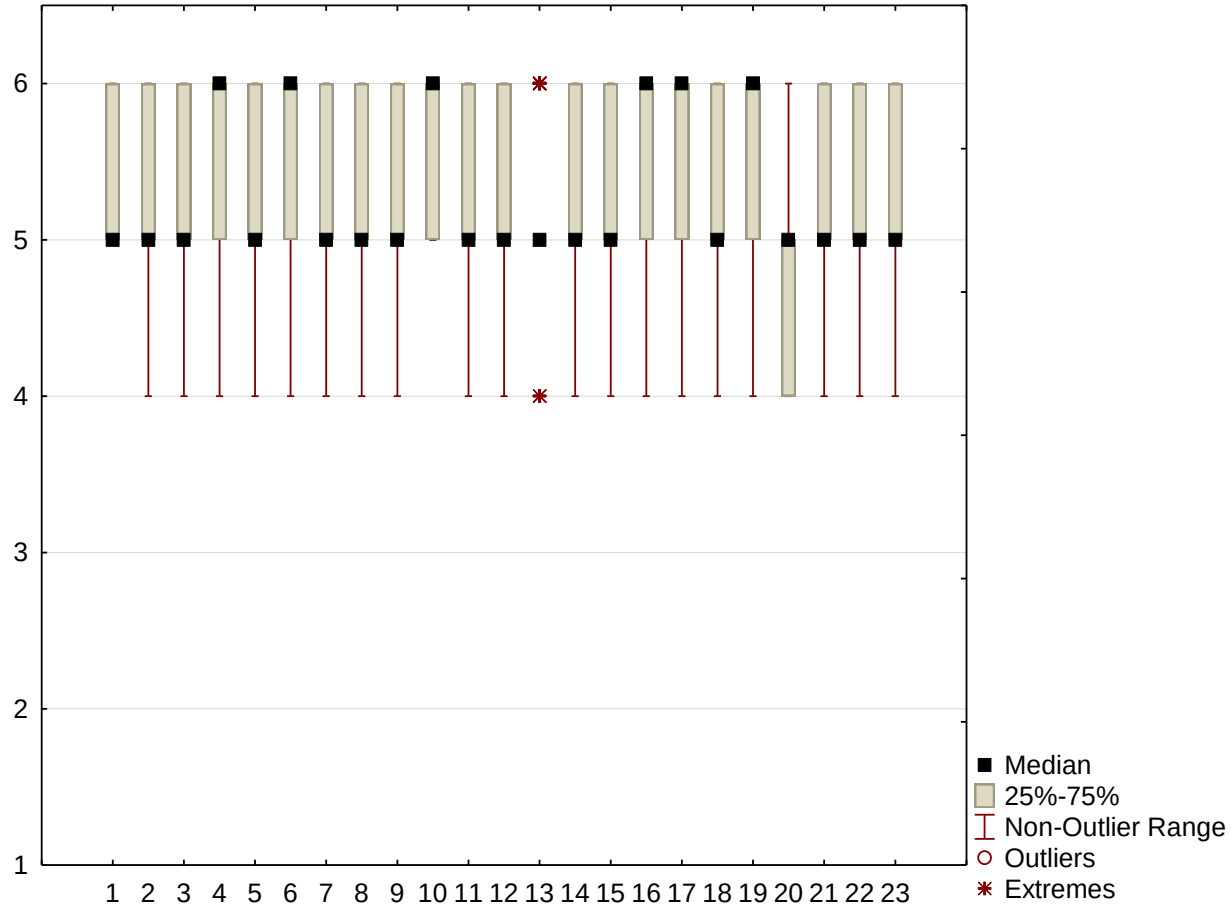

Figure 5.1: Boxplot illustration of the expert panel responses

Another observation is the difference in the trend of Item No. 20 amongst the items in the evaluation criteria. Item No. 20 was perceived to be between the Likert scale 4 and 5

by a majority of the members of the panel. This item represents the domain 'date,' which requires that the guideline be based on current evidence and presents real-time and relevant circumstances and recommendations. As such, a trigger point for an update was needed to recognize that the IP rights guideline need to be updated. In the guideline, it was addressed using the statement, *'If there are significant circumstances which may be new or that this guideline failed to recognize, an update of the guideline may be necessitated.'* Two similar comments were received for this requesting for examples of trigger points for better understanding. This item may be perceived as the sole weak point of the guideline with regards to the satisfaction of the consolidated evaluation criteria because of the difference in the trend compared to the other items. However, the general observation was still a Likert scale '5 – Agree' for this particular item.

For items with a Likert scale score of '4 – Somewhat Agree' on ratings above 10% or less than 22%, it can be observed that the experts did not seem to have difficulty in identifying the items and recognizing that they were addressed in the guideline. Items received ratings 10% or less than 22% across the 23 items were Items No. 3 of domain 'scope and purpose,' Item No. 7 of domain 'stakeholder involvement,' Items No. 11 and 12 of domain 'rigour of development,' Item No. 14, 15, 16, 17 and 18 of domain 'clarity of presentation,' Item No. 19 of 'domain date,' and Item No. 23 of 'domain applicability.' All domains had 'Somewhat Agree' score with at least one of the items, most notably with the item 18, which assess the summary in the guideline recommendations. However, in the guideline, it was addressed using a step-by-step guide. Experts may be satisfied with the items of the guideline, but their expectations may be higher at the same time. It should be noted that although experts who didn't regard these items of the guideline highly compared to the other experts, they still consider these items as somewhat satisfied. With that, the general observation was still a Likert scale '5 – Agree' and '6 – Strongly Agree' for these particular items.

Generally, based on the analysis presented in the preceding paragraphs, an excellent overall response was received for each of the items involved in the appraisal of the developed and reviewed IP rights guideline for the study. The quality assessment of the six domains based on the AGREE II formal is presented in the next section.

5.3 Evaluation Criteria

Following the analysis of the perceived degree of agreement/disagreement in each of the items of the consolidated evaluation criteria, the analysis progressed towards the measurement of the relevance, clarity, comprehensiveness, and appropriateness through the AGREE II formula. This analysis was for the six domains essential for the appraisal of the guideline quality, which are namely scope and purpose, stakeholder involvement, rigour of development, clarity of presentation, date, and applicability. The domain scores were calculated by summing the scores of each item in a domain after that scaling the total score obtained for that domain. The minimum possible score for each domain was calculated as the number of items multiplied by the number of evaluators 28 multiplied by the number of scores 1 (strongly disagree). The maximum possible score for each domain was calculated as the number of items multiplied by the number of evaluators 28 multiplied by the number of scores 6 (strongly agree). Therefore, the maximum standard score for each domain is 100%, and the minimum score is 0%. As quality standards differ among industries, it is recommended that professionals within an industry determine how to interpret the domain scores based on acceptable standards of their industry (Brouwers et al., 2010). The results and findings of the analyses are presented in the sections below.

5.3.1 Domain 1: Scope and Purpose

In the consolidated evaluation criteria, items 1-3 represents the totality of the domain Scope and Purpose. This domain represents the requirement in providing specificity towards what the IP rights guideline wanted to achieve, what the IP rights guideline wanted to address while ensuring that the intended population was clarified. The members of the expert panel provided a total score of 86% for this domain. There were no recommendations to improve this domain. Each expert agreed that the proposed IP rights guideline provided a clear and easy-to-understand statement, as shown in Table 5.2.

Table 5.2: Domain 1: Scope and purpose

Items	Number of Evaluators x Response			Total Responses
	(6) Strongly Agree	(5) Agree	(4) Somewhat Agree	
The overall objective(s) of the guideline is (are) specifically described	90 (15*6)	65 (13*5)	0	155
The topic question(s) covered by the guideline is (are) specifically described	60 (10*6)	85 (17*5)	4 (1*4)	149
The population to whom the guideline is meant to apply is specifically described	30 (5*6)	90 (18*5)	20 (5*4)	140
Total Responses	180	240	24	444
			Domain 1 Total Score	86%

5.3.2 Domain 2: Stakeholder Involvement

The following domain is the stakeholder involvement, which ensures the establishment of guideline developer-user relationship by ensuring the engagement and credibility. This domain can be achieved by stating the guideline developers and their qualifications and the target users of the guideline adequately. The total score was 89%, reflecting the consensus that stakeholder involvement was appropriate. There were no recommendations to improve this domain. This domain considered the strongest domain of the IP rights guideline, as presented in **Section 4.5.1.** Table 5.3 shows the total experts' responses to the 3 items (4 - 6) representing domain 2.

Table 5.3: Domain2: Stakeholder involvement

Items	Number of Evaluators x Response			Total Responses
	(6) Strongly Agree	(5) Agree	(4) Somewhat Agree	
The guideline developers are clearly stated	102 (17*6)	50 (10*5)	4 (1*4)	156
The target users of the guideline are clearly defined	48 (8*6)	90 (18*5)	8 (2*4)	146
The qualifications and expertise of the guideline developers link with the purpose of the guideline and its end users	96 (16*6)	55 (11*5)	4 (1*4)	155
Total Responses	246	195	16	457
			Domain 2 Total Score	89%

5.3.3 Domain 3: Rigour of Development

Items 7-12 of the criteria represented the domain rigour of development, which is one of the domains having the highest number of items involved in the appraisal. This domain relates to the processes used to search and synthesize evidence and to the methods used in formulating recommendations. The items in this domain specify the systematic methods employed in the search for evidence, clarity of description of research criteria, clarity of description of methods used in the formulation of guideline recommendations, and consideration of benefits and risks. As can be seen in Table 5.4, the members of the expert panel provided a total score of 86% for this domain. It can be interpreted that the expert panel was in perceived agreement that the methodology used to develop the guideline for the purpose of the study adequately met the expectation of the criteria. It includes the criteria for selecting and summarizing evidence, and this evidence-based approach was utilized to formulate the recommendations presented in the guideline. No suggestions or recommendations were provided in this domain.

Table 5.4: Domain 3: Rigour of development

Items	**Number of Evaluators * Response**			**Total Responses**
	(6) Strongly Agree	**(5) Agree**	**(4) Somewhat Agree**	
Systematic methods were used to search for evidence	48 (8*6)	75 (15*5)	20 (5*4)	143
The criteria for selecting the evidence are clearly described	48 (8*6)	90 (18*5)	8 (2*4)	146
The strengths and limitations of the body of evidence are clearly described	48 (8*6)	90 (18*5)	8 (2*4)	146
The methods for formulating the recommendations are clearly described	84 (14*6)	70 (14*5)	0	154
The benefits and risks have been considered in formulating the recommendations	36 (6*6)	90 (18*5)	16 (4*4)	142
There is an explicit link between the recommendations and the supporting evidence	60 (10*6)	75 (15*5)	12 (3*4)	147
Total Responses	324	490	64	878
			Domain 2 Total Score	86%

5.3.4 Domain 4: Clarity of Presentation

Six items represent the domain clarity of presentation, which is as many items as the domain rigour of development. It means that the proposed guideline must meet a certain level of acceptance to ensure that the message is transmitted in a matter that prevents ambiguity of interpretation by different users of the guideline. The items in this domain assess the language, structure, and format of the proposed guideline. The proposed guideline achieved this through the language and layout that presents specific, unambiguous recommendations for managing IP rights issues in CSE activities, clearly presents information regarding circumstances and provides information to support the implementation of recommended guidelines. As can be seen in Table 5.5, the members of the expert panel provided a total score of 84% for this domain. One expert commented that the presentation of the guideline was unambiguous and easy to follow.

Table 5.5: Domain 4: Clarity of presentation

Items	Number of Evaluators * Response			Total Responses
	(6) Strongly Agree	(5) Agree	(4) Somewhat Agree	
The recommendations are specific and unambiguous	24 (4*6)	110 (22*5)	8 (2*4)	142
The different position for the management of the situations or issues are clearly presented	66 (11*6)	70 (14*5)	12 (3*4)	148
Key recommendations are easily identifiable	45 (9*6)	75 (15*5)	16 (4*4)	136
The guideline is readable and easy to navigate	90 (15*6)	45 (9*5)	16 (4*4)	151
The guideline provides a complete reference list	96 (16*6)	45 (9*5)	12 (3*4)	153
Does the guideline provide a summary of its recommendation	48 (8*6)	70 (14*5)	24 (6*4)	142
Total Responses	369	415	88	872
			Domain 2 Total Score	84%

5.3.5 Domain 5: Date

In the formulation of the recommendations of the IP rights guideline to adequately safeguard the IP rights through active management and control, current real-time circumstances were taken into account. To ensure that recommendations can be authorized to achieve the objective of the research study. The items in this domain relate to the availability of the guideline completion date and a trigger point for the update to remain the proposed guideline valid. However, it was observed during the analysis that item 2 has a different trend, among others (**Section 4.5.1**). Though this is the case, the members of the expert panel provided a total score of 80% for this domain, reflecting consensus; this was the domain of lower-scoring. Thus, items No. 19 and 20 representing the domain date are addressed on the basis of the evaluation criteria, as presented in Table 5.6. There were no recommendations or suggestions provided for further improvement.

Table 5.6: Domain 5: Date

Items	Number of Evaluators * Response			Total Responses
	(6) Strongly Agree	(5) Agree	(4) Somewhat Agree	
The date of completion is available	78 (13*6)	50 (10*5)	20 (5*4)	148
A trigger point for the necessity to update the guideline is provided	30 (5*6)	45 (9*5)	56 (14*4)	131
Total Responses	108	95	76	279
			Domain 2 Total Score	80%

5.3.6 Domain 6: Applicability

Applicability is the domain whereby the uptake of the guideline is ensured by providing a strategy for implementation, and proactively provides probable limitations, barriers, or any resource impact. The members of the expert panel provided a total score of 84% for this domain. It means that the proposed guideline satisfied the requirements for the easy deployment of crowdsourcing platforms in their ways of working to achieve its objective quickly and to realize the benefits of its use easily. See Table 4.8 for the experts' responses

in the items represents this domain. No suggestions or recommendations were provided for this domain.

Table 5.7: Domain 6: Applicability

Items	Number of Evaluators * Response			Total Responses
	(6) Strongly Agree	(5) Agree	(4) Somewhat Agree	
The guideline describes facilitators and barriers to its application	42 (7*6)	100 (20*5)	4 (1*4)	146
The guideline provides advice and/or tools on how the recommendations can be put in practice	48 (8*6)	90 (18*5)	8 (2*4)	146
The potential resources implications of implementing the recommendations have been considered	54 (9*6)	75 (15*5)	16 (4*4)	145
Total Responses	144	265	28	437
			Domain 2 Total Score	84%

5.4 Strengths of the IP Rights Guideline for Platforms Supporting CSE Activities

Before this guideline, there was no established IP rights guideline for crowdsourcing platforms supporting CSE activities. As the distribution nature of the CSE process opened to a sizeable undefined crowd of participants, a more high risk of IP rights will likely need more engagement between stakeholders (Ågerfalk et al., 2015). IP rights in CSE activities require more systematic arrangements to manage tasks during broadcasting and assigning and control after tasks assignment (Peng et al., 2014). The proposed guideline was explicitly developed, reviewed, and evaluated to assist crowdsourcing platforms adequately safeguard IP rights in CSE activities (Domain Scope and Purpose). It is particularly important for the crowdsourcing platforms facilitators because of their primary responsibility to balance the rights of the crowdsourcers and the crowd participants during the crowdsourcing process (Domain Stakeholders Involvement).

The proposed guideline covered the integrated CSE activities detailing evidence-based recommendations (Domain Rigour of Development). Recommendations provide a definite direction in improving broadcasting and assigning mechanisms to ensure effective communication with the crowdsourcer and crowd, based on current

circumstances (Domain Date). Moreover, the recommendations end with a contractual agreement that would ultimately resolve issues of IP ownership identification, acquisition level, confidentiality, and originality based on a compromise. Additionally, the recommendations were presented in a manner that can easily be understood (Domain Clarity of Presentation) and can be adapted by the crowdsourcing platforms with minimal impact on resources, infrastructure, and documentations (Domain Applicability). Another strength that can be presented is the general application of this evaluated IP rights guideline as it is not affected by legal considerations of different countries, as exemplified by the expert panel demographics analysis. In this way, the crowdsourcing platform can easily take a position to keep fairness and transparency, and as a result, the crowdsourcer's willingness to initiate the process increase, and so as the crowd's motivation to participate.

5.5 Weaknesses of the IP Rights Guideline for Platform Supporting CSE Activities

Despite the strengths abovementioned, one weakness that can be noted with this evaluated IP rights guideline is the probability that not all the possible circumstances are recognized. The reason is that the circumstances constitute the evidence-based recommendations that define the position of foreground ownership and licensing in a precise manner. Thus, a circumstance that was not recognized can differ the strategy of detailing the provisions in the contractual agreement. In order to mitigate this scenario, it was advised to consult legal counsel and/or IP expert(s) as necessary as part of the notes in the guideline. Particular importance in the revision of the IP rights guideline for which Item No. 20 of the consolidated evaluation criteria is, as these circumstances can be the trigger point for revision.

5.6 Implications for Practice

On the implementation of the proposed IP rights guideline. In the first place, the crowdsourcing platforms facilitators will be able to establish a triangular relationship with the crowdsourcers and the crowd participants. Also, the facilitator will be able to understand better the specific needs of each crowdsourcer regarding IP rights, and effectively guide them based on those needs, while managing the expectations of crowd participants. Lastly, the facilitator will be able to follow-up crowdsourcer and crowd

using click-wrap agreement in drafting the necessary provision and ensure full compliance before execution. The literature demonstrates that the click-wrap agreement likely to encourage crowdsourcers to initiate the crowdsourcing process and crowd to participate. Facilitators are encouraged to review the proposed guideline and determine whether it is appropriate for their practice and target population. Facilitators should also consider that not all circumstances covered by the guideline and the covered circumstances were mainly retrieved from the existing guidelines; no preferences of both crowdsourcer and crowd were considered. Thus, new circumstances may arise; therefore, consultation of IP/law experts recommended as a necessity.

5.7 Threats to Validity

This section explains the threats to validity of the evaluation process of the IP rights guideline quality developed for this study wherein the validity can be evaluated in terms of construct, internal, external, and reliability (Aranda, Easterbrook, & Wilson, 2007). The modified Delphi method was designed to increase the possibilities that can offer the ability to achieve a valid conclusion in a reliable and repeatable manner (Hasson & Keeney, 2011). The Delphi methodology reduced personal bias by extracting safety data from the Delphi expert panel through redundancy, controlled feedback, and compacting responses from the Delphi members by statistical means (Rowe & Wright, 1999). The Delphi Group has a diversity and balance due to the precise selection criteria, experts from different origins of the practice, with varying length of experience in the relevant fields. The expert panel had diversity and balance by the selection criteria, members from both industry and academia.

5.7.1 Construct Validity

Construct validity indicates the extent to which the instrument used measures what it is intended to measure (Thanasegaran, 2009). It was done through two cyclical rounds of review-refinement (**Section 4.3.1 and Section 4.3.2**) in which the Delphi method was utilized to measure the comprehension of the experts and as a checkpoint that shared understanding existed for the consolidated evaluation criteria. Besides, these tasks also ensured the relevance of the items in appraising the quality of IP rights guidelines wherein comments and suggestions were encouraged to be written in the specified column of the consolidated evaluation criteria questionnaire. The solicited comments and

recommendations for improvement were addressed, and the refined IP rights guideline and consolidated evaluation criteria underwent another round of evaluation with the endpoint of having a consensus before proceeding to the evaluation. With input from the expert panel, the evaluation criteria content-related validity was considered to be excellent, ensuring that it would measure its purpose.

5.7.2 Internal Validity

Internal validity refers to the extent to which research design and data-generated from participants allows the researcher to draw an accurate conclusion of the collected data (Leedy & Ormrod, 2013). Threats to internal validity contain instrumentation, selection bias, testing, expectancy, and contamination (Endacott, Clifford, & Tripp, 1999). Delphi technique mitigates these threats through a series of rounds aimed at reducing peer bias and achieving consensus among participants (Endacott et al., 1999). It precluded the study from extracting incorrect conclusions for collected data and maintained internal validity. Thus, the internal validity was achieved by selecting participants on the basis of the criteria established and following the Delphi technique accurately (Skulmoski et al., 2007).

5.7.3 External Validity

External validity refers to the extent to which the research findings can be generalized or transferred to other settings, contexts, individuals, or groups (Lodico, Spaulding, & Voegtle, 2010). The goal of the Delphi technique is not to generalize results to other or larger populations and may be inadequate (Keeney, McKenna, & Hasson, 2011). Delphi's goal is to seek clarification and elaborate on issues, define areas of disagreement or agreement, and begin to reach consensus (Skulmoski et al., 2007). In this study, the practical utility of the proposed guideline was determined by the experts' panel recommendations and appropriateness in practice but not by the level of predictive performance. The small sample of experts' panel participated in the evaluation of the proposed guideline lack generalizability of the results and recommendations. The summative evaluation method used in this study limit to precisely interprets the weaknesses in terms of relevance, clarity, comprehensiveness, and appropriateness to inform future implementation efforts. The results from the study may be used by

crowdsourcing platforms, aiding facilitators in managing and controlling IP rights in CSE activities.

5.7.4 Reliability

Reliability is related to study stability and consistency over time. The reliability of whether research has been regularly examined is related to what is alleged to be examined (Price, Jhangiani, & Chiang, 2015). It relates to the precision and accuracy of the measurement procedure (Cooper & Schindler, 2003). In order to enhance the reliability, the development of the consolidated evaluation criteria presented in **Section 2.4.3,** whereby a holistic review of two widely-used guideline appraisal tools was utilized. An inclusion-exclusion strategy was conducted to design the criteria fit for IP rights guidelines. Additionally, a Delphi technique was utilized to gain confirmation of the applicability to ensure that all domains required for an IP rights guideline to have were adequately covered with clarity on the instructions. According to Cook and Beckman (2006), reliability denotes the level of responses made by independent evaluators rating the same performance. And as can be seen in **Section 4.5.2,** similar variability was observed for each of the items in the consolidated evaluation criteria. Thus, the responses are expected to be replicated.

5.8 Summary

This chapter presented responses received from 28 experts panel served as evaluators for the proposed IP rights guideline, using the consolidation evaluation criteria. A boxplot summarized the responses on an interval scale that shows a median of 5 and 6 for all items with variability from '4- Somewhat agree' to '6-Strongly agree'. The variable responses to the questions in the consolidation evaluation criteria highlight the strength and weak points of the proposed guideline. Using the AGREE II formula, it concluded that the proposed guideline yielded an overall assessment that the guideline is recommended for use with no modifications. Whereas the total quality scores for the six domains range from 80% to 89%. However, the IP rights guideline also poses weaknesses, albeit the strengths, it may have presented. Conclusively, the data obtained serves as an initial step to inform future efforts guiding an implementation to integrate proposed guideline into the crowdsourcing process and improve IP rights handling in CSE activities.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS FOR FUTURE WORK

6.1 Introduction

This chapter presents a summary of the key findings drawn to conclude the study described in this thesis. After which is the discussion of the research contributions and the research's limitations. Then, the direction for future research in this specific area of focus is outlined. And lastly, this chapter ends with a conclusion about the research.

6.2 Summary of Research

The research described in this thesis was undertaken to address the perceived difficulty in managing IP rights through the development and evaluation of a guideline. The proposed guideline encompasses the integrated CSE activities detailing evidence-based recommendations to the platforms' facilitators on the proper management and control of IP rights. To provide definite direction in improving their process in broadcasting and assigning mechanisms. The research study was executed using the 3-phases methodology, namely: Phase 1 - Preliminary Study, Phase 2 - Development and Phase 3 -Evaluation and Conclusion. Phase 1 commenced with a review of the literature and progressed to the identification of the existing IP rights issues and challenges through document analysis. Then, Phase 2 involved the development of the IP right guideline followed the review and refinement subsequently before proceeding to Phase 3, which involved the evaluation of the IP rights guideline quality and conclusion of the study.

The first objective of the research, which is "***To investigate the IP ownership issues and challenges in legal documents within crowdsourcing platforms supporting CSE activities.***" It was achieved through a review of the literature followed by the analysis of IP rights practices in the legal documents of crowdsourcing platforms. The outcome of the execution revealed and was able to identify precisely four IP rights issues and one challenge. The issues are the lack of divers IP ownership positions, the absence of stipulations prevents IP leakage of crowdsourcing task, the absence of stipulations

prevents contaminated content in the soliciting deliverables from the crowd, and the absence of the contractual agreement. The challenge lies in the elaboration of both broadcasting and assigning mechanisms based on the priority orientation approach. Results also showed that the majority of platforms grant themselves the discretion, which violates the definition of the platform as a facilitator between crowdsourcers and crowds. In certain circumstances, assignments and grants are directly given to the crowdsourcers. However, this is conducted without taking into consideration whether the work is original. And for platforms that allow direct communication between crowdsourcers and crowds, there must be a guarantee and contract to ensure the credibility of productive work. Furthermore, it was observed that all the platforms utilized browsewrap agreement with regards to their terms and conditions, which poses a risk and considered unfair because of its characteristic to bind the users only by clicking through a link. The results of the analysis confirmed and clarified the IP rights concerns identified in prior studies and contributed to the expansion of existing literature in the CSE context (Mao et al., 2017).

For the second objective of the research, which is "***To develop new IP rights guideline for crowdsourcing platforms supporting CSE activities.***" It was accomplished when the IP rights guideline and consolidated evaluation criteria received a consensual agreement from the expert panel. The development of the IP rights guideline specific for this study was through the review of literature, the analysis of legal documents, and the review of existing IP rights guidelines. The review of the guidelines was to abstract IP rights sound practices based on the issues retrieved from objective one and to identify the structure and components of the proposed guideline. Thirteen circumstances were identified to develop a decision-making process regarding the acquisition level of ownership and licensing positions, which formulated the recommendations, ended in a contractual agreement. The literature demonstrates that the contractual agreement suitable option for the crowdsourcing process takes the form of a click-wrap agreement. The literature also reflects the role of broadcasting and assigning mechanisms as an entry point for the crowdsourcing process, supporting the implementation of the recommendations. It contributes to documenting the necessary provisions in the click-wrap agreement and agreed upon by the crowdsourcers and crowd members before the executions.

Moreover, the structure and components of the reviewed guidelines were synthesized to ensure the logical presentation of guideline recommendations. Furthermore, as there is a lack of evaluation criteria that can assess the quality of IP rights guidelines, the development of such was also conducted. These developed IP rights guideline and consolidated evaluation criteria underwent a two-round review and refinement through a modified Delphi method with identified endpoint as achieving consensus before the evaluation phase.

The third research objective cited as "***To evaluate the new IP rights guideline for crowdsourcing platforms supporting CSE activities.***" It was achieved through the validation of 28 members of the expert panel defined as 'person who has a minimum 5 years of experience in IP/IP rights, Cyber Law, Information and Communication Technology Policy, Data Protection, Technology Transfer, and any other relevant fields.' The quality of the IP rights guideline was evaluated using the AGREE II formula, whereby the proposed guideline yielded an overall assessment that the guideline is recommended for use with no significant improvements in any domain. The highest domains scores were recorded in Stakeholder Involvement (89%), Scope and Purpose (86%), Rigour of Development (86%), Clarity of presentation (84%), and Applicability (84). The lowest domain score was recorded in Date (80%).

6.3 Contributions of the Research

Legal document analysis provided a precise understanding of current practices on how crowdsourcing platforms support CSE activities dealing with IP rights. Since IP rights issues have not been explored under the CSE context (Mao et al., 2017). The analysis thus contributed to the revelation of these issues that lie in several previous researchers' allegations. For example, Ford et al. (2015) highlighted the issue of IP ownership right, while de Beer et al. (2017) and Mazzola et al. (2018) highlighted the issue of the level of acquisition of such rights. In both studies, there was no explanation as to the basis of these issues and why they arose. Therefore, the analysis conducted on 31 legal documents revealed that this issue due to a **l**ack of diverse IP ownership positions, where one position is taken so far by each platform, which limited the acquisition-level. Thus, poor management of circumstances and expectations of both crowdsourcers and crowd participants. As in the case of other issues identified in **Section 2.2.3** and the related

investigation and clarification in **Section 4.2.6**. This analysis also identified the absence of the contractual agreement; no system of arrangement setting is apparent in the crowdsourcing platforms. Therefore, no agreement can be reached between crowdsourcers and crowd participants. These findings, in turn, contribute to extending scholarly knowledge about the IP rights issues in the crowdsourcing process with a particular focus in the CSE context.

The utmost contribution of this study is the evaluated IP rights guideline developed for the facilitators of crowdsourcing platforms, one of the first of its kind in CSE activities. Utilizing a summary of evidence and evidence-based circumstances, the author interpreted the evidence into recommendations describing actions to be taken in practice. Additional implications resources (i.e., consultation of IP experts and frontend software developers) were also added to each recommendation in a step-by-step guide. To assist facilitators in considering implementation challenges proactively and in developing a contractual agreement and elaborate broadcasting and assigning mechanisms to enhance implementation success. The guideline allows facilitators to build a triangular relationship that facilitated the engagement of both crowdsourcers and crowd participants in the decision-making process. Detailed recommendations in the guideline were developed to address issues relating to the identification of IP ownership and level of acquisition, confidentiality, and originality. For example, within the first recommendation, "identification of the ownership and licensing position," crowdsourcers are required to define the crowdsourcing task circumstance by considering the task requirements. The facilitators, in turn, are required to link the circumstance directly to one of the positions available, either A, B, or C, by considering the question(s) to answer. Besides, the facilitators are required to consider the expectations of the crowd participants based on the position identified by providing the appropriate reward to ensure they make transparency and fairness in the crowdsourcing process.

Recommendations within the guideline describe how IP rights can be handled in the crowdsourcing process for satisfying diverse needs and expectations of both crowdsourcers and crowd participants in CSE activities. As software tasks are often interdependent, complex, and heterogeneous, they may require cognitive effort and different types of expertise (Kittur et al., 2013). The recommendations provide the priority needed to reconcile different crowdsourcer's expectations with crowdsourcing

task requirements. In addition, these recommendations point to the need to reach an agreement on provisions related to the crowdsourcing tasks between crowdsourcers and crowd participants before tasks are carried out. Finally, the concluding grouping of recommendations identifies specific processes that facilitators should follow to link crowdsourcing goals with crowdsourcers' needs and crowd participants' expectations. Also, to provide specific assistant to crowdsourcers with regard to the provisions on the identification of IP ownership and level of acquisition, confidentiality, and originality required for drafting the contractual agreement.

Methodological contributions made by this doctoral thesis stem from the challenges encountered during the study completion, which in turn required the development of differences to meet the objectives. To develop the IP rights guideline, the researcher needed to structure and evaluate the content of the developed guideline. Unfortunately, there was no standard structure that ensures the appropriate distribution of the IP rights guideline components. Therefore, the structure and components of the four guidelines selected for the purpose of this study reviewed and synthesized to develop the proposed IP rights guideline. Also, there were no evaluation criteria to evaluate the relevance, clarity, comprehensiveness, and appropriateness of the IP rights guideline. Therefore, two widely used evaluation criteria, consolidated, reviewed, and verified to evaluate the proposed IP rights guideline. The structure and components and consolidated evaluation criteria contained in **Chapters 2** of this study are expected to benefit other researchers aimed at developing guidelines for IP rights.

6.4 Limitations of the Study

There are several limitations of this study, which can be in terms of methodology and applicability. The first is regarding the selection of platforms whereby only those launched before 2016 were included in the scope of the study. Thus, conclusions were drawn to these platforms and not based on any strategy implemented by newly-built platforms. Additionally, the analysis was conducted, inclusive whether the platform is involved completely or partially with CSE activities with documents available to the public at the time of the study. A case study was not considered the most appropriate methodology in executing the purpose of the research, given the ambiguity of the problem at the initial phase. Thus, specific questions cannot be asked to tackle the problem. Also,

document analysis helps control biases the platforms facilitators might have with regards to IP rights issues. The method of the study conducted was to relieve the perceived difficulties in reaching the platform facilitators, crowdsourcers, or crowd participants. Moreover, the focus of the analysis was on their approach regarding IP rights management, specifically on IP ownership and level of acquisition, confidentiality, and originality. To identify specific gaps in these points of concern and with no intention looking into the whole mechanisms governing the general crowdsourcing process.

With regards to the methodology employed during review and evaluation, the selection of the expert panel was through non-probability snowball sampling with a relatively small number of 28 participants from the field of IP/IP rights, Cyber Law, Information and Communication Technology Policy, Cloud Data Protection, Technology Transfer, Information Technology Law, and Contract Law. Also, during the demographics mapping, it was identified that the panel was mainly composed of people from corporate and academia. While reviewed and verified criteria, the consolidated evaluation criteria are not without limitations. The domains and items in the criteria do not address the validity of the recommendations themselves but rather emphasize the methodologic issues related to the development and reporting of the guideline. It is important to note, therefore, that explicit reporting and rigorous development do not promise acceptable and/or optimal recommendations or better outcomes for crowdsourcers and crowd participants. According to Brouwers et al. (2010), there will be a need for external review by the platforms facilitators prior to adaptation, in addition to the evaluation completed by 28 experts.

The proposed guideline has limited application as it was specially developed for the use of crowdsourcing platforms supporting CSE activities. The significance and applicability were not tested in cases that the crowdsourcing platform supports other fields of practice. Further to this, the recommendations in the guideline are sound practices that are proposed to be put in place. However, there are no technical provisions of terms and conditions enumerated because of the difficulty of achieving such at the time of writing this study as applicability is expected to be in general context regardless of the geographical location of the crowdsourcing platform. The reason is that the differences in the IP rights legal system, which might vary from different countries, thus taking into

account these geographical differences are also out of the scope of this study given the limitation of time and resources.

6.5 Recommendations for Future Work

Through the literature review, a gap was discovered in the availability of a guideline specifically geared towards management and control of IP rights in CSE activities. Because of this, the goal of the research study was to create a guideline for use in crowdsourcing platforms supporting CSE activities with the emphasis on facilitators, crowdsourcers, and crowd participants. The proposed guideline was developed with the guidance of the identified structure and components and consolidated evaluation criteria, respectively. Once the proposed guideline was developed, it was reviewed and evaluated using the consolidated evaluation criteria. Minor revisions and additions were noted and completed in evaluators' comments on the consolidated evaluation criteria results.

The proposed guideline could be further strengthened by the establishment of an expert panel to offer the review and revision at agreed intervals. It would also be suitable to perform several cycles of the Plan-Do-Study-Act (PDSA) approach to rapidly evaluate its usefulness in direct practice with facilitators and both crowdsourcers and crowd participants. The use of PDSA cycles has been effective in quality improvement and recommended for evaluating and verifying software projects such as in (Mergen, Kepler, da Silva, & Cera, 2014; Ning, Chen, & Liu, 2010). The PDSA cycle is abbreviated for evaluating a change by developing a change evaluate plan (Plan), performing the evaluation (Do), observing and learning from the evaluation results (Study), and identifying modifications to the evaluation (Act) (García-Mireles, Moraga, García, & Piattini, 2015). A successful example of the use of this PDSA cycle is offered by Tartaglia, Campbell, Shaniuk, and McClead (2013). Intending to improve compliance with published guidelines, the use of PDSA cycles resulted in a 30% increase in guidelines compliance from 60.5% to 90.4% within 12 months. Finally, it would be suitable to elicit the opinions, thoughts, or experiences of facilitators who are using the proposed guideline and/or crowdsourcers and crowd participants' perspectives being treated according to the guideline for more revision and strengthening.

6.6 Summary

An evaluated IP rights guideline was developed for this study to safeguard the platforms supporting CSE activities effectively. The results of the evaluation of the IP rights guideline demonstrate that the guideline can achieve the required characteristics to ensure quality. The crowdsourcing platforms may utilize the IP rights guideline to be able to streamline their IP rights management strategy with task broadcast and assignment mechanisms as focal points of interest. To effectively ensure the provisions in the contractual agreement govering IP ownership and level of acquisition, confidentiality, and originality. However, with recognized limitations but with future work explicitly advised, these will be opportunities for continuous improvement of the process which are essential to ensure transparency and fairness between the stakeholders, to encourage crowdsourcer's initiation and to maximize crowd's motivation to participate, which will eventually increase the crowdsourcing success.

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APPENDIX A

EVALUATION QUESTIONNAIRE

SAFEGUARDING INTELLECTUAL PROPERTY RIGHTS ON CROWDSOURCING PLATFORMS – A NEW GUIDELINE FOR CROWDSOURCED SOFTWARE ENGINEERING ACTIVITIES	
Reviewer's Name:	
E-mail Address:	
Field of Practice:	
Length of Work Experience:	
GUIDELINE CHECKLIST (CRITERIA FOR EVALUATION)	

1. *Evaluate the guideline using the items in this evaluation criteria. The Section reference of the guideline addressing the item is indicated under the item for easy guideline navigation.*
2. *Tick (√) **YES** if the criteria of the item is **fully met** by the guideline based on the Section references provided. Tick (√) **NO** if the criteria of the item is **not met at all** by the guideline based on the Section references provided. Evaluators are encouraged to provide under Comments the reason of not meeting the criteria and to give recommendations on how the researcher will be able to address it. Tick (√) **SOMEWHAT** if the criteria of the item is **partially met** by the guideline based on the Section references provided. Evaluators are encouraged to provide under Comments the reason of partially meeting the criteria and to give recommendations on how the researcher can improve the guideline in order to fully meet the criteria.*
3. *Evaluators are also encouraged to comment freely on the Item in this evaluation criteria (i.e., I cannot fully understand the requirements of the item, thus, **I can't evaluate**).*

ITEMS	Yes	Somewhat	No	Remarks
SCOPE AND PURPOSE				
1. The overall objective(s) of the guideline is (are) specifically described.				
Refer to Section 1.1.6 and Section 2 (Guideline) Introductory Paragraph.				

ITEMS	Yes	Somewhat	No	Remarks
2. The topic question(s) covered by the guideline is (are) specifically described.				
Refer to Section 1.3.1.				
3. The population to whom the guideline is meant to apply is specifically described.				
Refer to Section 1.4.5.				
STAKEHOLDER INVOLVEMENT				
4. The guideline developers are clearly stated.				
Refer to Page i.				
5. The target users of the guideline are clearly defined.				
Refer to Section 1.4.4.				
6. The qualifications and expertise of the guideline developers link with the purpose of the guideline and its end users.				
Refer to Page i.				

ITEMS	Yes	Somewhat	No	Remarks
RIGOUR OF DEVELOPMENT				
7. Systematic methods were used to search for evidence.				
Refer to Appendix A.1.				
8. The criteria for selecting the evidence are clearly described.				
Refer to Appendix A.2 and A.3.				
9. The strengths and limitations of the body of evidence are clearly described.				
Refer to Appendix A.1 and A.2.				
10. The methods for formulating the recommendations are clearly described.				
Refer to Appendix A.				
11. The benefits and risks have been considered in formulating the recommendations.				
Refer to Section 2.1.A.2, 2.1.B.2, and 2.1.C.2.				
12. There is an explicit link between the recommendations and the supporting evidence.				
Refer to Appendix A.3.				

ITEMS	Yes	Somewhat	No	Remarks
CLARITY OF PRESENTATION				
13. The recommendations are specific and unambiguous.				
Refer to Section 2.1.A.1, Section 2.1.B.1 and 2.1.C.1.				
14. The different position for management of the situations or issues are clearly presented.				
Refer to Section 2.1.				
15. Key recommendations are easily identifiable.				
Refer to Section 2 (Guideline) for the entire content.				
16. The guideline is readable and easy to navigate.				
Refer to Section 1.2.				
17. The guideline provides a complete reference list.				
Refer to Appendix C.				
18. Does the guideline provide a summary of its recommendations?				
Refer to the Section 2.2 Flowchart.				

ITEMS	Yes	Somewhat	No	Remarks
DATE				
19. The date of completion is available.				
Refer to Page i.				
20. A trigger point for the necessity to update the guideline is provided.				
Refer to Section 1.1.6.				
APPLICABILITY				
21. The guideline describes facilitators and barriers to its application.				
Refer to the Notes indicated in Section 2.2.				
22. The guideline provides advice and/or tools on how the recommendations can be put into practice.				
Refer to Section 2 (Guideline) Introductory Paragraph.				
23. The potential resources implications of implementing the recommendations have been considered.				
Refer to Section 2 (Guideline) Introductory Paragraph.				

APPENDIX B

TASK 2 REVIEW RESULTS (ROUND 1 AND 2)

Reviewer 1

I have addressed all reviewers' comments below.

Item	Original Section References	Reviewer's Comment	Revised Section	Revision / Response	Adequate revision?		Remarks (if any)
					Yes	No	
5.The target users of the guideline are clearly defined.	Refer to Section 1.4.4.	If you have detailed the section right, I don't seem to find the user?	Guideline Section 1.4.4	Revision of statement to "Intended Users Who Can Utilize This Guideline"	Yes		N/A
12.There is an explicit link between the recommendations and the supporting evidence.	Refer to Section 2.1.A.3, Section 2.1.B.3 and 2.1.C.3.	If you explain what you mean by with "supporting evidence?"	Refer to Appendix A.3	Revision of the statement for more clarity. "Out of which, 4 guidelines were selected meeting the aforementioned criteria and analysis of these selected guidelines directed to the identification of the three positions together with the respective circumstances supporting each as the body of evidence to support the recommendations this guideline presents for the treatment of Foreground (See Section 2.1)…."	Yes		N/A

Reviewer 2

I have addressed all reviewers' comments below.

Item	Original Section References	Reviewer's Comment	Revised Section	Revision / Response	Adequate revision?		Remarks (if any)
					Yes	No	
2.The topic question(s) covered by the guideline is (are) specifically described.	Refer to Section 1.1.6 and Section 2 (Guideline) Introductory Paragraph	It should be noted here that the answer to the question "Who owns the actual IP created by the crowd?" varies dramatically from legal system to another and doesn't apply to patents and copyright in the same legal system.	N/A	It has been identified under the Domain Applicability Item No. 23 that for the purpose of the implementation of this guideline, potential resource implication has been considered as per the following statement: "In the implementation of this guideline, resources such as legal counsel, IP expert(s) and/or front-end developer(s) may be consulted as necessary." These resources (experts) shall aid in this case according to the legal system required in the countries of crowdsourcing platforms supporting CSE activities adopting this guideline.	Yes		N/A
3.The population to whom the guideline is meant to apply is specifically described.	Refer to section 1.4.5.	More clarification required	Guideline Section 1.4.5	For more clarity, the statement was revised from: "Target Population" to: "Target Population to Whom This Guideline is Applicable to."	Yes		

4.The guideline developers are clearly stated.	Refer Page I	The documents dose not have Page I	Evaluation Criteria Item No. 4	Changed the reference Section from “Page I” to “Page i”	Yes		
6.The qualification and expertise of the guideline developers link with the purpose of the guideline and its end users.	Refer Page I	The document does not have Page I.	Evaluation Criteria Item No. 6	Changed the reference Section from “Page I” to “Page i”	Yes		
11.The benefits and risk have been considered in formulating the recommendation.	Refer to Section 2.1.A.2, 2.1.B.2, and 2.1.C.2.	There is no reference whatsoever to the risks.	Refer to Section 2.1.A.2, 2.1.B.2, and 2.1.C.2.	Below statements were added to Section 2.1.A.2 and 2.1.B.2. “This position must be taken with precaution and consideration must be undertaken whether the submitted content by is original and whether it may be a part of a background owned by another party as these instances impose risk to the crowdsourcer as the owner of the foreground by infringing third-party rights and risks associated with the ownership of contaminated content.” Below statements were added to Section 2.1.C.2. “This position must be taken with precaution and consideration must be undertaken, otherwise, risks arising from Crowdsourcer losing its competitive advantage when the agreement does not include provisions limiting the Crowd from some activities such as granting license to commercialize the Foreground in the same targeted market as of the Crowdsourcer.”	Yes		

17.The guideline provides a complete reference list.	Refer to Appendix C.	See the Future of the Digital Millennium Copyright Act: How Automation and Crowdsourcing can Protect Fair Use, Adam Eakman, Volume 48, 2015 Indiana Law Review.	N/A	The paper was initially included in the shortlist of documents where an inclusion and exclusion criteria was used during the rounds of review of literature, however, the guideline is focused on crowdsourced software engineering activities in which the paper is not specific for this purpose.	Yes		
20.A procedure for updating the guideline is provided.	Refer to Section 1.1.6.	There is a reference to a possible update but no mention to the procedure.	Evaluation Criteria Item 20	For more clarity, the statement was revised from: "A procedure for updating the guideline is provided" to: "A trigger point for the necessity to update the guideline is provided."	Yes		

Reviewer 3

I have addressed all reviewers' comments below.

Item	Original Section References	Reviewer's Comment	Revised Section	Revision / Response	Adequate revision?		Comments (if any)
					Yes	No	
9.The strengths and limitations of the body of evidence are clearly described.	Refer to Appendix A.1 and A.2.	The two paragraphs are with regards to the rigour of development of the guideline with a mention of the issues and current challenges and does not pertain to the strengths and limitations.	Refer to Appendix A.1	Addition of statement: "The strength of this study is the systematic methodology utilized, however the researched is limited to draw conclusions on the basis of crowdsourcing platforms supporting CSE activities which are commonly used and/or articulated in literatures at the moment of writing of the study and IP rights guidelines which were publicly available were included in the research."	Yes		N/A
12.There is an explicit link between the recommendations and the supporting evidence.	Refer to Section 2.1.A.3, Section 2.1.B.3 and 2.1.C.3.	The link was not established upon the sections provided.	Refer to Appendix A.3	Revision of the statement for more clarity. "Out of which, 4 guidelines were selected meeting the aforementioned criteria and analysis of these selected guidelines directed to the identification of the three positions together with the respective circumstances supporting each as the body of evidence to support the recommendations this guideline presents for the treatment of Foreground (See Section 2.1)…."	Yes		N/A

Reviewer 4

I have addressed all reviewers' comments below.

Item	Original Section References	Reviewer's Comment	Revised Section	Revision / Response	Adequate revision?		Comments (if any)
					Yes	No	
3.The population to whom the guideline is meant to apply is specifically described.	Refer to Section 1.4.5.	1.4.4 and 1.4.5. create confusion. Who is the intended user of the Guidelines? What does "target population" mean? How does it differ from "Intended Users"?	Guideline Section 1.4.4 Guideline Section 1.4.5	Revision of statement to "Intended Users Who Can Utilize This Guideline" and "Target Population to Whom This Guideline is Applicable to"	Yes		N/A
19.The date of completion is available.	Refer to Cover Page.	It is recommended that the exact date of completion and/or last date the guideline was revised be provided in the cover page.	Guideline Page i	The date of completion of the current version was inserted.	Yes		N/A
20.A procedure for updating the guideline is provided.	Refer to Section 1.1.6.	There was no procedure for updating of guideline mentioned in Section 1.1.6. It only provides for the need to update the guideline in view of new rules, regulations and/or changes in circumstances.	Evaluation Criteria Item 20	Revision to: "A trigger point for the necessity to update the guideline is provided."	Yes		N/A

Reviewer 5

I have addressed all reviewers' comments below.

Item	Original Section References	Reviewer's Comment	Revised Section	Revision / Response	Adequate revision?		Comments (if any)
					Yes	No	
3.The population to whom the guideline is meant to apply is specifically described.	Refer to section 1.4.5.	More clarification required	Guideline Section 1.4.5	Revision of statement to: "Target Population to Whom This Guideline is Applicable to"	Yes		N/A
5. The targeted user of the guideline is clearly defined.	Refer to Section 1.4.4.	Too limited	N/A	The guideline is specific for the use of managing IP in platforms supporting CSE activities. The conclusions of the study were limited to this scope.	N/A	N/A	N/A
8.The criteria for selecting the evidence are clearly described.	Refer to appendix A2 and A3.	Legal documents have multiple meanings, for example patent	N/A	Refer to Section 1.2 Definitions for the meanings of terms.	N/A	N/A	N/A
19.The date of completion is available.	Refer to Cover page.	It is recommended that the exact date of completion	Guideline Page i	The date of completion of the current version was inserted.	Yes		N/A

APPENDIX C

ROUND 2 REVIEW: SUPPORTING LETTER

THE UNIVERSITY OF JORDAN

رئاسة الجامعة
University Administration

To whom it may concern

After reviewing the Guideline for crowdsourcing Platforms authored by Hani Bajes Al-bloush and the revisions made afterword, I Dr. Suhail H. Haddadin Associate professor of Intellectual Property confirm that all the revisions are satisfied and there are no further comments for revision is required. Thus, the guideline is valid and can be moved to conclusion.

Regards,

Dr. SuhailHaddadin

Associate Professor at the University of Jordan

Suhail.haddadin@ju.edu.jo

17/2/2019

The University of Jordan

هاتف: ٥٣٥٥٠٠٠ (٦-٩٦٢) فرعي: ٢١١٢٠ فاكس: ٥٣٥٥٥١١ (٦-٩٦٢) فرعي- ٢١٠٣٥ عمان ١١٩٤٢ الأردن
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APPENDIX D

CONSOLIDATED EVALUATION CRITERIA FOR PHASE 3: EVALUATION

SAFEGUARDING INTELLECTUAL PROPERTY RIGHTS ON CROWDSOURCING PLATFORMS – A NEW GUIDELINE FOR CROWDSOURCED SOFTWARE ENGINEERING ACTIVITIES	
Reviewer's Name:	
E-mail Address:	
Field of Practice:	
Length of Work Experience:	
Origin:	
GUIDELINE CHECKLIST (CRITERIA FOR VALIDATION)	

1. *Validate the guideline using the items in this criteria. The Section reference of the guideline addressing the item is indicated under the item for easy guideline navigation.*
2. *Please tick one box for each of the items below to indicate the degree of your agreement or disagreement about how the item is being satisfied by the Guideline Section references provided.*
3. *Evaluators are required to specify on the given space any remarks regarding the disagreement to the item in this criteria.*

ITEMS	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree	Please specify any disagreement.
SCOPE AND PURPOSE							
1. The overall objective(s) of the guideline is (are) specifically described.	☐	☐	☐	☐	☐	☐	
Refer to Section 1.1.6 and Section 2 (Guideline) Introductory Paragraph.							

ITEMS	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree	Please specify any disagreement.
2. The topic question(s) covered by the guideline is (are) specifically described.	☐	☐	☐	☐	☐	☐	
Refer to Section 1.3.1.							
3. The population to whom the guideline is meant to apply is specifically described.	☐	☐	☐	☐	☐	☐	
Refer to Section 1.4.5.							
STAKEHOLDER INVOLVEMENT							
4. The guideline developers are clearly stated.	☐	☐	☐	☐	☐	☐	
Refer to Page i.							
5. The target users of the guideline are clearly defined.	☐	☐	☐	☐	☐	☐	
Refer to Section 1.4.4.							
6. The qualifications and expertise of the guideline developers link with the purpose of the guideline and its end users.	☐	☐	☐	☐	☐	☐	
Refer to Page i.							

ITEMS	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree	Please specify any disagreement.
RIGOUR OF DEVELOPMENT							
7. Systematic methods were used to search for evidence.	☐	☐	☐	☐	☐	☐	
Refer to Appendix A.1.							
8. The criteria for selecting the evidence are clearly described.	☐	☐	☐	☐	☐	☐	
Refer to Appendix A.2 and A.3.							
9. The strengths and limitations of the body of evidence are clearly described.	☐	☐	☐	☐	☐	☐	
Refer to Appendix A.1 and A.2.							
10. The methods for formulating the recommendations are clearly described.	☐	☐	☐	☐	☐	☐	
Refer to Appendix A.							
11. The benefits and risks have been considered in formulating the recommendations.	☐	☐	☐	☐	☐	☐	
Refer to Section 2.1.A.2, 2.1.B.2, and 2.1.C.2.							
12. There is an explicit link between the recommendations and the supporting evidence.	☐	☐	☐	☐	☐	☐	
Refer to Appendix A.3.							

ITEMS	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree	Please specify any disagreement.
CLARITY OF PRESENTATION							
13. The recommendations are specific and unambiguous.	☐	☐	☐	☐	☐	☐	
Refer to Section 2.1.A.1, Section 2.1.B.1 and 2.1.C.1.							
14. The different position for management of the situations or issues are clearly presented.	☐	☐	☐	☐	☐	☐	
Refer to Section 2.1.							
15. Key recommendations are easily identifiable.	☐	☐	☐	☐	☐	☐	
Refer to Section 2 (Guideline) for the entire content.							
16. The guideline is readable and easy to navigate.	☐	☐	☐	☐	☐	☐	
Refer to Section 1.2.							
17. The guideline provides a complete reference list.	☐	☐	☐	☐	☐	☐	
Refer to Appendix C.							
18. Does the guideline provide a summary of its recommendations?	☐	☐	☐	☐	☐	☐	
Refer to the Section 2.2 Flowchart.							

ITEMS	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree	Please specify any disagreement.
DATE							
19. The date of completion is available.	☐	☐	☐	☐	☐	☐	
Refer to Page i.							
20. A trigger point for the necessity to update the guideline is provided.	☐	☐	☐	☐	☐	☐	
Refer to Section 1.1.6.							
APPLICABILITY							
21. The guideline describes facilitators and barriers to its application.	☐	☐	☐	☐	☐	☐	
Refer to the Notes indicated in Section 2.2.							
22. The guideline provides advice and/or tools on how the recommendations can be put into practice.	☐	☐	☐	☐	☐	☐	
Refer to Section 2 (Guideline) Introductory Paragraph.							
23. The potential resources implications of implementing the recommendations have been considered.	☐	☐	☐	☐	☐	☐	
Refer to Section 2 (Guideline) Introductory Paragraph.							

APPENDIX E

BEST PAPER AWARD IN IRICT (2017)

IRICT 2017

BEST PAPER AWARD

THIS CERTIFICATE IS PRESENTED TO

Hani Al-Bloush and Badariah Solemon

FOR THE PAPER ENTITLED:

Intellectual Property Challenges in the Crowdsourced Software Engineering: An Analysis of Crowdsourcing Platforms.

at

the 2nd International Conference of Reliable Information and Communication Technology 2017 (IRICT 2017)

that is held in Pulai Springs Resort, Johor, Malaysia, on April 23-24, 2017

Faisal

Dr. Faisal Saeed,
IRICT 2017 General Chair

YSRG YEMENI SCIENTISTS RESEARCH GROUP

ISSIRG INFORMATION & SERVICE SYSTEMS INNOVATION RESEARCH GROUP

APPENDIX F

BEST PAPER IN SCIENCE AND TECHNOLOGY: IGRAD 2019