ITB Graduate School Conference (IGSC) ISSN: 2963-718X
December 21, 2021

Comparing the Participatory Design Implementation on Information Technology Research in Indonesia and Its Historical Root: A Critical Review

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Abstract. Participatory design originated from movement to create better workplace by codetermine the information system to support work life quality. It involves some aspects since the practice is utilized to help workers in organizational context such as politics, user, method, context, and product. The initial use of participatory design in information technology (IT) related field led the author to investigate its current implementation landscape on IT research in Indonesia using PRISMA framework. The investigation result shows that participatory design practices were diversified from its original and initial emergence. Most of the current research mainly focus on the usability and interface design aspect in utilizing participation. The utilization can be considered blurry with other design concept such as user centered design. By considering expert and previous researcher concern regarding the need to reform participatory design approach from the diverse practice, the author explores the new possible topics of participatory design research in IT field.

Keywords: *information technology research; participatory design; participatory design utilization; the root of participation; user empowerment.*

1 Introduction

Participatory design was originally from Russia and Germany but it grew in Scandinavia as a movement which related to democracy in the workplace (Hartson & Pyla, 2019). The movement that related to work practice aimed to codetermine the information system and workplace development (Clement & Besselaar, 1993 in Hartson & Pyla, 2019). The root of participatory design comes from the willingness to integrate social dimension of workers as humans and technology as tools to improve people's working condition (Muller & Kuhn, 1993). To conclude from what Muller and Kuhn wrote, participatory design is a term to represent democracy for workers in the context of technological and business growth to improve working condition and avoid dehumanization by technology in the workplace.

In recent study, participatory design is defined as a process that involve users and stakeholders in the early stage of design (Rosenzweig, 2015) for design of system

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involving human work which both users and stakeholders contribute equally into the interaction design (Hartson & Pyla, 2019). It becomes a way to connect involved participants to generate feasible ideas as well as to understand the constraints (Hartson & Pyla, 2019). Robertson & Simonsen (2013) define participatory design as a holistic process among many participants involves investigating, understanding, reflecting upon, establishing, developing, and supporting mutual learning. They stated that participatory design has to do with how stakeholders collaboratively make adjustment on the system, technologies, artefact to meet the needs of the people who will use them.

The initial use of participatory design in information system/technology development reminded the author of the rising of information technology (IT) implementation as the supporting tools in several field in Indonesia. Some IT developments or project research utilized participatory design as the approach. This paper aims to review how the IT developments in Indonesia utilize the approach and the comparison of its implementation to the core of participatory design. The comparison is done by considering Robertson & Simonsen's (2013) opinion their book. They argued that participatory design needs to improve regarding the new challenges of technical, socio-economic, political and admit heterogeneity and conflict of interest to embody the democracy and participation. This paper wants to identify the gap between the current implementation mainly in Indonesia and the core of participatory design.

2 Methodology

The compare the current utilization and the core of participatory design, firstly the author investigated the utilization of participatory design on information technology in Indonesia. It was done by systematically searching and reviewing all academic papers related to the current utilization. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) framework was selected to be the search method in order to show the transparency of the procedure and technique (Mosely et al., 2021).

The systematic review using PRISMA Framework consists of four phases: 1) data identification, 2) data screening, 3) eligibility, 4) data selection and synthesis (Moher et al., 2010; Mosely et al., 2021). The investigation of participatory design's academic research in Indonesia was conducted based on the four phases and explained through Figure 1. The publications were searched across five databases: ProQuest, Scopus, ScienceDirect, and ACM Digital Library. Google Scholars was also used to get local journal that are published in Indonesian language and managed under the online journal of the universities.

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The keywords used in the search were the combination of “participatory design” and “Indonesia” both in English and Indonesian language. The keywords of ‘information technology’ were not used as the IT development does not always use the words, so that the search results consisted of several domains. To filter the IT domain, the author manually read the title and or the abstract. In the beginning there were 398 search results. After screening and checking the eligibility of the papers, there are only 14 ones which are suitable with the criteria: related to IT, using participatory design approach, and located in Indonesia.

After getting the research papers, the author classify them based on how participatory design is practiced based on the former study conducted by Halskov & Hansen (2015). They did thematic analysis to generate the participatory design practice classification. The classification helps the author to mapping the landscape of recent research trend of participatory design practice and what should be improved.

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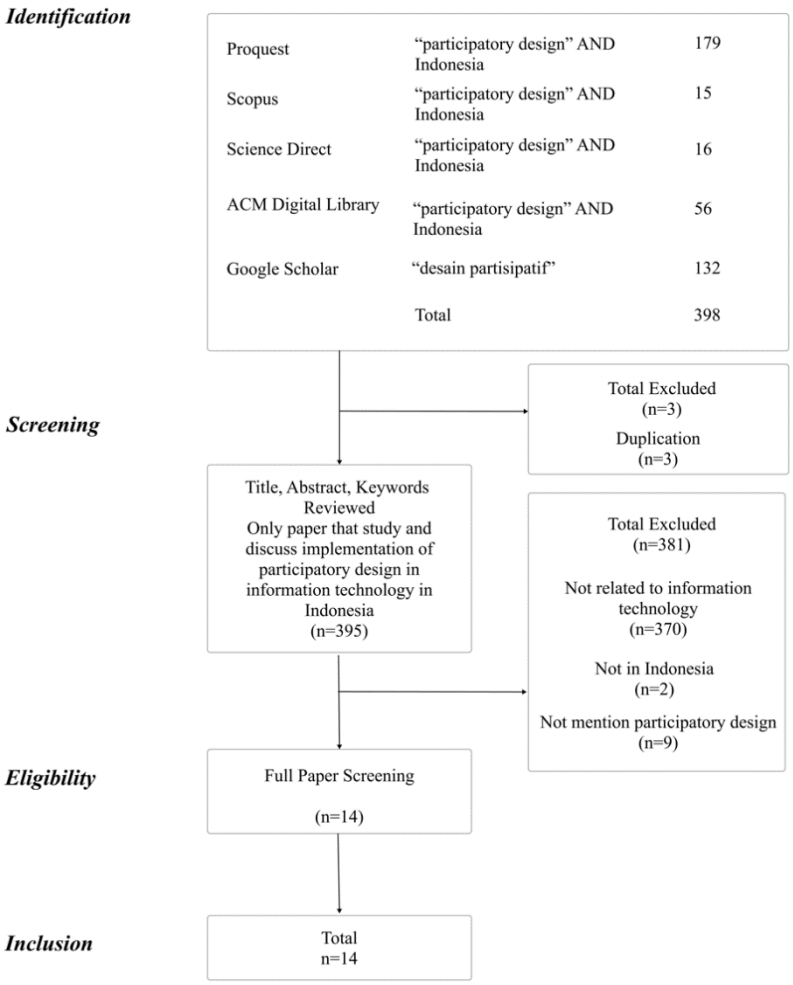

Figure 1 PRISMA Framework for data inclusion.

3 Contemporary Participatory Design Utilization

The study about contemporary participatory design practices has been conducted by Halskov & Hansen (2015). They conclude that current implementations of participatory design have been changing and diversifying from the original nature as some new context emerged. They identified three general paradigms of how participatory design research from 2002-2012 defined participation. They are (1) implicit, (2) users' point of views and (3) mutual learning. The three paradigms' definition represent almost of the research papers related to information

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technology design development in Indonesia that have been investigated. Thus, the author classifies all research based on the three paradigms.

3.1 Implicit

Implicit means that it is unclear how participation is defined in the design process (Halskov & Hansen, 2015). The participation design practice is taken for granted by considering certain kind of methods represent participation. Halskov & Hansen gave a case example of this paradigm or definition: "the report on blending PD and an iterative systems development approach in an attempt to have the two inform one another.". The case merged the concept of participatory design as user-oriented approach with development process. Halskove & Hansen argued that participation was failed to define clearly.

Among 14 research, there are 4 research that are closely related to this implicit definition. In a research held by Galang et al (2019), participatory was conducted by letting respondents with visual impairment to choose color, font-style, sound stimulus and input of design interaction to design a special game. The most voted variables are selected as the main component of the game design. Users were not directly involved in the game flow or other fundamental of a game design. A research by Lubis et al. (2019) embodied participation by conducting presentation to show a mobile application design and participants were asked to evaluate the design including "operational, representational and interaction design of the utility-based for mobile application.". The two other research by Anisah (2019) and Firdaus et al. (2019) conducted prototype evaluation as the embodiment of participatory design. Firdaus et al (2019) showed paper prototype to three stakeholders to gather feedback. It was done several times until all stakeholders agree with the final prototype. Anisah provided low fidelity game prototype to participants and asked them to try the prepared scenario. The process was done for 4 times until it fulfilled the participants' expectation.

3.2 Users' Point of Views

Users' point of views is defined as 'user driven process' as it includes what user considered to be important and believe that they are ready to make decision based on their knowledge (Halskov & Hansen, 2015). Nine research found in this paper are presumed adopting users' point of views. For example, research by Adipradana (2017), Asanti (2018), Ayuningtyas (2018), Damayanti & Hariandja (2015), Hamzah (2018), Nugraha (2018) Hadi et al. (2016), Reynaldo et al. (2021), and Violeta (2017) implemented design workshop as the participatory design method. Before the workshops were carried out, the researchers, except Hamzah (2018), conducted user interviews or distribute a questionnaire to identify users' needs and concerns. By providing the interview results, participants were grouped and instructed to make the concept of applications as

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well as the low fidelity visualization. Each group presented the concept to gather some feedback. In the end, in each research the best concept based on participant votes and or evaluation is selected. The selected prototypes are presumed to be the solutions.

3.3 Mutual Learning

Mutual learning means transfer knowledge happens among users and designers. It not only exposes user's point of view but also the value of it. The influence of users in this paradigm cannot be identified or still unclear (Halskov & Hansen, 2015). Only one research paper which fulfill this definition is found. It did not aim to design an application or website but to prepare a society towards appropriate technology development. Paulus & Kutay (2020) utilized participatory design to understand the value of indigenous community in Papua. They wanted the community can utilize and adjust technology to their uses without abandoning their culture and values. Participatory design helps the researcher to model the system dynamic to develop plans and objectives. They did interviews, field survey and brainstorming to identify key variables that limit and influence technology adaptation.

Table 1 Research paper classification based on participatory design practice

No	English Title/Authors/Year	Participatory Design Practice	Paradigm
1	Social Media Application Design for Elderly Using Participatory Design Model (Damayanti & Hariandja, 2015)	Participatory design was practiced by conducting design workshop involving the elderly to generate design concept and	User's point of view
2	Information Media Application Planning for Industrial Engineering Students of Pasundan University Using Participatory Design Approach (Raissa Rachman Hadi et al., 2016)	Researcher asked participants through questionnaire about the needed features to create persona and user scenario. Design workshop was conducted by grouping participants and each group recommended the design interface.	User's point of view
3	Education Website Design for Adolescent using Participatory Design Approach (Violeta, 2017)	Participatory design was embodied in design workshop with the 12 adolescents and 4 designers. Participants were divided into some groups and asked to create a design concept of the application.	User's point of view
4	Batik Air Mobile Application Evaluation and Redesign based on User Experience Aspect (Adipradana, 2017)	Design workshop by involving participants was conducted to generate design recommendation to replace the old application.	User's point of view

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5	The Role of Participatory Design in Mobile Application Development (Hamzah, 2018)	Design workshop was conducted twice to involve participants in the making of storyboard and high-fidelity prototype.	User's point of view
6	Breast Milk Donor Application Design using Participatory Design Approach (Ayuningtyas, 2018)	Design workshop was conducted to generate several design alternatives. Participants were asked to fill questionnaire to evaluate the design alternatives and decided which design was going to be used.	User's point of view
7	Wedding Supporting Application Design using Participatory Design Approach (Asanti, 2018)	Future brides and grooms were invited into design workshop along with wedding vendors. Design workshop was aimed to create application design concept.	User's point of view
8	KBBI V Application Evaluation and redesign based on Usability Criteria (Nugraha, 2018)	Design workshop was conducted to develop design concept by involving participants or users of KBBI.	User's point of view
9	Mobile Games Interaction Design for People with Visual Impairment using Participatory Design Approach (Galang et al., 2019)	Participants were given interface stimulus regarding to color, font style, sounds and input design. They were asked	Implicit
10	User Experience in Mobile Application Design: Utility Defined Context of Use (Lubis et al., 2019)	Researchers conducted focus group discussion to discuss the utility, capacity, and capability of the proposed application. Then they presented the proposed application design to the participants and asked them to evaluate the design.	Implicit
11	Usability Testing of Laboratory Website using a Participatory Design Approach (Firdaus et al., 2019)	Participatory design was held by conducting usability testing and discussion of the prototype to developer and users. I was done several times until all participants satisfied with the design.	Implicit
12	Education Game to Introduce Moslem Scientist (Anisah, 2019)	Participants were given the game prototype and asked to try some user scenarios. The process was done iteratively to generate the desired outcomes.	Implicit
13	Observations on Appropriate Technology Application in Indigenous Community Using System Dynamics Modelling (D. J. Paulus & Kutay, 2020)	The researchers conducted field survey and interviews with the indigenous community and brainstorming to identify the key variables that influence technology development.	Mutual learning

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14	Higher Education Information Provider Application Design for High School Students using Participatory Design Method (Reynaldo et al., 2021)	Design workshop was done by involving 9 participants and 1 facilitator to design the mockup application.	User's point of view

4 The Root of Participatory Design

Participatory design emerges when technology started to replace conventional way and take out its wisdom to face international competition and dramatic political change around the globe (Muller & Kuhn, 1993). Participatory design conference series in 1985 entitled Computers and Democracy highlighted the context of democratizing of work in computing for the sake of work life quality, how workers used computer system for their work and designed how computer could support the workers (Halskov & Hansen, 2015). Democracy becomes one of the fundamental ideas of participatory design as stated by Schuler & Namioka (1993), that it is critical to involve people destined to use the system in designing it, because they are the people affected by it so that they should have an opportunity to influence it. The same statement came from Clement & Van den Besselaar (1993) participatory design is not just about information system development but also the empowerment of workers to codetermine the information system in their workplace. Thus, it can be concluded that democracy and work life set the basic practice of participatory design.

Some participatory design projects had been done since 1970. Those projects involved company or organizational workers to determine the solutions and improve the quality of work life. The basic notion of participatory design emerged through the projects, that are participatory design is a complex process which involve technology and hierarchy in organization and highly dependent on specific context related to organization (Clement & Van den Besselaar, 1993). To gain more understanding towards the root of participatory design, the summary of project overview is presented in Table 2.

Table 1 Former participatory design project overviews from Clement & Van den Besselaar (1993)

No	Year/ Project Name	Overview
1	1970s Norwegian Computing Center	Provided 3 unions with the knowledge about the impact of using information technology on their working conditions. Encouraged the unions and company to build and implement their own technology.
2	Late 1970s Information system for local authorities	Aimed to provide socio economic information for local authorities to be used in planning activities. Participatory design was used to

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		negotiate contracts with people who owned the information but were reluctant to share and to design the benefits for them.
3	1981-1985 UTOPIA	Influenced the actual development in graphic technology and helped graphic workers to develop powerful skills and to enhance tools for them. The elements emphasized in this project were not only the product design but the quality of work and product, the work organization, training, and human skills.
4	1984-1986 Local Government and School Information System	Implemented local IS to a small school and local government. The workers' contribution was to investigate which work tasks should be automated.
5	1986 Self-Managed Office Automation Project at Canadian University (SMOAP)	Assisted the academic department secretaries in practicing and controlling the computerization of their work due to support staff experienced difficulties in dealing with word processing.

The projects were mostly conducted mainly due to problems occurred in or related to the workplace or working conditions and did not intend to build a new product. The resulted product considered as small scaled and isolated projects which cannot used outside the organization, only UTOPIA and NCC that could be potentially distributed out.

To more understand the concept of early participatory design, Halskov & Hansen (2015) have summarized some fundamental aspects of participatory design generated from the core participatory design literature. The aspects are politics, user, methods, context, and product. In political aspect, users have the power to influence as they are affected by the system. The users' involvement made the process becomes political and is prone to conflict. The user aspect highlights the critical role of users as decision maker and expert. The method aspect focuses on the important of user's perception of technology and how user participate in prototyping to show their voices. The context aspect views the user's situation as the fundamental starting point for the design process. The product aspect provides a tool for users to support their work and enhance workplace skills, and design to respond users' needs.

5 Discussion

In 1993, Clement & Van de Besselar noticed that practice of participatory design has shifted from time to time; from practice in manufacturing industries (e.g.

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NCC) to participatory in office and service industries (e.g. SMOAP). The shifting continues until today as the participation is practiced differently by researchers in Indonesia. Participatory design projects during 70s-80s is strongly correlated to the workers' empowerment in the workplace or organization and related to a specific context. Meanwhile some research in Indonesia that have been collected focus merely on information system or digital product development. The users did not involve in analyzing and determining the importance of the system and how the system impact their work and daily life, but mostly involved in designing the prototype regardless the techniques (except for the project in indigenous community). This indicate that now the participatory design approach has shifted and cover wide range of definitions and practices.

Looking at the core aspect of participatory design summarized by Halskov & Hansen (2015) and the research in Table 1, all the research related to information system and product development only fulfill the aspect of user, method, and product aspect. Users in those projects have been provided with the user scenario and needs derived from questionnaire or interviews or focus group discussion before the design workshops. In the design workshop, the main task is to create the design prototype so that their influence is very limited to the design interface. The projects do not view the users' situation or workplace context as some of them conclude the needs based on the researchers' interpretation on the interview results (e.g. Asanti, 2018; Damayanti & Hariandja, 2015). The projects with the implicit paradigm that only showed prototype to be evaluated do not fulfill all aspect except the method. While project of indigenous community fulfills all aspects expect the user aspect as the researchers did brainstorming only within the team.

The diversity of participatory design as practiced in the research collected in this paper, the participatory design concept might be blurred or misunderstood as user centered design and interaction concept (Halskov & Hansen, 2015). It is because most of the research only pay attention to how generating good design regarding to usability and user interaction. If usability and good interaction are the main objective in designing the product, it will be suitable if the researcher use user centered design and interaction design theory instead of participatory design.

The user involvement in creating prototype is indeed correct based on participatory design, but the researcher should look closely on the importance of the involvement in determining the usability and interface design. To do that, the author suggest questioning and reflecting 'does the involvement affect the user's empowerment or democratize the users in the system/organization?'. If the utilization of participatory design is solely related to the usability and interface design without considering the aspect of political and context, in the long run the participatory design could be considered as one of the ways to design user

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interface and the borderline with the other design concept, such as user centered design and interaction design, would be more blurred.

Clement & Van den Besselaar (1993) acknowledge that participatory design was still isolated in the workplace or organization and far from self-sustaining process. They argue in order to survive in the long term, participatory design should be able to deal with ideological aspects of the broader organizational context. Robertson & Simonsen (2013) also argued that participatory design needs to reform in facing new challenges of technical, socio-economic, and political. Hence, they suggest the shifting strategy of participatory design: from engaging users and working on prototype to 'designing for continuous appropriation' to establish continuous and sustainable co-creation that pay attention to the complex relationship of technology and wider system of socio material relation which shaping the connection among people, objects, and process. To embody the shifting, participatory design should not only focus on problem solving but also deal with disagreement and controversial things because co-creation happens in heterogeneity.

The potential conflicts such as disagreement can result in creativity if they can be managed well (P. B. Paulus & Coskun, 2011). Regarding the implementation of participatory design in software or application design, the research focus can be shifted to how designer conducting design workshop in manifesting the participation instead of how participant design the user interface. The design workshop requires design facilitation as a practice to let participants share their voices and perspectives on the design process to solve complex problems (Mosely et al., 2021). By shifting to design facilitation practice, researcher can deeply explore the participants' role on creating solution holistically that cover could participatory design aspects.

6 Conclusion

The implementation of participatory design in information technology research is diverse and differ from its historical practice. The author collected IT research that utilize participatory design as the approach. Almost the implementations solely direct the participant to focus on usability and the interface design. While the historical practice suggests the core aspect such as politic, user, method, context and product, the research found in this paper only cover the aspect of user, method, and product. This can lead to blurry border line since usability and interface design are correlated to user centered design concept. Considering on opinion from the participatory design book author and the previous researcher, the participatory design needs to reform into co-creation practice include technology that connect the wider system of people, objects and processes. The

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author suggest that participatory design research in IT field should be more focused in the design workshop or facilitation which emerges as the way to solve complex problem.

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